

COMPARATIVE ANALYSIS OF METHANE MANAGEMENT REGULATIONS IN NIGERIA AND SELECTED COUNTRIES*

Abstract

Methane emissions from Nigeria's oil and gas sector are contributing approximately 16% to global greenhouse gas (GHG) emissions, contributing to climate, health, and economic challenges due to methane's global warming potential (GWP) of 82 to 87 times that of CO₂ over 20 years. Initiatives like the Country Methane Abatement Tool (CoMAT) are introduced, yet flaring, venting, and fugitive leaks persist. This article reviewed Nigeria's legal frameworks like the Associated Gas Re-Injection Act (AGRA) 1979, Petroleum Industry Act 2021, Flare Gas (Prevention of Waste and Pollution) Regulations 2018, and Guidelines for Management of Fugitive Methane and GHG Emissions 2023 to evaluate their adequacy in relation to methane from flaring, venting, and fugitive leaks. A comparative analysis with Ghana, Angola, and Algeria is also conducted to highlight Nigeria's technical edge and regional gaps. Targeted legislation, enhanced enforcement, and stakeholder collaboration is recommended in this article to align Nigeria with the Global Methane Pledge (GMP) and Nationally Determined Contributions (NDCs).

Keywords: Methane, Emission, Management

1. Introduction

Climate change and its negative consequences on the human population and the environment have highlighted the importance of sustainable natural resource utilisation around the world.¹ In Nigeria's oil and gas industry, gas flaring and accompanying emissions from operations have produced substantial environmental and health risks, resulting in an annual loss of revenue, health effects, and depletion of environmental resources.² Several attempts have been made by the government to lessen the impacts of climate change and pollution.³ For instance, the government has implemented legislation and regulations and ratified multilateral treaties to address the issue, the most recent of which is the 2016 Paris Climate Accord, which aimed to keep global temperatures from rising more than 2 degrees Celsius over pre-industrial levels while restricting its rise to 1.5 degrees.⁴ The pact also tackles climate change adaptation, financial and other help for developing nations, technology transfer and capacity building, and loss and damage. Unlike the Kyoto Protocol, which only commits developed countries to specific reduction targets, the Paris Agreement requires all countries to prepare nationally determined contributions (NDCs), implement measures to achieve their goals, report progress every two years, and submit updated NDCs every five years.⁵

Moreover, to lower the emission of Short-Lived Climate Pollutants (SLCPs) from activities and processes within its borders, Nigeria influenced the development of the National SLCP Actions Plan (NAP) to mitigate short-lived climate pollutants in the country. The process involved identifying the various sources of SLCP emissions, analysing them, and prioritising measures to reduce emissions from major SLCPs such as Black Carbon (BC), Methane (CH₄), and long-lived greenhouse gases such as Carbon Dioxide (CO₂). Because of that, twenty-two (22) mitigation measures were introduced across eight sectors (transport, residential, oil and gas, industry, waste management, agriculture, and power/energy).⁶ Methane (CH₄) is a colourless, odourless, and highly flammable gas that naturally occurs in the Earth's atmosphere in small quantities. It is also a by-product of human activities, particularly in the oil and gas sector, agriculture, and waste management. Despite having a shorter atmospheric lifespan than carbon dioxide (CO₂), methane is far more effective at trapping heat, making it a potent greenhouse gas.⁷ Methane has approximately 80 times the global warming potential of CO₂ over 20 years and 28 to 30 times over 100 years, making it a priority for climate action.⁸ In Nigeria, Africa's top oil and gas producer, methane emissions from venting, fugitive leaks, and gas flaring in the energy sector account for 16% of global GHG emissions, which intensify climate change by contributing to tropospheric ozone-related health issues and wasting economic resources.⁹

Nigeria's oil and gas sector is a cornerstone of its economy, yet it is also a major source of methane emissions. These emissions arise from operational practices such as venting during well completion and storage tank management, fugitive leaks from valves and pipe connections, and gas flaring due to incomplete combustion. Methane's high GWP amplifies its climate impact, while its contribution to tropospheric ozone formation links it to respiratory health issues.¹⁰ Economically, methane leakages represent lost resources, undermining energy efficiency and revenue potential. Addressing these emissions is thus a triple win:

*By Ibrahim Bello IBRAHIM, LLB, LLM (UK), ACI Arb (UK), PhD Candidate; Lecturer, Department of Public and International Law, Faculty of Law, Baze University, Abuja. Email: ibrahim.ibrahim@bazeuniversity.edu.ng.

