CENTER FOR GLOBAL DEVELOPMENT

Nigeria: How Emissions Reduction Can Unlock Government Revenues

KATHRYN McPHAIL · ETIENNE ROMSOM

Abstract

The wasteful flaring and venting of gas associated with oil and gas production and processing is a persistent problem, leading to lost taxable income and reduced energy efficiency and access, adverse health impacts, and global warming. Nigeria is of particular interest since it is Africa's leading oil producer and the world's eighth highest flarer. The paper documents the scale and value of Nigeria's flaring, the reasons for its persistence, and the opportunity to capture the lost value. In 2024, the value of this wasted flare gas was around USD1.6 billion (and more if all exported at world prices); together with the value of vented gas, the lost value is the equivalent to some one percent of GDP. The paper places in the broader context the findings from a companion paper that analyzes the continued excess flaring of five super-emitter flares operated by international oil companies. Gaps in regulation, enforcement, measurement, and transparency are identified. Building on reforms undertaken by the Nigerian government, the paper sets out practical solutions to capture the value of the wasted gas through policy changes, including independent measurement, greater transparency, gas monetization, and fiscal and regulatory measures. Focus is placed on the opportunity for a methane fee and rebate scheme to incentivize companies to reduce flaring. The potential roles for various stakeholders are set out. A proposed next step is to develop a detailed government revenue model for flare and vent gas monetization options, potentially with IMF support, and in consultation with government, companies, and other stakeholders.

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EnergyCC

To assess the emissions performance of these Nigeria assets, data provided by VIIRS Nightfire (VNF) satellites were used as a diagnostic tool to measure and assess flares (Elvidge, Christopher D., Mikhail Zhizhin, Feng-Chi Hsu, and Kimberly E. Baugh. "VIIRS nightfire: Satellite pyrometry at night." Remote Sensing 5, no. 9 (2013): 4423–4449). This work has been made possible with the welcome support from the Earth Observation Group, Payne Institute for Public Policy.

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EnergyCC works collaboratively with public, private, and civil society organizations on the energy transition. In 2019, EnergyCC developed a methodology to reduce methane emissions from the energy sector (https://doi.org/10.35188/UNU-WIDER/2021/940-2).

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Foreword

Gas flaring and venting – the burning or release of natural gas associated with oil and gas production and processing – wastes some 8 percent of global gas production, a loss worth over USD100 billion annually. This practice is responsible for roughly one quarter of methane emissions from human activity that contributes to global warming, and the health consequences of poor-quality flaring are severe. Nonetheless, the extent of the waste and the harmful effects are largely invisible in global policy discussions.

The case of Nigeria is especially notable, since there is a multibillion-dollar opportunity to increase taxable income while increasing energy access and reducing adverse health consequences. Africa's largest oil producer and liquefied natural gas (LNG) exporter, Nigeria ranks eighth in the world for gas flaring. In 2024, the value of this wasted flare gas was around USD1.6 billion and together with the value of vented gas the lost value is equivalent to about one percent of GDP. Earlier progress in reducing flaring from extremely high levels stalled in the past decade and existing regulatory policies are proving insufficient to stem emissions. Understanding the reasons why, and highlighting the needed policy response, is important for Nigeria as well as for other oil-producing countries.

The paper documents the scale and value of Nigeria's flaring, the reasons for its persistence, and the opportunity to capture the lost value. By analyzing Nigeria's oil production and detailed satellite data on flaring, it places in a broader context the findings from a companion paper that documents the continued excess flaring of five super-emitter offshore flares operated by international oil companies. The paper outlines practical solutions, including independent measurement, greater transparency, gas monetization, and fiscal and regulatory measures. A particular focus is the proposal to introduce a performance-based methane fee and rebate scheme that would disincentivize flaring.

An important element in the development of this paper was the stakeholder consultation process. For government, meetings at start and end of the project were held with officials from the Nigerian Federal Ministry of Finance. The Ministry valued the initial findings, requested further analysis, and helped provide focus on implementation requirements for the methane fee and rebate scheme. IMF staff who develop and provide fiscal policy advice were consulted. International oil and gas companies – Chevron, ENI, Exxon, Shell and TotalEnergies – who are responsible for the emissions, received draft papers for their comment. The Natural Resource Governance Institute, working with the Nigeria Extractive Industries Transparency Initiative on mandatory corporate reporting, incorporated project findings into its Emissions Monitoring and Accountability Tool (EMAT). We hope that this paper will help spur policy action to curb emissions. A first step would be to develop a detailed government revenue model for flare and vent gas monetization options, potentially with IMF support, and in consultation with government, companies, and other stakeholders.

This paper is part of a broader CGD-EnergyCC research project examining the case for fiscal and regulatory measures to reduce gas flaring and venting in oil and gas producing countries. It is one of two papers dealing with Nigeria. Its companion paper – *Nigeria's Super-Emitter Flares* – analyzed the performance of five offshore super-emitter flare sites and found that existing regulatory and financial incentives had not fostered good quality field operations to minimize flaring and optimize oil reserves. An earlier literature review synthesized the evidence on the human health impact of gas flaring, including in Nigeria. Two related blogs – COP30: Learning from Brazil's Experience Limiting Gas Flaring and Gas Flaring: A $100 Billion Problem with a Policy Solution – set out the project's core argument: that eliminating wasteful flaring is not an intractable technical problem but a policy failure, and that well-designed fiscal measures can simultaneously generate government revenue, improve public health, and advance climate commitments. This paper contains further valuable evidence of the costly and persistent failures of governance and enforcement, and proposes practical solutions that can help Nigeria and, by example, many other countries.

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Summary

Capturing the value of Nigeria's wasted energy is a multibillion-dollar opportunity. Despite earlier successes, Nigeria's amount of natural gas wasted through flaring has been increasing since 2022 and reached USD 1.6 billion in 2024. Including emissions from venting the losses amount to some 1% of GDP.

Solutions exist today to address Nigeria's natural gas flaring and venting challenge and create a win-win for human health, energy access, and increased government revenues. An integrated framework is proposed that combines: 1) emissions measurement, 2) transparency, 3) gas monetization and 4) regulatory and fiscal measures.

Part of the solution framework is the introduction a performance-based methane fee and rebate scheme that incentivizes companies to reduce emissions by charging a fee for emissions above a certain threshold, while rewarding companies with rebates for keeping emissions below this benchmark. A key advantage is that it puts the accountability for emissions measurement squarely with the oil and gas operators. This resolves current institutional gaps on data reporting and disputes on emission volumes.

Companies currently classify persistent "flaring to produce" as "non-routine". This allows major volumes of avoidable flaring to sit outside zero-routine-flaring commitments. Independent regulatory verification is essential; satellite measurements provide complementary validation. A flaring assessment methodology is proposed that assumes continuous flaring is routine and incidental flaring is non-routine (for safety only) flaring.

Any fee pricing mechanism to discontinue routine flaring and venting needs to be carefully balanced and implemented to avoid undue disruption to oil and gas production, or compromise safety. Pricing should be balanced to be affordable, while also making it more attractive to invest in gas monetization than to flare and vent the gas. In addition, the Ministry may consider facilitating opportunities (such as third-party infrastructure access) to gather and transport remote natural gas to demand sources. Enabling partners, such as the IMF, are well placed to provide funding and technical assistance to implement the methane fee and rebate scheme that originated within the IMF. A proposed next step is to develop a detailed government revenue model for flare and vent gas monetization options, potentially with IMF support, and in consultation with government, companies and other stakeholders.

Nigeria's gas economy is growing: NLNG is expanding and the Yoho field is being redeveloped from an oil field into a gas field using Nigeria's first Floating LNG (FLNG). Such investments benefit from less gas wastage. The total amount of gas flared in Nigeria fits within the current NLNG capacity unutilised (utilisation was 58% to 66% in 2023–2025). The Yoho FLNG could have benefited from an additional USD 950 million of additional gas sales if this had been reinjected and preserved instead of flared.

Reviews and feedback

In preparation for publication of this work, draft copies of the paper were sent for Center for Global Development internal and anonymous external peer review. Draft versions of the paper were also sent for comments to the Government of Nigeria (Federal Ministry of Finance) and the following companies: Chevron, ENI, Exxon, Shell, and TotalEnergies.

We are grateful for the feedback received on our work through discussions and written comments. The Nigerian Government has helped to provide focus on the implementation requirements for the methane fee and rebate scheme. We have reflected this input in the final version of the paper. The five companies acknowledged to having received the draft paper and two companies (Shell and TotalEnergies) have sent substantive written comments. Exxon and Chevron appreciated the opportunity for review and to be consulted, and declined to offer comments.

Additional information provided by Shell and Total has been incorporated in the final version of the paper. Both companies mentioned using voluntary GFMR definitions to define their routine flaring emissions. The authors maintain that routine flaring needs further restraint beyond the GFMR definition that addresses only 30 percent of companies' reported flaring.

To effectively reduce flaring and venting emissions, there is a clear need for deeper dialogue between industry players and governing bodies to align their measures and strategies. The OGDC-2025-Status-Report.pdf highlights challenges in aggregating companies' GHG emissions data, having "different starting points, reporting practices and requirements, be they regulatory, shareholder/stakeholder expectations or historical corporate practices".

It is encouraging to note that "TotalEnergies supports performance standards based on robust monitoring, reporting and verification frameworks and policies to measure and reduce methane emissions. TotalEnergies considers that such policy frameworks should also take into account the imperatives of energy security and affordability. As such, TotalEnergies supports the development of regulations that aim to reduce methane emissions sector wide ….". Meanwhile, "Shell advocates putting a direct price on carbon emissions as part of a broader policy framework to achieve net-zero emissions. Additionally, market-based mechanisms, such as an emissions trading system, incentivise decarbonisation at the lowest cost, and support the long-term development of a global carbon market." It is the authors' view that voluntary measures for emissions reduction have to date not delivered on their promise. Moreover, financial mechanisms to incentivize flaring reductions at source (such as the methane fee and rebate scheme) are more effective and directly beneficial for countries, such as Nigeria, where such emissions occur.

1. Introduction

Nigeria is forgoing billions of dollars in taxable energy value every year while facing continuing fiscal pressure and energy shortages. This observation is based on a joint project between Center for Global Development (CGD) and EnergyCC to provide the evidence, policy recommendations, and institutional underpinnings needed to help countries capture these gains. Developing a handbook and template for coordinated action by the IMF with its 60+ oil and gas producing countries is one of the goals of the project.

Nigeria is Africa's largest oil producer and liquefied natural gas (LNG) exporter. Its oil and gas sector contributes about 85% of exports. Yet, Nigeria is one of the world's largest gas-flaring countries.[1] As a result, it is losing an opportunity to increase government revenues, improve the balance of payments while increasing energy efficiency and access, and mitigate adverse health and climate outcomes.

The case of Nigeria holds valuable lessons, since on the one hand it has demonstrated substantial reductions in gas flaring over a decade, while on the other it has shown the challenges to making further progress more recently. From a very high level of 21.4 billion cubic meters (bcm) flared in 2005, the world's second highest, Nigeria successfully reduced flaring by 66 percent between 2005 and 2015 but has seen limited progress thereafter. Nigeria still faces significant, and now rising, gas flare volumes. From the recent low point of 5.4 bcm in 2022, gas flaring increased to 6.6 bcm in 2024, making Nigeria the world's eighth highest emitter.

This paper explores the scale and value of Nigeria's flaring, and the reasons for its persistence. It sets out the opportunity to capture the value of the wasted gas through policy changes, including the introduction of a methane fee and rebate scheme, and stakeholder action.

The paper is structured as follows:

Section 2 presents the key findings of a study in a companion paper "*Nigeria's super-emitter flares – an updated evaluation of trends and causes of natural gas wastage*"[2] which documents five Nigeria offshore global super-emitter flares and their related field performances (2012–2026). The paper evaluates progress made by the international oil companies (IOCs) on their commitments made, highlighting noteworthy developments for each of these five offshore assets.

Section 3 provides the broader context of Nigeria's flaring performance, describing the progress made historically, the scale of the problem now facing Nigeria, and the size of the opportunity if flaring is curtailed. It includes an analysis of Nigeria's overall flaring performance since 2012. Following a request for such an exercise by the Nigerian Ministry of Finance, an estimate is made

1 Natural gas flaring is the disposal of unwanted natural gas by burning. It happens mostly when natural gas (methane) is produced as a by-product of oil extraction. Flaring may occur for a variety of technical, economic, or safety reasons.