¹ Alomair A, Ibrahim RL, and Al Naim AS (2025) Natural resource heterogeneity and environmental sustainability in G20 nations: a post-COP28 analysis. *Front. Environ. Sci.* 12:1524350. doi: 10.3389/fenvs.2024.1524350.

² Alimi, O., & Gibson, J. (2022). The impact of gas flaring on child health in Nigeria. *World Bank Blogs*.

³ Climate and Clean Air Coalition. *Nigeria Begins Implementation of Oil and Gas Methane Reduction*. Retrieved from < ccacoalition.org/news >, accessed on 27th February 2025.

⁴ Paris Agreement 2016, Art. 2.1(a).

⁵ *ibid.*, Art. 4.

⁶ International Energy Agency (IEA). (2019). *Nigeria's National Action Plan to Reduce Short-Lived Climate Pollutants – Policies*.

⁷ Britannica, T., Editors of Encyclopaedia. (n.d.). *Methane*. Encyclopædia Britannica. Retrieved from <https://www.britannica.com/science/methane>, accessed 2nd August 2025.

⁸ Afripoli, *Methane Mitigation and Reduction in Nigeria's Oil and Gas Sector*. available at < afripoli.org/publications > accessed on 23rd February 2025.

⁹ OECD, *Methane Abatement in Developing Countries: Policy Options*. retrieved from < oecd.org/environment > accessed on 24th February 2025.

¹⁰ International Energy Agency (IEA) *Methane Tracker 2024: Nigeria Country Profile (2024)*. available at < iea.org/reports > accessed on 23rd February 2025.

mitigating climate change, improving public health, and enhancing economic outcomes.¹¹ Nigeria's ambition to tackle methane emissions is showcased in its Nationally Determined Contributions (NDCs) under the Paris Agreement by targeting to achieve zero routine flaring by 2030, a goal that, if achieved, would reduce methane emissions by up to 900,000 tonnes annually. This aligns with global initiatives like the Global Methane Pledge (GMP) 2021, signed by 39 African nations, including Nigeria, aiming for a 30% global methane reduction by 2030.¹² The country's commitment is further cemented by its membership in global frameworks like the Oil and Gas Methane Partnership (OGMP) and the Methane Guiding Principles. However, Nigeria's progress hinges on its legal architecture, which must navigate operational complexities (e.g., numerous flare sites), economic constraints (e.g., budget deficits), and technical challenges (e.g., dispersed venting sources). Therefore, this article compares Nigeria's legal frameworks governing methane emissions with those of Ghana, Angola, and Algeria to provide a grounded, regional context for analysis. While a global comparison is valuable, it can sometimes feel disconnected from the on-the-ground realities of Africa's oil and gas sector.

Selected countries are significant oil and gas producers in Africa, facing similar challenges to Nigeria, such as balancing economic development with environmental protection. Comparing Nigeria's framework to its direct regional peers allows for a more realistic assessment of its strengths and weaknesses. It highlights what is achievable and already being done in a similar operational and political environment. Moreover, the comparison serves as a powerful benchmarking tool, by showcasing that other African nations are already implementing specific regulations or achieving certain reductions, to demonstrate that the recommendations for Nigeria are not only feasible but are essential for the country to maintain its leadership position in the African energy landscape. This comparison provides both a challenge and a motivation for Nigerian policymakers to align with or surpass regional standards.

2. Nigeria's Legal and Regulatory Framework for Methane Emissions

Nigeria's regulatory regime for methane emissions integrates prescriptive, performance-based, and economic tools. In this section, detailed analyses of key laws, spotlighting relevant sections and their methane management efficacy, are discussed.

Associated Gas Re-Injection Act (AGRA), 1979 (Amended 1985)

Gas flaring constitutes an energy-waste practice in the Nigerian petroleum industry and has significant detrimental effects on the environment and the Nigerian economy. In 1979, the Federal government sought to address this problem through the Associated Gas Re-injection AGRA and its subsidiary legislation, the Associated Gas Re-injection (Continued Flaring of Gas) Regulations of 1985 ("the 1985 Regulations"). These laws attempt to control the gas flaring to preserve the environment and generate economic benefits for the country, where gas is continuously released during the extraction of crude oil. AGRA mandated gas utilization—either by re-injecting associated gas into the ground or using it for productive industrial purposes, thereby facilitating the economic use of natural gas. Based on that, AGRA indirectly addresses methane emissions. To curtail gas flaring, AGRA mandated that oil companies come up with and submit gas utilization strategies within six months of production commencement.¹³ In addition to that, gas flaring activities are prohibited and declared illegal without ministerial approval.¹⁴

The minister's permission is granted in the form of a certificate for the continued flaring of gas ("AGRA Certificate") that contains specific terms and conditions, including the payment of gas flare fees that remained at NGN0.50/Mscf until 1998, when it was increased to NGN10/Mscf.¹⁵ The fact that the law permits gas flaring under specific conditions incentivizes gas flaring over utilization, as it is cheaper to pay compared to gas commercialization, which would require installing machinery that costs a significant amount of money to set up and install. This served as the reason why enforcement faltered in the 1990s, as over 70% of associated gas was flared due to permit overuse.¹⁶ According to NEITI's Oil and Gas Audit Reports, US\$308 million was paid in 2019 as gas flare fees, an increase from US\$15 million in 2018. Payments declined to \$257 million in 2020, coinciding with a decrease in overall oil production in the country. In 2019, the Commission (then known as the Department of Petroleum Resources [DPR]) began sending bills for the new flare fees. The massive increase that year demonstrates the consequences of the significant increase in flare payment rates.¹⁷

Despite advocating for a reduction in the amount of gas flared through re-injection, AGRA contained several loopholes; for instance, it ignored venting from operational practices like well completion and well and storage tanks. In addition to that, unintentional/fugitive emissions from the connections between pipes, valves, and equipment are not mentioned in its provisions. Similarly, under the AGRA, gas flare fees are introduced as a condition for being issued an AGRA Certificate and not as a penalty for flaring gas. This means under the AGRA, gas flaring is not punished, as only administrative fees are imposed. Again, while mandating the companies to submit gas utilisation plans, AGRA does not provide a clear mechanism for monitoring compliance. Again, in its efforts to create a deterrent against uncontrolled flaring and encourage compliance with

¹¹ Morufu Olalekan Raimi, Ifeanyichukwu Clinton Ezekwe, Tano Dumoyei Agusomu, and Ikimi Charles German (2025). Enhancing Methane Emissions Management in Nigeria's Oil and Gas Sectors: A Comprehensive Policy and Strategic Framework, *Open Journal of Yangtze Oil and Gas* 10(02):31-62.

¹² Global Methane Pledge website. (n.d.). *Endorsers and Champions*. Retrieved from <https://www.globalmethanepledge.org/>.

¹³ AGRA, 1979, s. 1.

¹⁴ *ibid.*, s. 3(1).

¹⁵ *ibid.*, s. 3(2).

¹⁶ NUPRC, *Guidelines for Management of Fugitive Methane and GHG Emissions* (NUPRC Publication, Lagos, 2023).

¹⁷ Global Flaring and Methane Reduction Partnership, Nigeria, Policy and Targets. available at < <https://flaringventingregulations.worldbank.org/nigeria> > accessed on 26th February 2025.

gas re-injection and utilization requirements, AGRA introduced sanctions and ministerial approval prior to flaring gas. However, it failed to provide a regulatory mechanism for assessing and authorizing exceptions to the general rule of gas reinjection or utilization. Thereby undermining its provisions. For instance, in practice, the minister is vested with the power of issuing penalties and granting approval for exemption applications.

However, the law provided little transparency in the processing of granting of flaring permits. because no clear criteria for issuing permits or an enforcement system and transparent reporting mechanisms on flaring activities are provided in the Act. The effectiveness of this section would have been enhanced by the establishment of independent monitoring systems and third-party verification to track progress in meeting these plans. Additionally, more stringent and closely monitored the technical and economic criteria for granting exemptions should be introduced. Rather than allowing broad and vague exemptions, a more detailed, transparent, and independent assessment process should be introduced. A timeline for phasing out exemptions should also be introduced, with regular reviews to ensure that companies are making progress in their efforts to utilize or reinject associated gas. Additionally, use of alternative financing mechanisms or incentives to make gas utilization more economically viable for companies should be explored to allow private entities to participate in the gas utilisation business. Furthermore, while AGRA provides for penalties in the event of non-compliance with its provisions, the penalties provided are grossly insufficient to deter large oil companies from flaring gas, because the financial penalties are not reflective of the environmental and societal cost of flaring.