2 https://www.cgdev.org/publication/nigeria-how-emissions-reduction-can-unlock-government-revenues.

of the value of wasted gas in 2024 from all of Nigeria's 180+ flares, both onshore and offshore, giving an idea of the opportunities for generating taxable income by reducing flaring.

Section 4 examines why the problem of flaring persists and identifies ways in which shortcomings can be overcome, identifying a number of gaps in regulation, enforcement, measurement and transparency.

Section 5 sets out practical solutions for public-private sector action, including independent measurement, transparency, gas monetization, and fiscal measures. Particular focus is placed on the opportunity for a methane fee and rebate scheme to incentivize companies to reduce flaring. Expanding on the economic, fiscal, and regulatory reforms of 2023–2026, the proposed actions will turn wasted gas into additional revenue. This commercialization supports the government's objectives to boost internal revenues and improve the balance of payments – would contribute to the government's ambition to bolster domestic revenues and strengthen the balance of payments. It sets out benefits that would accrue to the Ministry of Finance, the Nigeria Revenue Service, and the NUPRC.

Section 6 shows how these solutions can be enabled by partners, including those providing technical assistance and capacity support.

Section 7 concludes by highlighting the importance of policy action to reduce flaring, and placing Nigeria's example in the context of the opportunities globally.

Two aspects of the origins and sources for this work should be noted. First, the study of the five super-emitter flares as part of the Center for Global Development-EnergyCC project is a follow up to a 2023 study by EnergyCC published by Oxford Policy Management Limited (OPM).[3] The earlier study documented the natural gas flaring performance of five offshore super-emitters operated by IOCs during 2012–2022. At their peak, the assets contributed a third to Nigeria's oil production (2016) and 14% of its overall gas flaring (2017). Designed for zero routine flaring, these five assets were nevertheless classified as global super-emitters, flaring large amounts of gas routinely. Their levels of emissions and natural gas wastage would not be tolerated in many other regulatory environments. EnergyCC sent the 2023 study in draft to the Nigeria National Petroleum Company (NNPC) and to Chevron, ENI, Exxon, Shell, and TotalEnergies for comment, before publication. ENI, Shell, and TotalEnergies responded, but did not question the methodology or findings. Instead, they committed to reduce flaring; improve emissions measurement; and, for ENI, to account for emissions by an accredited third-party. The present follow-up study assesses the extent of progress made since.

Second, EnergyCC conducts its own analysis of gas flaring from publicly available satellite data sources. The flaring data therefore differ in some respects from other reports. For example, EnergyCC global data coverage includes satellite data on flaring from downstream oil and gas

3 https://energycc.com/news/energycc-major-studies-on-nigeria-super-emitters-published-by-oxford-policy-management.html.

operations that are not included in the World Bank's Global Gas Flaring Tracker Report. In 2025, The Earth Observation Group (EOG) updated its Visible Infrared Imaging Radiometer Suite (VIIRS) Satellite Flaring data processing of daily satellite measurements of global flares since March 2012, to enhance the quality of flare location and volume estimates. EnergyCC's earlier flare assessment analytics, accessing EOG's VIIRS Nightfire (VNF) satellite database with 10,000 flares globally, was revised to take account of these changes. Combined with other data sets, including for oil production and price information, this satellite data allows quantification of key indicators, including flare volumes and flare intensity, as well as estimates of gas and oil value loss based on calculations of flare variability, routine flaring, and links between flaring and oil production decline.

2. Updated evaluation of Nigeria's super-emitter flares – key findings

The updated evaluation of the performance of five selected offshore super-emitters through H1 2026 offers insights into why gas flaring remains a persistent problem; and by implication what needs to change to incentivize corrective action to monetize the value of oil and gas that is otherwise wasted. For these mature assets, with oil production declining over time, offshore flaring is not simply an issue of wasted gas: it is an indicator of operational reliability, good reservoir management, and governance quality.

EnergyCC's 2023 report included commitments made by IOCs to reduce flaring; these have not consistently delivered results. Between 2022 and 2025, the five offshore assets reduced gas flaring by about 21%, even as Nigeria's national gas flaring increased by around 30%. When compared to the 2020–2022 period, outcomes for 2023–25 vary widely. Bonga and Agbami show flaring reductions of 77% and 57%, respectively. Abo's shutdown in 2023 and compressor upgrade did not deliver significant flare reductions (6%); Usan's flaring increased (8%), while Yoho also increased (25%).

1. **Operational reliability is a major determinant of flare outcomes**. The updated analysis shows that meaningful flare reduction depends on reliable field, facility, and reservoir management, as much as on formal flare reduction commitments.
2. Except for Bonga, that exports its produced gas to Nigeria Liquefied Natural Gas (NLNG) plant, all assets show a persistently high rate of flaring, **reflecting operational weakness. The evidence reinforces the notion that good reservoir management**, in particular low Gas-Oil Ratio (GOR) production, is critical **to maximize asset value, optimize ultimate oil recovery, and avoid routine gas flaring.**
3. Gas flaring is **often a continuous intentional production practice** (not just safety related) **even for assets designed for zero routine flaring. However, when** operators can classify **'flaring to produce' oil as 'non-routine flaring**', their efforts to reduce routine flaring are weakened. To address this, the *Nigeria's super-emitter flares* report provides a practical method to measure routine flaring when defined as all flaring except for safety reasons.

4. Flare intensity is a measure of energy loss as a percentage of crude energy produced. **Both the value of gas volumes flared as well as gas flare intensity are critical influences on government revenues and efficient energy utilization**. The project developed and tested a conceptual gas flare life cycle model that helps show the link between **flare intensity and oil production decline.** Flaring can represent a loss of both gas value and oil value (in USD) as high flare intensities are correlated with high oil decline rates (correlation coefficient = 0.64 for the 5 assets combined).
5. **Satellite-measured flare data compared well with monthly reported flare data** (a Goodness of Fit of 94.5% for the combined data from four assets, for which reported flare data could be retrieved),[4] indicating the capability to cross-check from the two sources.
6. **Commercial and regulatory uncertainty** can discourage maintenance and investment, and lead to reservoir overproduction, which in turn contributes to higher flaring with avoidable operational and environmental impacts.

The *Nigeria's super-emitter flares* paper also shows noteworthy developments:

- **Bonga** (Shell) shows the strongest improvement with about 77% reduction in flare volumes during 2023–2025 compared to 2020–2022, while oil production increased. Flare rates fell sharply after 2022 following repairs and operational improvements.
- **Agbami** (Chevron) also reduced flaring significantly during 2023–2025, with 57%, although flaring rose again in late 2025 and early 2026 during and after major maintenance and compressor commissioning.
- **Abo** (ENI) and **Usan** (Exxon) show little or no meaningful improvement in flare rates.
- **Yoho** flaring worsened (with 56% increase in 2023–2024 compared to 2020–2022) before ExxonMobil transferred operatorship to Seplat in December 2024. Yoho then showed a reduction in flaring (a decrease of 45%), but the asset was 'shut in' after a fire in September 2025.

These examples provide evidence that companies can improve performance. Bonga is no longer classified as a super-emitter flare, while Agbami has also reduced its overall gas flaring. The better relative performance of Bonga between the five super-emitters may stimulate action within the companies, motivated to demonstrate similar operational performance improvements.

The *Nigeria's super-emitter flares paper* shows that early flare reduction should be incentivized because once gas breakthrough occurs, reservoir pressure loss and high gas-oil ratios are established, the production lost through flaring becomes harder, and sometimes impossible, to recover.

In the following sections, further findings about *Nigeria's super-emitter flares* are shared, starting with the significant economic value that Nigeria loses each year from large volumes of oil and gas not being monetized.

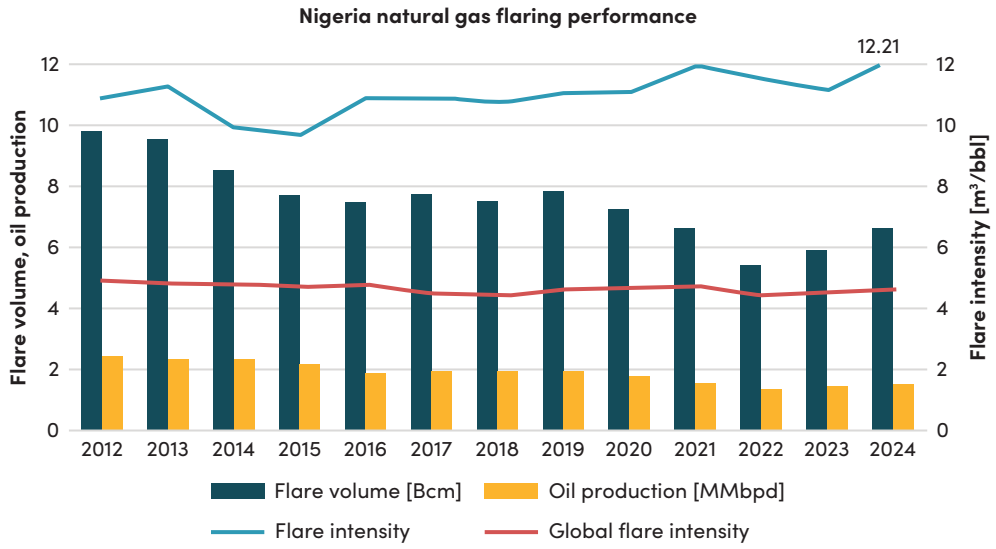
4 'Goodness of Fit' methodology based on the Dynamic Time Warping (DTW) method is described in the *Nigeria super-emitters flares* paper in Appendix A. A 95.4% Goodness of Fit indicates an average relative error of 5.6% between VNF satellite measurements and oil company reported flare rates.

3. The scale of the problem and the size of the opportunity

Despite Nigeria's earlier success, natural gas flaring is increasing, not decreasing. The quantity and value of the consequent waste can be estimated, indicating the scope of the opportunity to tap additional sources of revenue income.

Between 2005 and 2015, Nigeria cut gas flaring significantly by 66%. However, from 2015 onwards, further reductions slowed then stalled (Figure 1). In 2022, Nigeria's annual gas flaring was the lowest it had been (5.4 bcm) at that point. It then increased in 2023 to 5.9 bcm, and again to 6.6 bcm in 2024. The 23% increase in flaring compares with a 15% oil production increase over the same period. Hence flare intensities have also been rising, and – as illustrated in Figure 1 – are far higher than the global average. Nigeria's *super-emitter flares report* (Figure 1) shows that Venezuela, Iran, Libya and Iraq each have higher flare intensity than Nigeria, with Russia, Canada, US, and Saudi Arabia each having lower flare intensity. Despite gas flaring being legally banned since 1984 and regulatory penalties being in place[5] flaring remains continuous and widespread. In 2024, Nigeria is one of the highest contributors to global gas flaring (ranked eighth). It is also ranked as the top or second such country in the global portfolios of most of the five IOC offshore operators.[6]

FIGURE 1. Nigeria country natural gas flaring and oil production performance 2012–2024



Notes: Author's illustration, flare data from VIIRS, oil production data from NUPRC.

5 See Appendix Box A.
6 See Appendix Box B.

Nigeria's historic success in reducing flaring in the decade from 2005 illustrates the efficacy of the measures taken then while also – given the subsequent stalling – pointing to the need for a more comprehensive set of actions. Many efforts contributed to the earlier success, including the ten-year UK FCDO funded Facility for Oil Sector Transparency and Reform (FOSTER) programme which strengthened regulatory policies.[7] For example, FOSTER supported the drafting of Nigeria's gas policy and fiscal policies to increase flare penalties. There was innovative use of technologies and transparency measures, including Nigeria's 2014 pioneering Gas Flare Tracker, supported by FOSTER and the environmental regulator, NOSDRA.[8] Despite these efforts, independent satellite data confirm gas flaring remains a large and urgent challenge. Moreover, with gas prices and energy demand rising globally, the opportunity to capture the value of the wasted energy remains very large.

The Ministry of Finance expressed strong interest in this current updated study of super-emitter flares, which they stated "*would be invaluable for the Federal Government*". They were also interested more broadly in the opportunities to increase Nigeria's revenue from gas now wasted. At their request, an analysis of Nigeria's total volume and value of gas flaring by asset in 2024 was prepared. This shows that flaring to produce oil wastes gas sales valued at USD 1.6 billion/year (roughly 0.6% of GDP).[9] This is forgone taxable gas revenue; though not all proceeds would flow to the government, the monetization of this wasted gas would support the government's efforts to increase federal tax revenue collections that were only about 5 % of GDP in 2024.