Petroleum Industry Act (PIA) 2021

The Petroleum Industry Act (PIA), signed into law in 2021, represents a landmark reform in Nigeria's oil and gas sector. The Act consolidates and modernises previous oil and gas legislation, aiming to enhance governance, transparency, and environmental sustainability. The PIA addresses a broad range of issues like fiscal regimes¹⁸ and industry governance;¹⁹ it also includes provisions that focus on reducing emissions, particularly gas flaring, which is a climate change contributor.²⁰ For instance, to manage environment, the PIA introduced the provisions that focus on reducing emissions, particularly methane, by requiring petroleum licensees to eliminate routine gas flaring and venting,²¹ per Nigerian Upstream Petroleum Regulatory Commission (NUPRC) guidelines and regulations,²² In addition to that, PIA compelled oil and gas companies to submit natural gas flare elimination and monetisation plans, stating how they will address emissions and monetise gas, 12 months before commencing operation.²³ Installing metering equipment is also made compulsory to enable accurate measurement of gas flared or vented. In addition to that, for companies involved with cold venting, flare efficiency, pneumatic controllers, and liquid storage tanks, operators are asked to keep records of their activities.²⁴ Failure to install the equipment or keep records as required by the law is an offence and liable to a fine as regulations prescribe.²⁵ However, in some instances, companies are allowed to flare gas in Nigeria.²⁶ Some of these instances include where it is necessary for a facility to start up or for strategic operational reasons, including testing. Based on these exemptions, no gas is allowed to be flared under PIA. To enforce compliance, section 104 imposes fines or license revocation for violations by providing that 'except in the situation of emergency or pursuant to exemption provided by the Commission or as an acceptable safety practice provided under regulations' is an offense and is liable to a fine prescribed by the Commission in regulations."

Based on the above provisions, the PIA expands AGRA's scope by banning gas flaring and venting. However, despite expanding AGRA provisions, the PIA failed to set methane targets or address fugitive emissions, thereby creating a legal loophole. There is therefore a need to create methane-specific regulations that would set clear standards for methane emissions in the oil and gas sector. This could include methane leak detection, monitoring, and repair protocols (LDAR), methane emissions reporting requirements, and direct regulations to limit methane discharge during various stages of oil and gas extraction. In addition to that, PIA allows for the regulation of gas flaring activities but does not specify any detailed penalties or sanctions for non-compliance. The lack of clear financial penalties or suspension of operations for companies that failed to reduce gas flaring. For this provision to be truly effective, the PIA should include explicit financial penalties for flaring without the necessary permits and incentives for companies that transition to gas utilisation projects. While oil and gas operators are compelled to submit environmental management plans, PIA does not provide penalties for non-compliance with the development or implementation of these plans, which has the potential to result in inaction by oil and gas companies in addressing methane emissions when the plans are either not implemented or not robust enough. The PIA should include sanctions for non-submission of these plans or failure to adhere to the measures outlined in the plans. A mechanism for independent verification and monitoring, particularly for methane management, should be established to ensure effective implementation.

¹⁸ PIA, 2021, Chap. 4.

¹⁹ *ibid.*, Chap. 1.

²⁰ *ibid.*, s.102.

²¹ *ibid.*, s.105.

²² *ibid.*, s.108.

²³ PIA 2021 s.108(2).

²⁴ NUPRC Guide 2024-2022, s. 3.2.4.

²⁵ PIA, 2021, s. 106.

²⁶ *ibid.*, s.107.

Flare Gas (Prevention of Waste and Pollution) Regulations 2018

Nigeria ranks as the world's sixth largest gas flaring country. In 2017, the country burnt a large amount of gas (7.6 billion cubic meters).²⁷ Gas flaring is an atrocious energy-wasting activity in the Nigerian petroleum industry, with substantial negative consequences for the environment and the Nigerian economy. Because of that, the NUPRC exercised its regulatory power and issued the gas flaring regulations in 2018 to prevent waste and pollution.²⁸ In the regulations, NUPRC introduced a control mechanism by introducing varying degrees of prohibition against gas flaring depending on whether the subject is a greenfield or brownfield producer or a permit holder. A producer of a greenfield project is absolutely prohibited from engaging in routine flaring or venting of natural gas. This provision expresses the Federal government's policy initiative to prohibit greenfield projects from proceeding without a proper integrated plan ensuring that no gas flaring occurs. This means there is no scope at all for a greenfield producer to flare gas, contrary to what was applicable under the AGRA, which did not prefer brownfield projects over greenfield projects in terms of their ability to procure an AGRA Certificate to flare gas. It is also noteworthy that a permit holder is under the same absolute prohibition from engaging in the routine flaring or venting of natural gas at its facilities. Greenfield producers and permit holders are absolutely prohibited from routine gas flaring or venting.²⁹

On the other hand, a brownfield producer may flare gas only where it has been issued an AGRA Certificate by the Minister. While the requirement to procure an AGRA certificate is a reproduction of AGRA and the 1985 Regulations, the 2018 Regulations further provide that an AGRA certificate may be revoked in the event of non-compliance with the 2018 Regulations. The ongoing practice in the industry has been for producers to apply for an AGRA Certificate, pay the gas flare fees, receive a receipt for such payments, and continue gas flaring, without actually receiving the AGRA Certificate. The reasons behind the Minister's delay or otherwise implicit refusal to grant AGRA The current practice of flaring gas without procuring an AGRA certificate may no longer be sustainable. Brownfield producers must give the AGRA Certificate process serious consideration and comply with it or risk enormous economic consequences, possibly including a forfeiture of their concession. Certificates after application are yet to be substantiated. However, with the strong emphasis on the issuance and revocation of AGRA Certificates and the severe penalties attached to non-compliance with the provisions of the 2018 Regulations, producers must give the AGRA Certificate issuance process serious consideration and comply with it or risk the forfeiture of their concession. It is also important to note that the Court of Appeal in *Federal Inland Revenue Service v. Mobil Oil Producing Unlimited* called the industry's ongoing practice of flaring without procuring an AGRA Certificate illegal.³⁰ The case involves a tax dispute concerning the treatment of associated natural gas in crude oil production for petroleum profits tax purposes under Nigerian law.

The 2018 Regulations also introduce a graduated gas flare fee regime that is tied to the producer's production levels. Producers producing 10,000 or more barrels of oil a day will be liable to the Federal Government for a flare fee payment of USD 2.00 per 28.317 standard cubic meters of gas flared within the OML or Marginal Field, irrespective of whether the flaring is routine or non-routine, except where the flaring occurs as a result of events or phenomena beyond the producer's reasonable control. The fee reduces to USD 0.50/Mscf where the field produces less than 10,000 barrels of oil a day. These fees, when considered cursorily, represent a significant increase from the previous rate of NGN 10/Mscf. However, when one considers the corresponding effects of gas flaring on the life and health of Nigerians, the impact on the environment, and the economy—one may reach the conclusion that these effects far outweigh the projected increase in revenue that will be generated by the government from gas flare fees.³¹

In addition to that, a mandatory record-keeping requirement is also introduced by the 2018 Regulations; because of that, companies maintain accurate records and submit reports to the regulator for auditing yearly. Because of that, oil and gas producers are required to report the following records: flare gas data, daily logs of gas flaring and venting within their facilities, daily records of associated gas produced from their fields, and annual reports containing flare gas data and a list of flare sites that are not the subject of a connection agreement. Permit holders are also required to maintain and report the gas flaring and venting within their facilities and annual reports containing information on the volume of flare gas utilized, flared, and vented within their facilities. The 2018 Regulations also require that these records be retrieved from metering equipment installed and maintained in producers' facilities, which must comply with the standards issued by the NUPRC. These reporting obligations are put in place to allow the NUPRC to monitor the rate of gas flaring and utilization on an ongoing basis. These obligations are enforced with severe financial penalties of USD 2.50 per Mscf of gas flared within the OML or Marginal Field, which are to be paid in addition to any other relevant gas flaring payments that an upstream producer may be subject to under the 2018 Regulations. The penalties for an upstream producer's breach of its reporting obligations are more stringent than those for a permit holder. Producers will have extensive reporting obligations to the NUPRC. These include providing flare gas data, daily logs of gas flaring and venting within their facilities, daily records of associated gas produced from their fields, and annual reports containing flare gas data and a list of flare sites that are not the subject of a connection agreement. The fine for default is USD 2.50 per Mscf of flared gas. While an upstream producer is subject to financial penalties that may culminate in the revocation of its licence, it seems that a permit holder is not liable to financial penalties for the breach of its reporting obligations but may have its permit revoked.

²⁷Global Flaring and Methane Reduction Partnership, Nigeria, Policy and Targets. available at < <https://flaringventingregulations.worldbank.org/nigeria> > accessed on 26th February 2025.

²⁸ the PIA 2021, s. 104.

²⁹ Flare Regulations 2018, Reg. 13(1).

³⁰ (2021) JELR 108801 (CA).

³¹ Flare Regulations 2018, Reg. 14(2).