This natural gas value loss calculation is based on EnergyCC's analysis of satellite data for Nigeria's 182 active flares. Half of the commercial value is obtained by focusing on the 28 largest flares (Figure 2). If the assumption is changed to assume that all of the wasted gas is sold for LNG export, the taxable gas revenue increases to USD 2.3 billion (about 0.9% of GDP) since export prices are far higher than domestic prices.

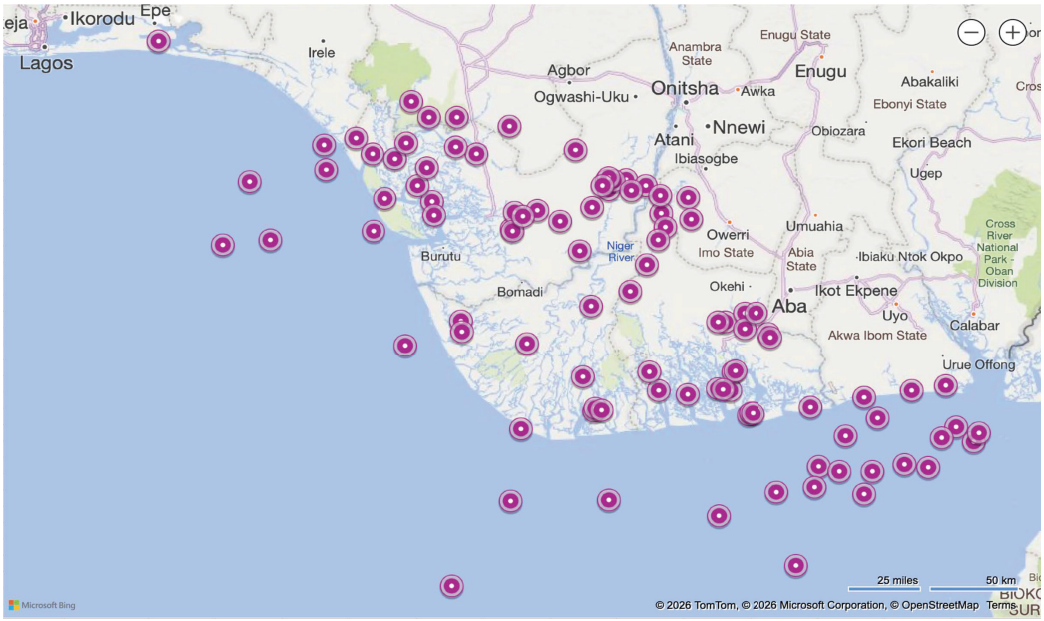
7 EnergyCC's 2023 super-emitter flare studies with OPM were funded by the FOSTER programme.

8 https://www.cgdev.org/event/practical-action-methane-emissions-how-imf-and-others-can-help.

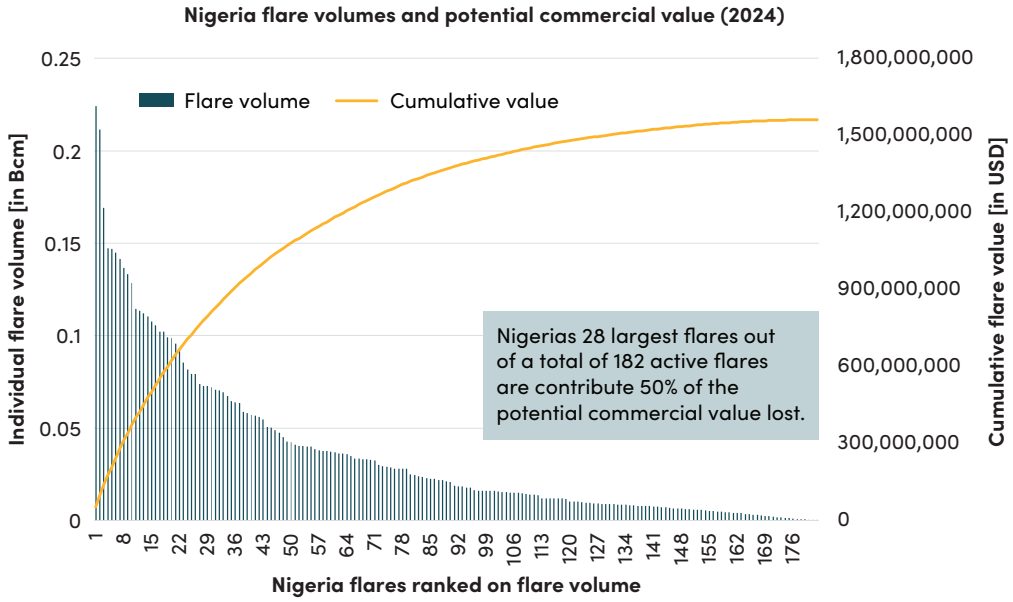
9 The valuation assumes that half would be sold on the domestic market at a gas price of USD 2.92/MMBtu, and half sold for LNG export at a price of USD 9.306/MMBtu, making allowance for gas used in the liquefication process.

FIGURE 2. Nigeria gas flares and value loss ranked by size

Nigeria's top-100 flare locations (2024)



Creaming curve of Nigeria flare volumes and $-values



Flare values assume gas monetisation based on 50% domestic and 50% export markets

Notes: Author's illustration, flare data from VIIRS, oil production data from NUPRC. Valuation assumes 50% of flared gas could be monetized as domestic gas and 50% supplied for LNG export.

The *Nigeria's super-emitter flares evaluation* demonstrates that gas flaring has led to revenue loss, sustained over many years. Over their operational lives to date the five offshore assets have wasted gas valued at about USD 4.34 billion, if monetized through LNG at USD 10/MMBtu. This ranges from USD 473 million (Bonga) to USD 1.01 billion (Agbami), with Abo, Usan and Yoho having flared about

USD 950 million each. Not only was persistent flaring observed, but the reasons were also analysed: a major factor is that 'flaring to produce oil' appears to be condoned to sustain oil production, even when equipment failures occur.

The calculated loss of value from gas flaring, associated with oil production, is just part of the waste. One must add the value of gas (mainly methane) that is vented – i.e., released unburned into the atmosphere, intentionally or accidentally, or not fully combusted – and this is of additional concern because of the much worse impact on health and climate. The measurement and calculation of the value of vented gas is not easy (and was not part of this study), but based on the IEA estimates of methane emissions from the oil and gas sector in Nigeria, it is not unreasonable to conclude that the value of Nigeria's flared and vented gas at world prices is at least one percent of Nigeria's GDP.[10,11]

A further loss of revenue occurs when excess flaring undermines future oil revenues by accelerating oil production decline. When excessive flaring is an indicator for reservoirs being overproduced, accelerated oil production is more than offset by subsequent steeper oil decline rates, resulting in compromised oil ultimate recovery, and hence value loss, for the field. This necessarily also reduces future royalties, taxes, oil profits, and other government income. The report estimates that for all five studied assets combined, the flared gas value loss in 2025 is USD 1.67/bbl (USD 153 million at USD 10/MMBtu LNG price). In that same year, the accelerated oil production decline from higher flaring intensity for these assets was 8.6%, exceeding an average field decline of 5%. The estimated oil value loss due to the additional 3.6% decline is USD 217 million (at USD 60/bbl oil price). Some of the loss of oil value is directly related to insufficient gas reinjection (i.e., flaring), some is related to other aspects of operational quality for which gas flaring is merely an indicator, and some to other operational factors, such as maintenance activities.[12]

The benefits of reduced gas flaring will be realised in several ways:

Support Government priorities of reducing debt dependence and boosting revenues: In 2026, the Minister of Finance and Coordinating Minister of the Economy, Wale Edun, said that the global financial environment had become increasingly hostile to developing economies, making debt driven financing more costly and less viable. "*And of course, we need to reduce our dependence on debt*". Nigeria must urgently deepen fiscal reform and boost revenue mobilization. He noted that developing countries paid about USD 163 billion as debt service in 2024, while overseas development

10 In 2024, IEA estimated vented methane emissions (including from flares) to be **1.50** million tonnes, mt (in 2025 1.36 mt). Converting this into natural gas volumes, this equates to **2,87** bcm in 2024 (2,60 bcm in 2025). In 2024, Nigeria flared 6.63 bcm. Including venting volumes, the estimated impact on GDP is 0.6% * (6.63 + 2.87)/6.63 = **0.86%**. GDP impact valuation assumes 50/50 Domestic Gas/LNG pricing; values increase if 100% LNG export prices are assumed.

11 Including all methane emissions (i.e., including fugitive) the emitted natural gas emissions through flaring and venting are **1.94** mt and thus **3.72** bcm, and the estimated impact on GDP is 0.6% * (6.63 + 3.72)/6.63 = **0.94%**.

12 The Super-Emitter paper explains that correlation between flare intensity and oil decline rates does not imply causality. Although excess GOR production can cause reservoir energy and hence oil rates to decline, sometimes asset maintenance activities cause oil production to shut in (oil decline) while the gas is flared to depressurize equipment. The (5%) optimum average field decline rate under high-quality operations is subject of further study.

assistance and foreign direct investments were only USD 42 billion and USD 97 billion, respectively. "*So clearly, it is what we do for ourselves internally that's going to be important at this time*". He stressed that policy reforms alone would not be sufficient without strong execution and improved compliance, yet compliance cannot be achieved through enforcement alone: "*no fiscal reform can deliver results if compliance is weak or uneven … It is carrot and stick*".[13]

For the 2026 fiscal year, the Nigeria Revenue Service has set an ambitious total revenue target of 40.71 trillion NGN (USD 29.7 billion).[14] The government revenue from creating value out of wasted gas from flaring (even without including the waste from venting and oil value loss) could contribute to meeting this ambitious target. It could also add to the recent set of tax policy and tax administration measures that are estimated to yield 4.6% of GDP within three years of implementation.[15]

Balance of payments. Capturing lost value would boost Nigeria's balance of payments. The Bonny Island LNG (NLNG) plant has been in production since 1999. However, the *Nigeria's super-emitter flares* paper shows that NLNG has had low utilization since 2021, ranging from 58% in 2023 to 66% in 2025. If all gas flared in Nigeria in 2024 had been used for LNG export, it would have contributed one quarter of the country's total LNG exports that year, with an LNG sales value of USD 2.3 billion. NLNG exports have declined even while flaring in Nigeria has increased. There has been a recent turnaround since due to tighter infrastructure security and new upstream non-associated gas fields. For example, the final investment decision for the development of TotalEnergies Ubeta field was taken in 2024 to supply NLNG. These helped monthly volumes rebound to five-year highs by late 2025. Capturing flare gas could help replace imported petroleum products, by using the gas for power (replacing diesel generators) or for transportation (compressed natural gas, CNG, replacing conventional fuels). The opportunity to improve fuel efficiency is significant, as the energy content of flare gas can be high as 35% of the energy content of the crude produced (Abo).

Gas monetization. The biggest fiscal upside could potentially come from turning wasted gas into taxable economic activity whether in the form of LNG sales, chemical feedstock, or power generation. This is a clear fiscal alternative to relying only on penalties/fees. If no such opportunities are available currently, produced gas should be reinjected for future use. The *Nigeria's super-emitter flares* paper discusses this in detail.

Energy access. Almost 40% of Nigerians currently lack electricity, underscoring the opportunity cost of wasting natural gas as a valuable domestic energy resource that is particularly suited for power generation, see the Nigeria's Gas Flare Commercialisation Programme.[16]

13 https://punchng.com/nigeria-must-cut-dependence-on-debt-edun/.
14 See Appendix Box A, Figure A1.
15 See IMF 2026 Article IV staff report, p. 17.
16 See Appendix Box A.

Health outcomes. Reducing methane emissions and other toxic pollutants from dirty (incomplete) flaring as well as from deliberate and accidental venting of natural gas is especially significant in this context since it contributes to meeting other development priorities for households such as improving health through reduced air pollution.[17]

4. Why does the problem persist and what can be done?

Nigeria's gas flaring persists because of regulatory, enforcement, reporting and transparency gaps.

Regulatory gaps

Satellite and third-party verified data can reduce reliance on self-reporting and help establish definitive assessments of asset-level emissions.