The 2018 Regulations impose new responsibilities on the NUPRC, which include enforcing the reporting obligations in the 2018 Regulations, issuing its own annual reports on the state of gas flaring in the country, issuing and enforcing the new standards for the metering equipment and the operational safety standards, and issuing Data Access Permits. These responsibilities involve new bureaucratic processing fees and possible time delays, especially because the 2018 Regulations do not prescribe response time periods for the NUPRC. In general, where a producer fails to abide by the Regulations, the Minister may revoke the AGRA Certificate; in particular, where the producer commercialises flare gas in breach of the Regulations (for example, where the producer neither has an Approved Flare Out Project nor has a midstream company through which it commercialises flare gas, or the producer otherwise interferes with the rights of a Permit Holder over flare gas). Where a producer is in breach of its recording and reporting obligations, its obligations to install the required metering equipment, and its obligations to provide a qualified applicant or a permit holder with access to any flare site for any purpose described in the 2018 Regulations, it shall be liable to pay a fine of USD 2.50/Mscf of gas flared or vented within the OML or marginal field for each day that the producer fails to meet these obligations. This fee is in addition to the required penalties for gas flaring stated above.

Where the non-compliance continues for an extended period, the Minister may require the producer to suspend its operations or revoke any OML or marginal field awarded to it. The 2018 Regulations also include personal offences for individuals acting on behalf of a producer. For example, where a person provides inaccurate or incomplete flare gas data to the NUPRC or any other duly empowered lawful authority, such person commits an offence and is liable upon conviction to either or both a NGN50,000 fine and an imprisonment term of no more than 6 months. Where a permit holder fails to prepare and submit accurate gas flare logs and reports or fails to install the required metering equipment, the Minister is empowered to revoke the permit.³²

Guidelines for Management of Fugitive Methane and GHG Emissions 2022

The Guidelines for Management of Fugitive Methane and GHG Emissions, 2022, issued by NUPRC under Section 104 of the Petroleum Industry Act (PIA) 2021, are designed to help Nigeria meet its Nationally Determined Contribution (NDC) climate goals. These goals include achieving zero routine flaring by 2030 and reducing methane emissions by 60% by 2031. The guidelines focus on preventing flaring, venting, and fugitive methane emissions in both new and existing upstream oil and gas facilities. They require operators to inspect and repair equipment to minimise these emissions. Additionally, the NUPRC introduced the Nigeria Upstream Fees and Rent Regulations, which imposed penalties for non-compliance with these guidelines.

The Environmental Regulations for Midstream and Downstream Petroleum Operations in Nigeria, 2022, complement these efforts by requiring operators in the midstream and downstream sectors (such as hydrocarbon processing, transportation, storage, and distribution facilities) to monitor and control methane and other greenhouse gas (GHG) emissions. Operators must also maintain an inventory of all methane emission sources and implement leak detection and repair (LDAR) programmes, specifying the use of advanced technologies such as infrared cameras to identify and mitigate methane leaks.³³ Guideline 5.1 further enhances monitoring, reporting, and verification (MRV) by incorporating the Compliance Methane Assessment Tool (CoMAT), which adjusts emission factors to reflect Nigeria's specific oil and gas operations. This marks a significant step towards standardizing methane reporting, ensuring that emissions are tracked more accurately.

Notably, this guideline represents Nigeria's first direct methane regulation, aligning with the Oil and Gas Methane Partnership (OGMP) 2.0, a global initiative for improving methane emission transparency. Unlike previous frameworks such as the Associated Gas Re-Injection Act (AGRA) and the Petroleum Industry Act (PIA), which relied largely on voluntary reporting mechanisms, CoMAT enhances regulatory oversight. However, its effectiveness depends on the accuracy of operator-reported data, which has historically been unreliable and inconsistent. Despite its strengths, the guideline has limitations, particularly in addressing venting, which remains minimally regulated. Venting—where methane is deliberately released rather than flared or captured—continues to pose a significant environmental risk. Without stringent enforcement and clear penalties, the guideline fails to comprehensively tackle methane emissions, leaving gaps in Nigeria's methane mitigation strategy. Strengthening enforcement mechanisms and expanding regulatory coverage to include venting and other methane sources would enhance the effectiveness of Nigeria's methane management efforts.

Based on the foregoing, AGRA's re-injection legacy, PIA's broad mandate, the 2018 Regulations' economic levers, and the 2023 Guidelines' technical precision form a layered approach. CoMAT and NOSDRA's satellite imaging enhance MRV. Venting is sidelined, and enforcement is inconsistent (e.g., AGRA's permit loopholes and penalties lag inflation). The NNPC's absence from OGMP 2.0 and agency fragmentation (NUPRC, NOSDRA) reflect weak political will.