- **Problems of ambiguity in definition: 'operators shall not flare to produce oil'.** EnergyCC's 2023 and 2026 reports and the Clean Air Task Force (CATF) apply, and recommend, the definition of 'routine flaring' ('flare to produce') versus non-routine (safety) flaring ('flare to safely stop production'). This is a narrower definition than that used by the World Bank Zero Routine Flaring by 2030 (ZRF30) initiative, which allows companies three flaring types and definitions.[18] This significantly lowers the target volume for 'routine flaring' reductions.
- **Flare penalties are not set at levels that incentivize flaring reduction**, even after penalties were increased in 2018. The fee must be high enough to change behaviour. The key economic driver to stop wasted flared and vented gas is that the wasted energy resources have a value that far exceed the penalty (fee) income. In 2022, gas flare payments levied on all oil and gas companies operating in Nigeria were USD 249 million in total vs. USD 1.3 billion in lost gas sales from all Nigeria flares.[19] At present, **penalties require regulators to prove emissions volumes, leading to protracted negotiations, and disputes** over "how much was flared".
- **Improved regulatory oversight** is needed to enforce better the conditions (including gas conservation) under which field development plans were approved. Four of the five assets studied (except Bonga) were designed for gas reinjection. Field development obligations specify that producing assets not in reach of gas monetization infrastructure are to reinject and preserve produced gas for future use. Commerciality of oil-to-gas redevelopment during late field life benefits from maintaining sufficient gas resource volumes in the reservoir through reinjection, instead of flaring gas throughout the production lifetime.

17 Hailey Hoyle. 2026. "Health Impacts of Natural Gas Flaring: A Literature Review of Nigeria, Iraq, and Brazil." CGD Case Study. Washington, DC: Center for Global Development. https://www.cgdev.org/publication/health-impacts-natural-gas-flaring-literature-review.

18 See Appendix Box B.

19 Assumes half of the flared gas monetized in the domestic market and the other half monetized as LNG, taking into account a percentage of gas that Is consumed in the LNG liquefaction process.

Enforcement gaps

The use of independent satellite measurement and transparency can support improved corporate accountability.

- **Civil society organizations (CSOs)** report that the Nigeria Upstream Petroleum Regulatory Commission **(NUPRC)**, **does not use satellite data**, although measuring flare volumes by satellite is globally adopted as a complementary and independent source of data. The Nigeria Gas Flare Tracker was developed by NOSDRA; satellite measurement underpins the World Bank Global Gas Flare Tracker, and publications by CATF, EnergyCC. Remote emissions measurements by satellite aim to complement and not replace metered emissions.
- **Parliamentary accountability:** The substantial **non-payment of flare penalties** is reported by the Nigeria Extractive Industries Transparency Initiative (NEITI) since its 2021 Annual Report. NEITI finds non-payment by operators totalled USD 862 million by June 2024. However, this is **not reported by NUPRC, the regulator**, responsible (until 2026) for collecting the penalties. NEITI's reports prompted parliamentary inquiries and hearings into non-payment, leading legislators to call for greater enforcement and accountability among the international oil and gas companies.
- **Methane regulations**,[20] which mandate measurement and reporting of actual third-party verified emissions, **are poorly implemented**. The Natural Resource Governance Institute (NRGI) which builds civil society capacity for corporate accountability on cutting methane emissions, worked with NEITI to integrate the EITI 2023 greenhouse gas emissions Standard into NEITI's reporting framework.[21] However, in 2022 and in 2023, only 15 out of 62 oil and gas companies disclosed GHG emissions data in Nigeria.[22]

Reporting and transparency gaps

Reporting and transparency gaps undermine compliance. Satellite evidence indicates systemic flaring and hence asset-level transparency is essential.

Reporting to the World Bank voluntary **ZRF30 initiative by both countries and companies has declined** since the initiative was launched in 2015 (Figure 3). In 2024, Nigeria is one of eleven countries that reported its routine flaring data; 25 countries/states did not report. For these voluntary initiatives to be successful, endorsing countries and companies must deliver on their commitments

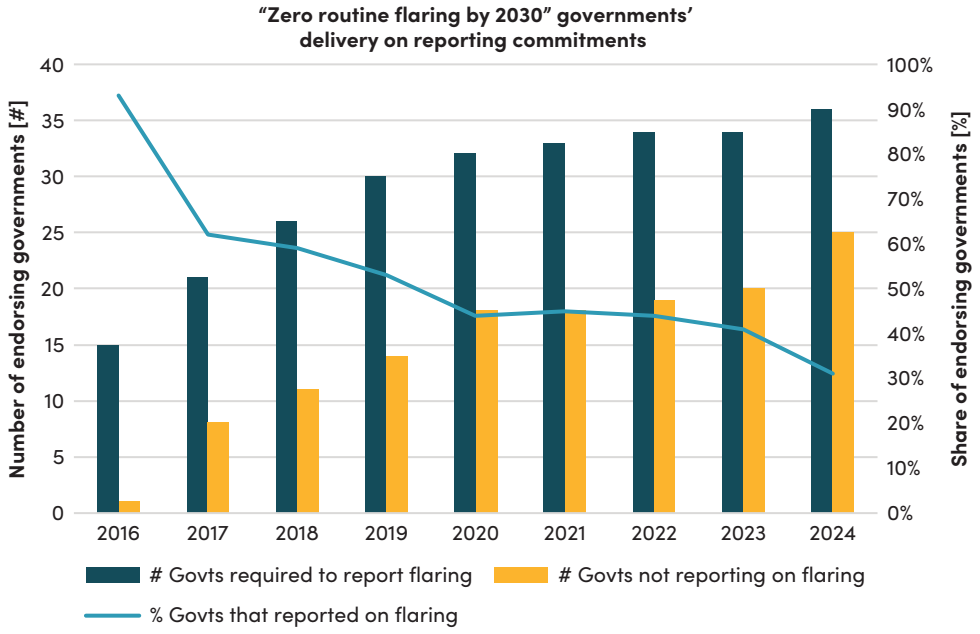
20 https://faolex.fao.org/docs/pdf/nig231711.pdf.

21 https://resourcegovernance.org/articles/turning-emissions-data-accountability-lessons-nigerias-eiti-experience and https://resourcegovernance.org/publications/strengthening-methane-emissions-reduction-nigerias-oil-and-gas-sector and https://resourcegovernance.org/events/strengthening-corporate-compliance-and-public-accountability-methane-emissions-targets and https://resourcegovernance.org/events/advancing-legal-and-regulatory-methane-emissions-reforms-nigerias-oil-and-gas-sector.

22 NEITI 2023 Annual Audit Report Appendix 17 Systematic Disclosures show that the 15 companies include Chevron, ENI, Exxon, Shell and TotalEnergies.

for reporting of flaring data that is consistent, reliable and complete. In 2024, 30% of endorsing countries, and 60% of endorsing companies, did so.

FIGURE 3. Reporting performance of governments committed to provide transparency on their flaring performance under the ZRF30 initiative



Notes: Authors' illustration, based on data by The World Bank Group ZRF30 Initiative, https://www.worldbank.org/en/programs/zero-routine-flaring-by-2030/reporting. The percentage of governments that report flaring has been declining since 2016.

- **Voluntary reporting can create loopholes and corporate definitions are not sufficient**. Exxon, Chevron, Shell, TotalEnergies, and ENI, endorsed the ZRF30 initiative and all five IOCs' report on routine flaring. However, companies can classify persistent "flaring to produce" as "non-routine", which allows major volumes of avoidable flaring to sit outside zero-routine-flaring commitments. This makes independent regulatory verification essential. *EnergyCC's flaring assessment methodology assumes that continuous flaring is routine and that incidental flaring is non-routine (for safety reasons only) flaring.*
- CATF reports that corporate reporting is inadequate since it typically covers only operated, not equity-weighted (non-operated), assets.[23] CATF finds that **more than half of the global flaring volume attributed to the 10 largest IOCs comes from their non-operated assets**. The Oil Gas Methane Partnership (OGMP 2.0), a United Nations Environment Programme initiative launched in 2020, requires member companies to establish a company-wide methane (CH_4) emission reduction target to cover all material sources of methane – flaring,

23 See Appendix Box B.

venting, leaks. Additional targets – including for non-operated assets/joint ventures are encouraged but not required.[24]

- **IOCs target dates to eliminate routine flaring globally.** In 2023, as part of its USD 40 million global asset wide initiative to use advanced drone-based technologies at its upstream sites, TotalEnergies signed a cooperation agreement with NNPC to carry out methane detection and measurement campaigns on NNPC oil and gas facilities. Shell accelerated its target to eliminate routine flaring from upstream operated assets from 2030 to 2025. Shell reports that "we ceased routine flaring of associated gas in January 2025, achieving our target independent of the sale of SPDC to Renaissance".[25] There is a risk that asset divestment can reduce reported corporate emissions without real decarbonization.[26]
- **NUPRC is responsible for reporting flare volumes.** It reports oil production by asset, but reports flare volumes only by company. This makes corporate accountability more challenging when CATF reports that companies can operate as much as 15 flare sites. Beginning 2019, NEITI publishes asset level data on flare volumes and gas flare penalties by each licence holder. NNPC also publishes monthly gas production data by asset (produced, utilized, reinjected, flared) in its website[27] although this does not appear to be linked to NUPRC.

5. A comprehensive framework for emissions reduction

Solutions exist today

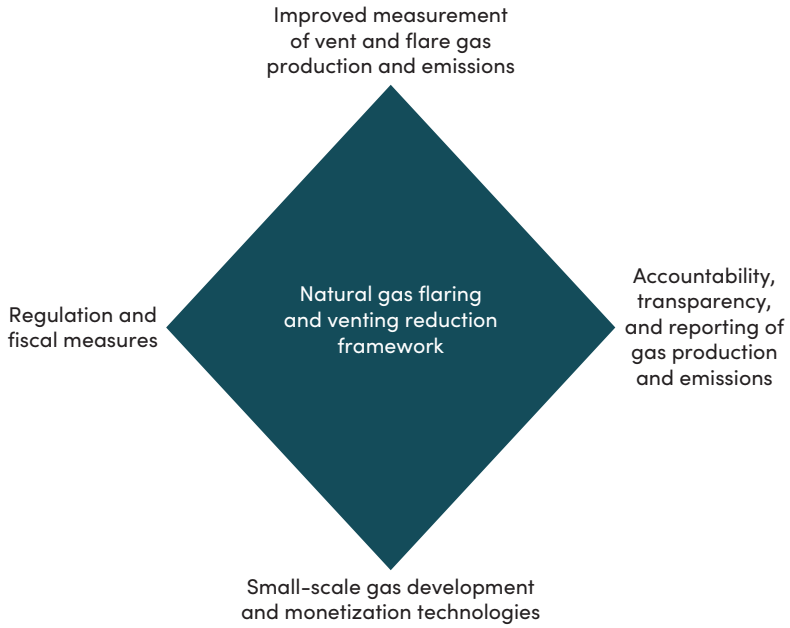
EnergyCC's four-part solutions model as presented in WIDER (2021) can be applied to help close the gap between policy ambition and operational performance (Figure 4).[28] The model suggests that public-private sector action should combine: 1) satellite measurement; 2) transparency; 3) gas monetization technologies; and 4) fiscal and regulatory measures. These solutions require implementation by different stakeholders, working together. Each stakeholder group has a key role to play: Government (Ministry of Finance, Nigeria Revenue Service, and Regulators), companies who are responsible for the emissions, civil society organizations (including those working to build capacity), and enabling partners who can provide funding and technical assistance e.g., IMF, World Bank Group.

The previous section suggested ways in which gaps in regulatory, enforcement, reporting and transparency can be addressed through independent measurement, transparency and

24 https://www.ogmpartnership.org/frequently-asked-questions.
25 Shell 2025 Annual Report (page 73), published June 2026 https://www.shell.com/investors/results-and-reporting/annual-report.html.
26 https://www.wider.unu.edu/sites/default/files/Publications/Working-paper/PDF/wp2022-131-looking-ahead-COP27-from-climate-pledges-to-action.pdf.
27 https://nnpcgroup.com/documents/.
28 Romsom, E., McPhail, K. (2021) Capturing economic and social value from hydrocarbon gas flaring and venting: evaluation of the issues. WIDER Working Paper 2021/5. Helsinki. https://doi.org/10.35188/UNU-WIDER/2021/939-6.

accountability. It also makes it crystal clear that policies to achieve emissions reductions do not require new technologies or large financing by the government. On the contrary, reductions of emissions should generate significant additional revenues and contribute to Nigeria's Nationally Determined Contribution (NDC).

FIGURE 4. Comprehensive framework for emissions reduction



Notes: Authors' illustration, https://doi.org/10.35188/UNU-WIDER/2021/940-2.

How to incentivize companies to improve operational performance?

Since May 2023, the administration of President Bola Tinubu, as part of its bold reforms to strengthen domestic revenue mobilization, has adopted an incentive-based approach. This in order to boost prospects for growth through foreign direct investment (FDI), especially in the oil and gas sector.[29] Early results indicate that Nigeria has restored its position as a leading oil investment destination for international oil and gas companies after a ten+ year hiatus. Its major fiscal, tax, exchange rate, and oil sector reforms have created a window of opportunity for practical action. Nigeria has reform momentum, but despite stronger rules, new methane regulations, and voluntary commitments, further policy action is warranted to tackle the rise in natural gas flaring.

The most promising lever is a well-designed methane fee and rebate scheme.[30] This gives the Ministry of Finance a practical tool to penalise emissions and create incentives to capture and monetize the gas rather than waste it. Workable templates already exist and can be adapted to

29 See Appendix Box A.

30 The methane fee and rebate scheme can be implemented in various ways, including as a penalty, charge, see https://www.cgdev.org/media/methane-reduction-climate-and-development; and https://www.cgdev.org/blog/gas-flaring-100-billion-problem-policy-solution.

country circumstances with targeted technical assistance.[31] One suggestion is for the International Monetary Fund to use its well-established processes to provide policy advice and technical assistance to support its adoption. The IMF comments annually through its Article IV consultations on each country's macroeconomic policies, including fiscal measures, and thus has an established process to raise flaring and venting issues on the policy agenda.

A methane fee and rebate scheme would align operators' commercial incentives with national priorities to increase government revenues while maintaining investment competitiveness. One reason why companies continue to flare and waste gas may reflect the way companies calculate their rate of return on investments. EnergyCC's second UNU-WIDER paper shows that technologies have advanced for small scale gas utilization (lower cost and implementable for remote locations). The gas wasted from super-emitter flares is often sufficient to be commercial for local applications. In other situations, aggregating the gas from multiple emitters is needed either for a larger scale local development or for export as LNG. By creating scale through aggregation, affordability of the gas is enhanced. The commercial issue appears to be that the incremental costs of emissions mitigation dilute the internal rate of return (IRR) of oil developments. Even though increased revenues from the gas exceed costs, as optional incremental developments, gas monetization may not meet companies' high IRR investment thresholds. However, if gas monetization is mandatory and treated as part of the integrated project, the total oil and gas project is profitable.

NUPRC and NRS gain better visibility over wasted gas, stronger compliance leverage, and additional taxable activity from monetized gas. The benefits for Government that arise from the increased economic activity are discussed at the end of this section. However, the fee needs to be sufficiently high to create the incentive for operators to repurpose wasted gas. The IRR of incremental gas developments can be increased significantly by introducing a methane and rebate fee to turn a project with a marginal IRR into a profitable one. This would address the under-utilization of existing gas monetization projects. Any fee pricing mechanism to discontinue routine flaring and venting needs to be carefully balanced and implemented to avoid undue disruption to oil and gas production, or compromise safety. The Ministry in addition, may consider facilitating opportunities (such as third-party infrastructure access) to gather and transport remote natural gas to demand sources.

Operational design of a methane fee and rebate scheme

- **Establish the charge base:** NUPRC would publish standard deemed emissions factors for flaring and venting, differentiated by asset type, production profile and gas handling infrastructure. Operators would then pay the fee upfront against these deemed emissions. This would help the NUPRC which would no longer have to negotiate with companies on volumes of gas flared to determine gas flare payment. It would support the Nigeria Revenue Service by tackling non-payment of penalties since the fee is paid in advance.

31 https://www.cgdev.org/blog/gas-flaring-100-billion-problem-policy-solution.

- **Responsibility for measurement is shifted from regulator to operator:** To qualify for the rebate, operators would install or commission approved flare and vent measurement, maintain auditable records, and submit independently verified emissions data. To fulfil the aspirations of UNEP's OGMP 2.0 Framework, reporting would cover data from assets companies operate themselves, as well as from those operated by others. Companies which report on an equity-weighted basis would give NUPRC and the Nigeria Revenue Service full visibility of the total value of gas wasted.
- **Rebates are given only after verification:** The Nigeria Revenue Service would retain the upfront fee until NUPRC confirms, through independent verification, that actual emissions are below deemed levels.
- **A rebate fee on deemed emissions would immediately change the investment decisions for operators**, who would be incentivized by this 'carrot and stick' approach to reduce and repurpose emissions. The costs to build infrastructure to access monetization facilities, and to replace compressors for gas reinjection, would be offset by the rebate in methane fees and the value of the repurposed gas monetized or conserved.
- NUPRC could provide the necessary support for gas delivery by enabling third-party access to, or gas sales into, infrastructure (e.g., pipelines). It could also facilitate gas aggregation and transportation to existing gas and LNG feeder infrastructure and fast-track approvals for projects that convert wasted gas into marketable supply. NRS would obtain additional tax revenues from the value of wasted gas sold into the market.
- **The performance-based scheme would reward companies** that improve implementation of field, facility, and reservoir performance. By excluding over time those better performing companies with verified emissions data from the rebate model, the remaining fees would be distributed over the smaller pool of companies. Remaining companies would face higher average fees with increasing incentives to manage their operations efficiently and monetize the wasted gas to leave the rebate pool.

Reform in the oil and gas sector provides the framework for implementing a methane rebate and fee system. The Petroleum Industry Act 2021, including sections 104 and 105, sets conditions for permitting flared gas and requires financial penalties under the responsibility of NUPRC. The Gas Flaring, Venting and Methane Emissions (Prevention of Waste and Pollution) Regulations 2023 support payments, fines, reporting, metering and enforcement for flaring, venting, methane-emissions data and related non-compliance. Guidelines for Management of Fugitive Methane and Greenhouse Gases Emissions in the Upstream Oil and Gas Sector, 2022 include further requirements (see Appendix A).

Benefits to Ministry of Finance, Nigeria Revenue Service, and NUPRC

Flare rate measurement provides the Revenue Service with data on lost taxable value, which far exceeds the current gas flare penalty fee. This enables the NRS in its national revenue framework, to assess and include **the full value** of flare-related fiscal flows.

Flare intensity measurement gives the Revenue Service data on both the **gas value loss** (in USD) but also potential **value loss from oil** production, reserves recovery, and taxable petroleum income. For example, although there are multiple reasons for the flare intensity-oil decline relationship, the *Nigeria super-emitter flares report* finds that this would constitute 3.6% of 2025 oil production for the five offshore assets, yielding a valuation of USD 217 million (at an oil price of USD 60/bbl).

Flare performance can inform revenue forecasting as a regulatory and **investment performance metric**. Production and tax revenue forecasts should incorporate flare rate, flare intensity, and routine flaring trends, especially when satellite data show persistent or worsening flaring performance. A combination of metered and satellite data can be used to verify companies' claims, thereby strengthening accountability.

A methane fee and rebate scheme can **broaden the Government's revenue base**. The increased economic activity by utilising the gas provides increased government revenues and opportunities for local communities to increase their economic output. Gas monetization can be supported through commercial and fiscal stimulants for measures that reduce energy waste, such as gas aggregation schemes, gas pipelines, exemption of import duties on gas emission metering equipment. Repurposing associated gas is often economically viable as Yoho's redevelopment with floating LNG[32] illustrates. The Ministry can encourage the regulator to enable third party gas sales and third party access to gas infrastructure outside of oil and gas production licenses.

Empirical evidence[33] indicates that resource rich countries tend to have a negative relationship between taxes collected on the resource itself and non-resource tax collections. Addison and Roe, in their body of literature,[34] demonstrate that these risks can be mitigated. Policy choice, transparency and accountability, and institutional design are important, including at the local level.

32 Floating LNG are offshore facilities that extract, liquefy, store, and offload natural gas directly at sea. This eliminates the need for expensive long-distance pipelines to land and traditional onshore processing terminals.

33 see papers in the European Journal of Political Economy, e.g., Bornhorst, Gupta and Thornton 2009 and Crivelli and Gupta, 2014 https://www.sciencedirect.com/science/article/abs/pii/S0176268009000068 and https://ideas.repec.org/a/eee/poleco/v35y2014icp88-101.html.

34 Addison T, Roe AR. (2018). Extractive Industries: The Management of Resources as a Driver of Sustainable Development. Oxford University Press and Addison, T. and Roe, A. (2024) Resources Matter: Ending Poverty While Protecting Nature. Oxford: Oxford University Press. https://global.oup.com/academic/product/extractive-industries-9780198817369?cc=th&lang=en& and https://global.oup.com/academic/product/resources-matter-9780192872197?cc=th&lang=en&.

This is enhanced by adopting an 'all of government' approach[35] and partnership between public and private sectors.[36] This collaborative framework allows nations to enhance the large indirect income-raising effects of resource operations. Specifically, high wages paid to direct, and to suppliers', workforces flow into local businesses, expanding the broader economic tax base even if it does not immediately boost non-resource tax collections directly.

There is a prevalent belief that gas utilization technologies are either unavailable or prohibitively expensive. In Nigeria, however, the international oil companies have been investing significant amounts in gas monetization since the 1990s. This trend continues. OML100, operated by TotalEnergies, accounted for 57 percent of global routine flaring for Total Energies' Exploration and Production in 2020. Routine flaring ended in 2023 by modifying asset infrastructure to send flared gas to Nigeria LNG. This has reduced emissions with a total reduction in greenhouse gas emissions of around 330 kt CO_2e/year, including 1.3 kt CH_4/year of methane, and created value for Nigeria through monetizing the gas for LNG export.[37] Current investment trends show government and IOCs investing in Nigeria LNG, a limited liability company owned by four shareholders (NNPC – representing the Nigeria government, Shell, TotalEnergies, and ENI). This is the largest liquefied plant in Africa. Train 7 will be completed in 2027 at a total cost of USD 4 billion and boost capacity from 22 mtpa to 30 mtpa. After many years of flaring as a super-emitter, the Yoho third-party gas monetization scheme utilising Nigeria's first Floating Liquefied Natural Gas (FLNG) facility,[38] (investment of USD 5 billion), demonstrates the commerciality of monetizing flare gas, even for Nigeria's mature oil assets. A proposed next step is to develop a detailed government revenue model for flare and vent gas monetization options, potentially with IMF support, and in consultation with government, companies and other stakeholders.

Furthermore, commercial returns of integrated oil and gas developments can be improved by better operational management. The *Nigeria's super-emitter flares* report finds that flaring can represent a loss of both gas value (in USD) and oil value, while also causing a loss to energy efficiency.[39] By incentivising good reservoir management, this would optimise ultimate oil recovery which improves returns on investment.

An example of a good master plan for integrated oil and gas planning and development is the USD 20 billion Dangote Petroleum Refinery near Lagos. This is Africa's largest single private investment. Officially operating since January 2024, it processes crude oil into products such as diesel and

35 Addison, T. and Roe, A. (2024) 'Transforming States: Economic Management', in Resources Matter: (Chapter 7). https://academic.oup.com/book/59013/chapter/496209700.

36 McPhail, Kathryn, 'Enhancing Sustainable Development from Oil, Gas, and Mining: From an 'All of Government' Approach to Partnerships for Development', in Tony Addison, and Alan Roe (eds), Extractive Industries: (Chapter 17). https://academic.oup.com/book/27405/chapter/197227438.

37 TotalEnergies Sustainability & Climate 2026 Progress Report (page 52) Sustainability & Climate 2026 progress report.

38 https://www.thisdaylive.com/2026/02/11/nigerias-first-flng-gets-2026-construction-timeline-as-julius-rone-bags-sun-investor-award/.

39 The *Nigeria's super-emitter flares report* assesses the loss in energy efficiency as the fraction of gas energy flared and oil energy produced.

aviation fuel.[40] Dangote is also a major consumer and off-taker of natural gas to power its massive operations. Anchor projects such as Dangote support domestic gas infrastructure development. The IMF Executive Director for Nigeria, Mr. Ouattara Wautabouna, noted a sharp drop in the amount of refined fuel imports as the Dangote refinery boosts domestic production, turning Nigeria into a net exporter of refined petroleum products.[41] A separate report estimates that the Dangote Refinery could increase foreign exchange reserves by up to about USD 5.5 billion per year, which in turn would boost the balance of payments.