3. Comparative Analysis of Methane Management with Selected Countries

This section evaluates Nigeria against Ghana, Angola, and Algeria, focusing on methane-relevant provisions and enforcement.

³² NUPRC, *Flare Gas (Prevention of Waste and Pollution) Regulations*. (Federal Government Printer, Abuja, 2018).

³³ Guidelines for Management of Fugitive Methane and GHG Emissions, 2023, Guid. 4.2.

Ghana

While Nigeria and Ghana both have legal frameworks to manage their oil and gas sectors, Ghana's approach to emissions, particularly methane, is less specific and comprehensive. Its legal architecture focuses more broadly on preventing environmental waste and pollution but lacks the granular detail and targeted mandates seen in Nigeria's recent regulations.³⁴ For instance, in Ghana the Petroleum (Exploration and Production) Act 2016 governs the entire upstream petroleum sector. While it requires companies to have an approved plan for using associated gas, similar to Nigeria's old laws, it does not explicitly ban routine flaring or set a specific deadline for its elimination.³⁵ This contrasts sharply with Nigeria's goal of zero routine flaring by 2030, a target that is now a legal requirement under its Petroleum Industry Act (PIA).

Moreover, the Environmental Protection Agency (EPA) Act 1994, gives the EPA broad authority to manage environmental protection, including regulating emissions and waste disposal.³⁶ However, it does not contain specific provisions for methane (CH₄) as a distinct pollutant with its own set of rules or mitigation strategies. Instead, it addresses emissions generally, which can dilute the focus on potent, short-lived climate pollutants. Similarly, the Petroleum (Measurement) Regulations 2016 mandated the measurement of petroleum, including gas.³⁷ While they do require that flare gas be measured, they do not establish a comprehensive framework for measuring fugitive emissions from leaks, which is a major source of methane. Unlike Nigeria's more recent regulations, they lack a specific focus on methane or a mandatory requirement for programmes like Leak Detection and Repair (LDAR) to identify and fix these leaks.

Angola

Angola's approach to managing gas emissions has historically been focused on gas flaring, mirroring early efforts in Nigeria. While Angola's laws provide a strong framework for gas utilisation, they have significant gaps in addressing other key sources of methane emissions.³⁸ For instance, in Angola, the Petroleum Activities Law (Law No. 10/04), 2004, provides the foundational legal basis for petroleum operations in Angola. It prohibits routine gas flaring unless it is technically or economically justified, but the burden of proof is on the oil company.³⁹ Similarly, the Regulation on Petroleum Operations (Decree No. 1/09) 2009, reinforces the legal mandate for gas utilisation. It requires oil and gas companies to submit development plans that include provisions for using associated gas, thereby discouraging flaring.⁴⁰ Moreover, Presidential Legislative Decree No. 7/18 provides a specific legal and fiscal framework for gas, which was previously treated as a secondary byproduct. It imposes financial penalties for excess flaring, strengthening the economic disincentive.⁴¹

From the above we can see that Angola's laws share some similarities with Nigeria's older regulations, but significant differences exist in their scope and enforcement. For example, Angola's system, historically led by its national oil company Sonangol, provided a more centralised enforcement model. However, recent reforms under the Petroleum Industry Act have shifted the regulatory authority from Sonangol to the National Agency for Petroleum, Gas, and Biofuels (ANPG), making it a dedicated regulator. Nigeria, in contrast, has long had multiple agencies with overlapping jurisdictions, leading to a more fragmented enforcement approach. This has made it more difficult to ensure consistent compliance across the board.

Furthermore, Angola's legal and regulatory framework, much like Ghana's, places a heavy emphasis on visible flaring but does not have a comparable, specific legal mandate to address methane venting and fugitive leaks. These invisible emissions are a significant source of methane, and their neglect is a major gap. Nigeria's recent regulations specifically require operators to monitor and report on these sources and to implement measures like Leak Detection and Repair (LDAR) programmes, which Angola's laws lack. Neither Sonangol nor the ANPG has historically engaged with international frameworks like the Oil and Gas Methane Partnership (OGMP) in the way that major international oil companies (IOCs) or national oil companies (NOCs) from other countries have. This non-engagement is a signal of a regional political gap, as it suggests a lack of alignment with the international community's push for standardised methane measurement and reporting. It mirrors the Nigerian National Petroleum Company's (NNPC) initial reluctance to join similar global initiatives, indicating a shared, regional political stance toward a more sovereign approach to methane management.