A methane fee and rebate scheme on deemed emissions would immediately change investment decisions for operators, who would be incentivized to invest in the Nigeria gas economy, instead of wasting the gas. **The methane fee and rebate scheme will implement existing regulation better, rather than replacing it**. NUPRC and other regulators retain core oversight roles, while the fiscal mechanism strengthens incentives for **compliance**.

NUPRC benefits from a clear, transparent and **data-driven definition to distinguish routine flaring** (i.e., flaring to produce) from emergency/safety flaring (flaring to safely stop production). Zero routine flaring targets are not enough if non-emergency "non-routine" flaring remains unchecked. CATF finds that while IOCs committed to ending routine flaring by 2030 under the ZRF30 Initiative, only 30% of their reported flaring was classified as routine; the remaining 70% may therefore remain largely unabated.[42]

6. Enablers for action

Many countries are looking to the oil, gas and mining sectors for a major contribution to their economic development over the next 25 years.[43] The IMF finds that "*Of the simulated Top35 emission reductions, the extractive sector accounts for 66 percent, while the agricultural and waste sectors account for 17 percent each*". Despite the undisputed benefits of methane reduction, international financial support to countries for methane reduction is less than 2% of total climate finance. There is also a lack of technical assistance, as noted by members of the New Producers Group for Sustainable Energy. This organization comprises policymakers from twenty-two countries in Africa, Asia, Caribbean, and South America. It provides a platform for peer-to-peer learning. At its Annual Meeting in Suriname (2024), members asked: where is the help to develop our resources with minimal emissions, address looming debt problems, and provide finance for climate adaptation?

40 With 650,000 barrels per day (bpd) installed capacity and plans to expand to 1.4 million bpd by 2028, the Dangote refinery addresses a decades long issue for Nigeria that has long imported most of its petrol and diesel from Europe. Current capacity is sufficient to supply Nigeria's 230 million people with refined products with excess capacity available for export. The Dangote Petrochemicals plant (part of the same complex) also provides fertilizer and plastics.

41 See Statement by Mr. Ouattara Wautabouna, Executive Director for Nigeria on IMF 2026 Article IV staff report, p. 2.

42 https://www.catf.us/resource/flaring-accountability/, November 2024.

43 Addison T, Roe AR. (2024). Resources Matter: Ending Poverty While Protecting Nature. Oxford University Press.

How can the IMF help?

The IMF has well established processes to give policy advice and technical assistance to help member countries adopt a methane fee and rebate scheme while preserving investment competitiveness. In its mandatory annual review of macro and fiscal policies with its 60+ oil and gas producing countries, it can advise on how to include measures on natural gas wastage through flaring and venting into the policy agenda, building on existing legislation. If requested, the IMF can provide technical assistance and has established Trust Funds in place.

Specifically, and in the case of Nigeria, the draft findings of the EnergyCC 2023 reports were presented at NOSDRA's National Stakeholders Summit in Abuja: The use of Satellite for Tracking Gas Flare emissions in the Oil and Gas Sector in Nigeria, September 2022. The Ministry of Finance asked: "*how can we design a system to capture the value from the flared gas?*". Targeting super-emitters will yield the greatest impact. Lessons and experience from Nigeria can be shared with other oil and gas producing countries which are looking for good practice examples.

Partners with strong networks for capacity building and dissemination

Given the scale of emissions and wasted energy resources from oil and gas, there is an important role for societal organizations, in Nigeria and globally. Civil society organizations are key for transparency, public accountability and building capacity, for example, for emissions verification, asset level reporting, and revenue collection. Partners include:

Nigeria Extractive Industries Transparency Initiative

NEITI is a multi-stakeholder organization. It is focused on improving transparency and accountability in the oil and gas sector by publishing credible and trusted data to implement the EITI standard. The World Bank provides technical assistance and funding support for NEITI. This began 20 years ago with initial grants to establish the organization through the NEITI 2007 Act. Funding then focused on implementation. Nigeria became an EITI compliant country in 2012 through the validation process. World Bank funding has continued, which has allowed NEITI to accelerate publication of its reports in a more timely and efficient manner, and engage broadly with civil society.

Natural Resource Governance Institute

The Natural Resource Governance Institute (NRGI) is an independent non-profit policy institute focused on improving how countries manage their natural resources. This includes transparency, accountability, and stronger regulations to reduce methane emissions in the oil and gas sector. NRGI's Nigeria in-country team is working with the communities, media and civil society to raise public awareness of the harm from emissions and make companies more accountable. This is being done actively through

briefings on emissions reduction,[44] multistakeholder dialogues, accountability tool creation,[45] building coalitions driving advocacy campaigns, capacity buildng meetings for civil society, the media, and others. NRGI shares and disseminates key messages to other oil and gas producing countries.

Africa Capacity Building Foundation

Governors of this Foundation are the African Ministers of Finance and Economic Planning who are well positioned to share good practice and lessons learned with Ministries of Finance across 40 member countries. Its focus is domestic resource mobilization and regional outreach. Specifically, it could help Ministries of Finance understand the technical assistance requirements on how a methane fee and rebate scheme can be implemented.

7. Conclusion: Nigeria's path to higher revenues, with lower emissions

Nigeria's ambition is to double oil production and increase gas output by 2030. International oil and gas companies have been incentivized to commit USD 15–40 billion for new offshore gas developments. It is important that the planned significant expansion of oil and gas production is done responsibly, with minimal methane emissions and consistent with Nigeria's NDC.

Since the first super-emitter flares report (2012–2022) was completed, Nigeria has launched major reforms to support growth and economic stability. Key measures include:

- eliminating decades-long fuel subsidies, unifying foreign exchange rates;
- global benchmarking of its oil and gas sector to attract USD 50+ billion FDI commitments;
- designating a centralized Revenue Service to manage direct remittance of oil and gas revenues to the Federation Account and new leadership to fix revenue leakages;
- introducing higher regulatory, performance standards and operational guidelines for methane emissions and gas flaring, banned since 1984.

The updated evaluation of the five super-emitter flares, and the analysis conducted of the volume and value of Nigeria's overall level of flaring, make clear that gas flaring is persistently high and increasing again. This also means that capturing the value of Nigeria's wasted energy is a multibillion dollar opportunity.

Solutions exist today to address Nigeria's gas flaring challenge which is fundamentally one of lost value rather than cost. Independent satellite measurement, asset-level transparency, a clear

44 https://resourcegovernance.org/publications/strengthening-methane-emissions-reduction-nigerias-oil-and-gas-sector and https://resourcegovernance.org/events/strengthening-corporate-compliance-and-public-accountability-methane-emissions-targets and https://resourcegovernance.org/events/advancing-legal-and-regulatory-methane-emissions-reforms-nigerias-oil-and-gas-sector.

45 https://policy-t.vercel.app/emat.

definition of routine flaring, can be combined with a performance-based methane fee to support gas monetization. This mobilizes additional government revenues from resources that are currently being burned or vented.

Introducing a methane fee and rebate scheme incentivizes companies to reduce emissions by charging a fee for emissions above a certain threshold, while rewarding companies with rebates for keeping emissions below this benchmark. It provides a nudge for companies to improve operational practices and capture more gas for sale, improve revenues and reduce cost liabilities. By increasing economic productivity, governments benefit from additional revenues.

How can this be achieved? Different stakeholders must act: the government, especially the Ministry of Finance, working with the Nigeria Revenue Service and regulators (NUPRC); companies who are responsible for the emissions; civil society organizations, including those working to build capacity; and enabling partners who can provide technical assistance, e.g., the Nigeria Extractives Industry Transparency Initiative; the New Producers Group for Sustainable Energy; the Africa Capacity Building Foundation; and funding, e.g., the World Bank Group. A particular role is played by the International Monetary Fund (IMF), which first developed the methane fee and rebate scheme. The IMF has well-established processes for policy advice and technical assistance to enable countries to adopt performance-based schemes which strengthen domestic revenue mobilization and the balance of payments.

Lessons and experience from Nigeria, the world's eighth largest flarer, can be shared with other oil- and gas-producing countries. Global gas flaring increased for the second consecutive year in 2024, reaching the highest level (163 bcm) since 2007. The opportunities world-wide for policies to reduce emissions are therefore significant.

Natural gas provides one quarter of global energy demand, yet in Africa 600 million people have no access to electricity. If all the natural gas flared and vented globally (with potential sales value of over USD 100 billion annually) is captured and brought to market, it could supply 92% of all of Africa's plus South & Central America's gas consumption.[46] The volumes of gas flared exceed the satellite measured values, because flares usually do not reach a 100% combustion target where all hydrocarbons are fully destroyed. Imperfect flare quality causes the production of a range of chemicals that are toxic to human health as well as adversely affecting air quality and climate. EnergyCC has estimated that the social cost of atmospheric release (SCAR) of this global gas wasted is USD 955 billion per year.[47] Reducing emissions at source contributes to better health outcomes and climate objectives through countries' Nationally Determined Contributions (NDCs).

46 In 2024, global flaring and venting wasted 317.8 bcm, compared to the total amount of gas consumed in Africa (178 bcm) and South & Central America (168.9 bcm), see https://www.energyinst.org/statistical-review.

47 Romsom E, McPhail K. (2021). Capturing economic and social value from hydrocarbon gas flaring and venting: evaluation of the issues. WIDER Working Paper 2021/5. Helsinki: UNU-WIDER. https://doi.org/10.35188/UNU-WIDER/2021/939-6. See also Nigeria's super-emitter flares report concluding paragraph.

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Appendix A: Nigeria macro, fiscal, and regulatory reforms

Nigeria has undertaken bold macro reforms since May 2023, to support growth and fiscal reforms aimed at the urgent need for revenue mobilization. These attracted international praise. They include unified exchange rate, and removal of fuel subsidies. The World Bank reported that although the fuel subsidy was fully removed in October 2024, NNPC only began transferring revenue gains to the Federation in January 2025, starting with 50% and using the rest to offset past arrears.[48] In April 2025, President Tinubu replaced the 11-person board of NNPC. The new Chairman, Ahmadu Musa Kida, is a former TotalEnergies executive. The Chief Executive was replaced with former Shell executive, Bashir Ojulari. The President tasked the Board to increase investment in the industry to USD 30 billion by 2027 and USD 60 billion by 2030, raising production to 2 million barrels of oil per day by 2027 and 3 million by 2030. In December 2025, Mrs. Oritsemeyiwa Eyesan, former EVP Upstream in NNPC, was appointed to head NUPRC and NUPRC's Board was replaced.

These reforms in the oil and gas sector successfully created incentives to attract foreign direct investment in offshore oil and gas and to (re) position Nigeria as Africa's top destination for oil and gas investment. By contrast, regulatory reforms and higher operating performance standards on gas flaring and methane emissions have not delivered results.

Central emphasis on revenue mobilization

President Tinubu set up the Presidential Fiscal Policy and Tax Reforms Committee in 2023 chaired by Taiwo Oyedele. The aim was to tackle Nigeria's revenue crisis, reflected in one of the world's lowest tax-to-GDP ratios.[49] The committee included 36 members from across key stakeholder groups, including NNPC and NUPRC. Finance Minister Wale Edun argued that Nigeria must strengthen domestic revenue mobilization, especially given the scale of debt service compared with foreign aid and investment inflows.

One outcome of the committee's work was the creation of the Nigerian Revenue Service under the 2025 Establishment Act, replacing FIRS and centralizing revenue collection (replacing 60+ individual collection agencies) across the federation from 1 January 2026. This reform also affects agencies such as NNPC and NUPRC, whose previous revenue-retention powers under the landmark Petroleum Industry Act 2021 (PIA) had, according to World Bank[50] analysis, reduced net inflows to

48 https://www.worldbank.org/en/country/nigeria/publication/nigeria-development-update-ndu May 2025.

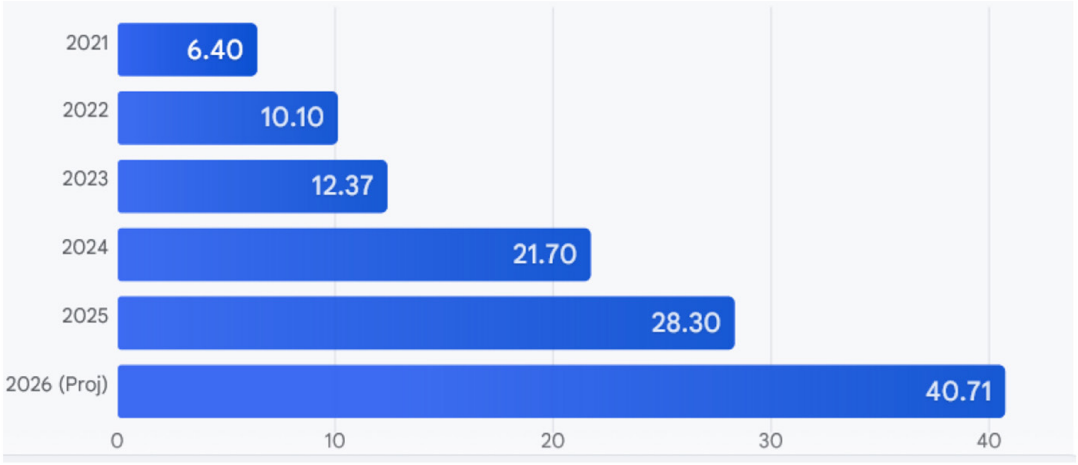
49 See Table 1 in https://www.wider.unu.edu/publication/global-oil-theft-impact-and-policy-responses#. This paper addresses Government dependency on oil revenue versus tax yield for a range of countries. It particularly raises the point of Governments' vulnerability to loss of income (not only from oil theft but also due to varying commodity prices) if not diversified by other sources of (taxation) income: "Government tax yield benchmarks are also important for maintaining access to principal sources of external financing in developing countries as well as for achieving their sustainable development goals (SDGs)."

50 World Bank, "From Policy to People: Bringing the Reform Gains Home", October 2025; https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099100825010038474.

the Federation Account. The PIA had replaced the 1969 Petroleum Act with NNPC as a commercial entity and had set up a newly created upstream regulator NUPRC, responsible for enforcement, regulation, revenue collection, and gas flare payments (until 2026). Its powers to collect oil revenues included 30% of oil and gas profits earmarked for frontier basin exploration, 30% of oil and gas sales for operational costs, and 30% of proceeds from Production Sharing Contracts (PSCs). The NUPRC collected and retained royalty payments, petroleum profit taxes and other statutory revenues. To restore fiscal discipline and enforce Section 44(3) of the Nigerian Constitution, the President passed Executive Order 9. Individual asset operators and contractors must pay all royalties and oil profits straight to the Nigeria Revenue Service. NNPC is formally barred from collecting the 30% management fee and managing the 30% Frontier Exploration Fund.

Immediate opportunities to raise additional revenues from gas flaring. The annual revenue collected by the Federal Inland Revenue Service (FIRS) (Figure A1) is reported for 2024 as 21.7 trillion NGN (USD 16.13 billion). Satellite data show that the potential gas sales value wasted by flaring in that same year, 2024, is USD 1.6 billion per year. Though not all gas sales proceeds will flow to government, the loss is equivalent to about 10% of federal tax collections in 2024. Additional value is wasted from venting of gas and from faster oil decline due to poor reservoir management (see *Nigeria super-emitter flares*). For the 2026 fiscal year, the Nigeria Revenue Service has set an ambitious revenue target of 40.71 trillion NGN (USD 29.7 billion).

FIGURE A1. NRS/FIRS rising annual revenue trend 2021–2026



Source: The Nation online, February 10 2026; https://thenationonlineng.net/nrs-targets-%E2%82%A640-7trn-revenue-in-2026/.

Policies to capture and use this wasted gas would support domestic revenue mobilization and improve balance of payments. **Flare rate measurement** provides the Nigeria Revenue Service with data on lost taxable value, which far exceeds the current gas flare penalty fee. **Flare performance** can inform revenue forecasting as a regulatory and investment performance metric. **Flare intensity measurement** gives the Nigeria Revenue Service data on both the gas value loss (in USD) but also

potential value loss from oil production, reserves recovery, and taxable petroleum income. Some of the oil value loss is directly related to insufficient gas reinjection (that leads to flaring), some is related to other aspects of operational quality for which gas flaring is an indicator, and some to other operational factors, such as maintenance activities.

Investment turnaround in the oil and gas sector and industry structure

The Petroleum Industry Act 2021 was the first effort to reform the oil and gas industry in twenty years. Building on the Decade of Gas initiative, government aimed to attract more investment while maintaining near-term revenues. In 2023, the Nigerian Government benchmarked the country against 13 other regional and global countries where IOCs are active. Nigeria ranked low on investment attractiveness for deepwater, where two thirds of Nigeria's gas reserves are still underdeveloped. This low ranking was due to slow project delivery, high costs, and weak fiscal terms.[51] Government is focused on faster, cheaper, and more efficient projects, with greater emphasis on gas as a transition fuel. Nigeria reversed a decade-long investment slump. IOCs were incentivized[52] to finalise commitments of more than USD 16.4 billion with additional FIDs of USD 40+ billion. Nigeria regained its top spot for oil investment in Africa.[53] The IOCs are now concentrated offshore, with large onshore asset disposals to Nigerian companies approved and executed in 2024/2025.

Policy and regulatory reform for the oil and gas sector

In contrast to reforms which successfully created incentives for companies and attracted significant new foreign direct investment into the oil and gas sector, the regulatory reforms have not yet delivered results.

Three areas of regulatory reform

In 2021, Nigeria's Nationally Determined Contribution (NDC) set out methane reduction targets for the first time. Nigeria became the first country in Africa to regulate methane emissions from its oil

51 Mrs. Olu Verheijen was appointed Special Adviser on energy to President Bola Ahmed Tinubu in June 2023 to improve Nigeria's energy competitiveness; https://theenergyyear.com/articles/the-tinubu-administration-streamlining-nigerias-energy-policy/.

52 This change in investment climate was also noted by Wael Sawan as being important for Shell, together with the professional approach taken by the Tinubu government; https://statehouse.gov.ng/shell-global-ceo-hails-president-tinubu-says-his-leadership-and-vision-the-reasons-shell-is-keen-to-invest-20-billion-in-nigeria/.

53 Shell formally committed USD 7 billion for Bonga North and USD 2 billion for HI Gas project to supply Nigeria LNG Train 7, targeting production by 2028; Chevron is financing USD 1.4 billion for infill drilling at Agbami and Usan fields; Exxon formally committed USD 1.5 billion for Usan; TotalEnergies is investing USD 6 billion for deepwater and shallow offshore blocks. Advanced FIDs by Exxon for USD 10 billion for Owowo tieback to Usan, Shell looking to complete USD 20 billion FID for Bonga South West by 2027. ENI has agreement to invest USD 10.4 billion in Zabazaba and Etan offshore fields; https://www.ecofinagency.com/news-industry/2204-54914-nigeria-clears-10-billion-deepwater-oil-investment-by-eni.

and gas sector[54] with its 2023 Gas Flaring, Venting and Methane Emissions (Prevention of Waste and Pollution) Regulations, which replaced the 2018 regulations. These achievements were supported by the Clean Air Task Force (CATF) and the Climate and Clean Air Coalition (CCAC).[55] Nigeria is also a 'Global Methane Pledge Champion' with high level commitment to the Global Methane Pledge.

1. **The Gas Flaring, Venting and Methane Emissions (Prevention of Waste and Pollution) Regulations, 2023**

   Key requirements include:

   - Setting emission standards and methane capture requirements.
   - Mandatory measurement of all chemical releases from gas flaring and venting.
   - Transparency through company reporting of actual, third-party verified emissions.

2. **The Petroleum Industry Act (PIA) 2021 (Sections 104 and 105) and 2023 Methane Regulations set conditions for permitting flared gas:**

   - **Gas Flaring Permitting:** Flaring is allowed only in emergencies, if granted an exemption by NUPRC, for safety and with payment of a flaring fee.
   - **Financial Penalties and Environmental Remediation:** Penalties are not cost recoverable nor tax deductible and are intended for environmental remediation and for host communities. NUPRC had been responsible for collecting flare gas penalties until 26 February 2026, Executive Order 9 changed this to direct remittance to the Federation account.
   - **Mandatory Measurement and Reporting:** Companies must meter and keep daily records of gas produced, used, delivered, flared, vented, or lost.

3. **Guidelines for Management of Fugitive Methane and Greenhouse Gases Emissions in the Upstream Oil and Gas Sector, 2022**

   This requires:

   - emissions measurement and verification,
   - performance targets and benchmarks,
   - ongoing monitoring and annual reporting for each flare site,
   - a corrective action framework.[56]

54 https://www.nuprc.gov.ng/wp-content/uploads/2022/11/METHANE-GUIDELINES-FINAL-NOVEMBER-10-2022.pdf.
55 https://www.catf.us/2024/01/mastering-methane-nigeria-clean-air-task-force-taking-methane-pollution-together/.
56 https://www.nuprc.gov.ng/wp-content/uploads/2022/11/METHANE-GUIDELINES-FINAL-NOVEMBER-10-2022.pdf.

These NUPRC Guidelines are designed to support Nigeria's NDC. They also address flare quality, noting that incomplete combustion is a key source of methane emissions. Flares are to achieve 98% destruction efficiency.[57,58] Previous work by Romsom and McPhail shows that real world performance often fails to meet the 98% standard.[59] NUPRC is to produce an annual report demonstrating compliance with each section of the guidelines, including for each flare site.

NNPC Gas Master Plan, January 2026

Government and operators committed to ending routine gas flaring by 2027, three years earlier than the World Bank Zero Routine Flaring by 2030 initiative.

Nigeria's Gas Flare Commercialisation Programme

This programme, managed by NUPRC, offers prospects to monetize wasted gas for social and economic development. Launched in 2016, it relaunched in September 2022 under the 2021 PIA and started implementation in 2026 with 28 companies. It aims to attract USD 2 billion, create over 100,000 jobs, and unlock nearly 3 gigawatts of power generation potential from captured gas.[60]

57 World Bank; https://flaringventingregulations.worldbank.org/nigeria#section2.

58 https://www.wider.unu.edu/publication/capturing-economic-and-social-value-hydrocarbon-gas-flaring-and-venting-solutions-and.

59 Romsom, E., McPhail, K. (2021). Capturing economic and social value from hydrocarbon gas flaring and venting: evaluation of the issues. WIDER Working Paper 2021/5. Helsinki: UNU-WIDER; https://doi.org/10.35188/UNU-WIDER/2021/939-6.

60 https://www.reuters.com/sustainability/climate-energy/nigeria-issues-permits-gas-flaring-project-targets-2-billion-investment-3-gw-2025-12-12/.

Appendix B: Oil and gas industry key terms and definitions

Upstream oil and gas industry operations and ownership structure

Upstream assets have Joint Operating Agreements whereby a project has a single **Operator**, including National Oil Companies (NOCs), appointed by the joint venture with full operational control of the asset. Multiple non-operating **Equity owners** co-fund the project, do not participate in daily management, but share its profits and liabilities.

The Clean Air Task Force for the first time analysed the ten largest IOC's flaring performance by **operatorship** and by **equity ownership**.[61] It apportioned flare volumes to companies based on their percentage ownership stake in the flaring asset, regardless of whether they operate the asset. Company commitments to reduce flaring often do not apply to non-operated assets (for example, CATF found that Chevron is the only company of the 10 companies analysed to also report flaring volumes from non-operated assets).[62] More than half of the flaring volume attributed to these companies comes from their non-operated assets (see Figure B1). Seven of the 10 companies analysed have higher flaring intensities at non-operated assets than operated assets. The Clean Air Task Force (CATF)[63] advocates that oil and gas companies must be held responsible for all emissions across their entire portfolio, regardless of whether they physically run the facility.

Gas flaring and venting

Gas flaring mostly occurs when natural gas (methane) is produced as a by-product of oil extraction. Flaring (the disposal of unwanted gas by burning) may occur for safety reasons – to cope with sudden increases in gas pressure during oil extraction for instance and so avoid a potential explosion. Flaring also occurs **routinely,** however, for example where a producer deems it uneconomic to capture and process the gas for use, reinjection, or sale.[64]

Natural gas losses also occur during the oil production process through **venting** as well as flaring of associated gas.

- **Gas flaring** is the controlled combustion of natural gas associated with oil production for operational, safety, or commercial reasons.

61 https://www.catf.us/resource/flaring-accountability/.

62 See CATF report above, Footnote 2. Exxon https://corporate.exxonmobil.com/publications/metrics-and-data, TotalEnergies https://totalenergies.com/system/files/documents/totalenergies_pr-results-q4-2025_2026_en.pdf, ENI https://www.eni.com/en-IT/media/news/2025/10/ns-eni-confirm-un-gold-standard-methane-emission-reporting.html now also report emissions both on operated and equity basis. Shell, Shell Sustainability Report 2025 only reports Operated flaring metrics; https://www.shell.com/sustainability/reporting-centre/_jcr_content/root/main/section_597740108/promo.multi.stream/1773292334336/bc75b249a20f6bc14f52b418fe212e2b98104de1/shell-annual-sustainability-data-supplement-25.xlsx.