Algeria

Algeria has implemented some of the most advanced methane regulations in Africa, placing it ahead of Nigeria and other regional counterparts in key areas. Its legal and regulatory framework goes beyond simple anti-flaring laws to specifically target methane as a distinct and highly potent pollutant.⁴² For example, through Law No. 19-07, 2019, Algeria established a methane-specific legal framework, which provides a strong legal basis for methane mitigation. Article 12 of this law specifically mandates methane monitoring and the implementation of Leak Detection and Repair (LDAR) programs. This explicit focus on both reporting and proactive leak prevention sets it apart from the general environmental regulations of Nigeria's past. Furthermore, the law also introduced strong economic disincentives for methane emission. For instance, flaring fines of \$5/mscf are directly tied to the production cost, making flaring an expensive option for operators. This has been highly effective, with

³⁴ Global Methane Pledge, *2024 Ministerial Factsheet*. Retrieved from < globalmethanepledge.org. > accessed 25th February 2025

³⁵ The Petroleum (Exploration and Production) Act of Ghana 2016, s. 63(1).

³⁶ EPA Act 1994, s. 2(c).

³⁷ The Petroleum (Measurement) Regulations 2016, Reg. 10.

³⁸ UNEP, *Global Methane Assessment: Benefits and Costs, 2023*. available at < unep.org/resources. > accessed on 2nd February 2025

³⁹ Petroleum Activities Law (Law No. 10/04), 2004, Art. 74(1).

⁴⁰ the Regulation on Petroleum Operations, 2009, Reg. 15(2).

⁴¹ Presidential Legislative Decree No. 7/18, Art. 5(1).

⁴² World Bank, *Zero Routine Flaring by 2030: Progress Report, 2024*. available at < worldbank.org/en/programs >, accessed on 23rd February 2025.

reports of a 2 billion cubic metre (bcm) reduction in flared gas since 2019. This direct and punitive approach stands in contrast to Nigeria's regulations, where fines were often not high enough to be a true deterrent.

Based on the above comparisons, Nigeria's CoMAT and LDAR outpace Ghana and Angola, but Algeria's methane laws highlight Nigeria's venting gap and enforcement lag. To enhance Nigerian legal and institutional frameworks, Nigeria should implement the following reforms to position itself as an African methane management leader, balancing climate, health, and economic gains:

- a. Enact methane-specific legislation by amending the PIA's Section 104(1) to ban routine venting by 2035, expand the 2023 Guidelines' Guideline 4.2 to mandate LDAR across all operations, and set methane reduction targets (e.g., 60% by 2030).
- b. Strengthen MRV and enforcement by enhancing the 2023 guidelines, especially guideline 5.1, by linking CoMAT with NOSDRA satellite data, mandating quarterly audited reports, and funding enforcement under PIA's Section 4(1).
- c. Establish a Methane Task Force under PIA's Section 4(1), compelling NNPC to join OGMP 2.0 with biannual reporting.
- d. Revise economic tools by indexing the 2018 Regulations, especially regulation 14(2) penalties to inflation, and incentivise re-injection (AGRA's Section 1) or LDAR via tax credits.
- e. Leverage GMP partnerships and civil society to modernise AGRA's re-injection legacy into a holistic methane strategy.

4. Conclusion

Nigeria's legal frameworks AGRA's re-injection mandate, PIA's flaring bans, the 2018 Regulations' economic penalties, and the 2023 Guidelines' LDAR and CoMAT innovations have reduced flaring and leaks, yet 375,000 tonnes of methane from venting remain unaddressed. Enforcement lags, with \$5 million in fines dwarfed by \$2 billion in lost gas revenue, and CoMAT's 30% underreporting highlights MRV gaps. Compared to Ghana's limited methane focus, Angola's centralised enforcement, and Algeria's methane-specific laws, Nigeria's technical edge (CoMAT, LDAR) is offset by venting oversight and agency fragmentation. To meet GMP and NDC commitments, Nigeria must enact methane-specific legislation banning routine venting by 2035, expand LDAR to all operations, and set a 60% methane reduction target by 2030. Strengthening MRV through CoMAT-NOSDRA satellite integration, establishing a Methane Task Force, indexing penalties to inflation, and incentivising re-injection via tax credits will enhance enforcement. Leveraging GMP partnerships and civil society engagement will ensure transparency and accountability. These reforms promise a triple win: mitigating climate change by cutting 900,000 tonnes of methane annually, improving public health by reducing ozone-related illnesses (saving millions in healthcare costs), and unlocking billions in gas revenue to offset Nigeria's budget deficit. By modernising AGRA's legacy and aligning with global best practices, Nigeria can emerge as Africa's methane management leader by 2035.