63 https://www.catf.us/resource/flaring-accountability/, November 2024.

64 https://www.opml.co.uk/insights/using-satellite-technology-identify-super-emitter-gas-flares-nigeria.

- **Venting** is the direct release of natural gas into the atmosphere, creating methane and other emissions that are harder to detect than gas flaring.

Definitions of 'routine flaring'

- As recommended in EnergyCC's 2012–2022 report,[65] the definition of Routine Flaring needs to be precise: International best practice in the oil and gas industry has two definitions: 1) flaring only for safety reasons (i.e., flaring to stop production safely) and 2) flaring to continue production.
- The Clean Air Task Force (CATF)[66] Flaring Accountability report recommends this binary approach to regulation:
    1. Routine Flaring: Any flaring that occurs during standard, predictable, or poorly planned operations (including maintenance, process restarts, and infrastructure bottlenecks). This must be banned completely.
    2. Emergency/Safety Flaring: Strictly limited to legitimate, unpreventable emergencies or critical safety events to protect human life and facility integrity.
- This recommendation is based on CATF's findings that 10 of the world's largest IOCs, including ENI, Exxon, Chevron, Shell and TotalEnergies, classify only 30% of their total flaring as 'routine'. The remaining 70% was classified as "non-routine".
- The World Bank Global Gas Flaring and Methane Reduction Partnership and the World Bank Zero Routine Flaring by 2030 initiative apply three categories of flaring:[67]
    1. Safety flaring;
    2. Routine flaring
    3. Non-routine flaring, typically intermittent and of short duration. It is either planned or unplanned following unavailability or failure of equipment that handles the gas during normal operations, until repair or replacement, which allows "*flaring during standard oil production operations when there is insufficient capacity or suitable geology to re-inject, utilize, or market the produced gas*".
- Following the CATF recommendation on flaring definitions, EnergyCC developed a methodology and analysis, documented in *Nigeria's super-emitter flares report,* that shows that five Nigerian offshore super-emitters 'routinely' flared between 47% and 72% of total gas flared (in the period 2012 to April 2026).

65 https://energycc.com/news/energycc-major-studies-on-nigeria-super-emitters-published-by-oxford-policy-management.html.see Box A Corporate Reporting Challenges of flaring emissions.

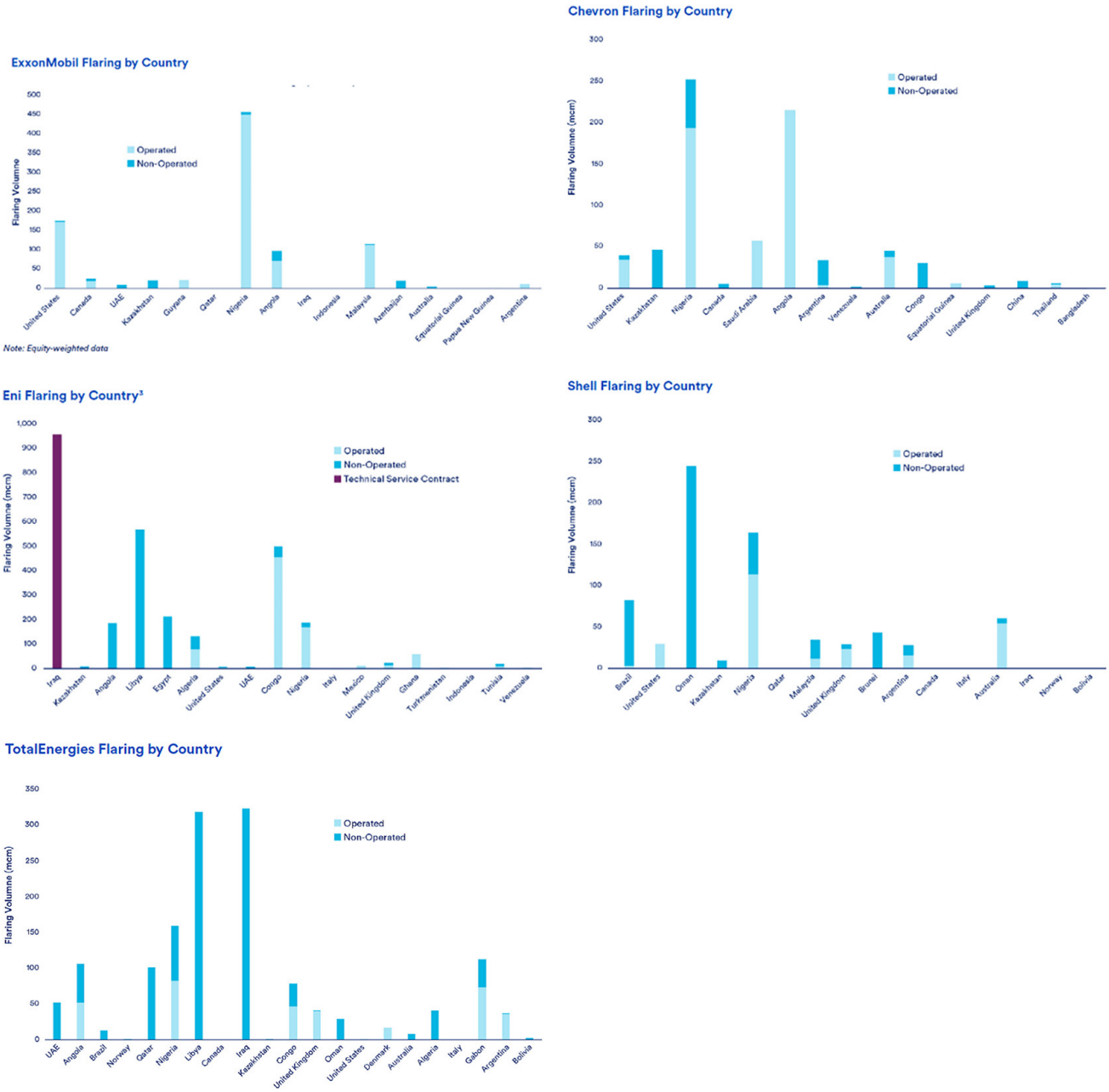
66 Clean Air Task Force, "Flaring Accountability – Global gas flaring by major oil and gas companies and their partners", 12 November 2024; https://www.catf.us/resource/flaring-accountability/.

67 https://documents.worldbank.org/en/publication/documents-reports/documentdetail/755071467695306362.

Satellite measurement

Independent satellite data also shine a light on gas volumes flared in Nigeria relative to other oil producing countries. The Clean Air Task Force's report measures flaring worldwide for ten major IOCs. The country with largest flare volumes globally for Exxon and Chevron is Nigeria, second for Shell, and significant for ENI and TotalEnergies:

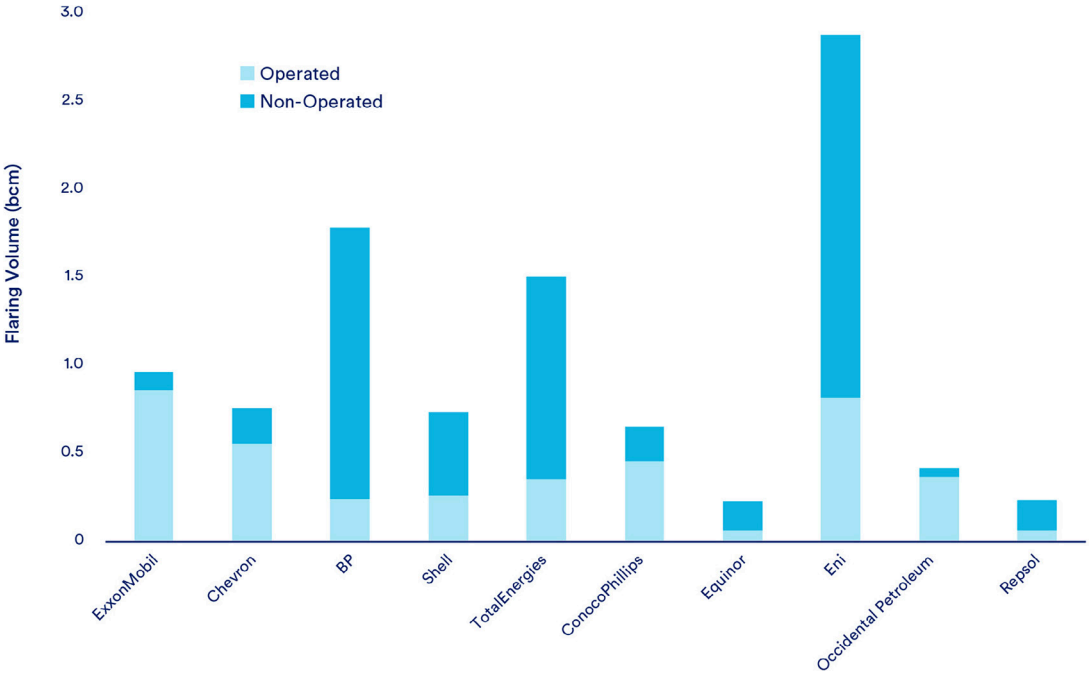
FIGURE B1. Companies' flare volumes (operated, non-operated, and under service contract) by country, 2023



Source: CATF Flaring Accountability, https://www.catf.us/resource/flaring-accountability/.

CATF shows how satellite flaring data is available for operated and non-operated assets (Figures B1 and B2) yet are **frequently excluded from corporate reporting.** The ZRF30 voluntary initiative only mandates operators to disclose emissions for the facilities they operate. A 2022 BBC investigation,[68] shows gaps where IOCs rely on operators for emissions reporting. If these operators fail to fulfil this responsibility, emissions were not reported at all. By 2025, companies that subscribe to UNEP's OGMP 2.0 Framework must report emissions for operated assets, and their entitlement share in non-operated joint ventures is encouraged but not required.

FIGURE B2. Global operated and non-operated flare volumes by international oil company, 2023



Note: Equity-weighted data.
Source: CATF Flaring Accountability, https://www.catf.us/resource/flaring-accountability/.

68 https://www.bbc.com/new/science-environment-62917498.

Appendix C: Acronyms

Bbl	barrel of oil
bcm	Billion (one thousand million) cubic meter
Bonga SW	Bonga South West
bpd	barrels of oil per day
Btu	British thermal unit
CATF	Clean Air Task Force
CCAC	Climate and Clean Air Coalition
CGD	Center for Global Development
CNG	Compressed Natural Gas
CSO	Civil Society Organization
EOG	Earth Observatory Group
FCDO	Foreign, Commonwealth and Development Office
FID	Final Investment Decision
FIRS	Federal Inland Revenue Service
FLNG	Floating LNG Facility
FOSTER	Facility for Oil Sector Transparency and Reform
GHG	Greenhouse Gas Emissions
GFMR	Global Gas Flaring and Methane Reduction partnership, led by the World Bank Group
GMP	Global Methane Pledge
GOR	Gas-oil Ratio
GTL	Gas-To-Liquids
IEA	International Energy Agency
IMF	International Monetary Fund
IOC	International Oil Company
IRR	Internal Rate of Return
JV	Joint Venture
LNG	Liquefied Natural Gas
MMBtu	Million British thermal unit
mt	Million metric tons (tonnes)

mtpa	Million tonnes per annum
NDC	Nationally Determined Contribution
NEITI	Nigeria Extractive Industries Transparency Initiative
NGN	Nigerian Naira
NLNG	Nigeria LNG plant
NNPC	Nigeria National Petroleum Corporation
NOSDRA	National Oil Spill Detection and Response Agency
NRGI	Natural Resource Governance Institute
NRS	Nigeria Revenue Service
NUPRC	Nigeria Upstream Petroleum Regulatory Commission
OGMP 2.0	Oil and Gas Methane Partnership
OPML	Oxford Policy Management Ltd
PIA	Petroleum Industry Act
PSC	Production Sharing Contract
SCAR	Social Cost of Atmospheric Release
UNEP	United Nations Environment Program
USD	United States dollar
VIIRS	Visible Infrared Imaging Radiometer Suite (satellite-based scientific instrument)
VNF	VIIRS Nightfire
ZRF30	Zero Routine Flaring initiative by 2030 – supported by World Bank Group