Natural Resource Governance Institute

Reducing Methane Emissions in Senegal's Hydrocarbons Sector: A Call for Proactive and Transparent Action

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- Senegalese authorities, and oil and gas companies must urgently take preventive measures to mitigate future methane emissions in Senegal's oil and gas industry. With planned extraction expansions, these emissions could impact climate, public health, the environment and more directly, competitiveness of projects.
- Senegal currently emits low levels of methane, and there is political will to reduce methane emissions. However, the government should clearly spell out the country's ambitions in national strategic documents such as the Nationally Determined Contribution (NDC), the Energy Sector Development Policy Letter (LPDSE), and the upcoming long-term low-emission development strategy.
- Greater transparency and disclosure of disaggregated data are needed to boost the confidence of local stakeholders and improve the evaluation of emission reduction measures. The Extractive Industries Transparency Initiative (EITI), with its multi-stakeholder structure and new 2023 standard, can help the government and compagnies to improve transparency in methane emissions reporting.
- As officials are drafting the implementing decree for the new environmental code, the government should reinforce regulations with transparency and accountability obligations, such as requiring companies to share their methodologies to improve data accuracy for public decision-makers. The government should also clarify what constitutes "emergency situations", such as authorized flaring.
- Senegal must advance its MRV (measuring, reporting, and verification) system with independent audits and standardized estimation methods for reliable data. While MRV is crucial long-term, a practical short-term system is needed to track progress without stifling action. Additionally, the government should enhance its teams' technical skills to efficiently reduce methane emissions in the oil and gas sector.
- PETROSEN should proactively manage methane emissions in order to strengthen its global position and meet growing expectations in terms of environmental performance. In the short-term, it should sign the Oil & Gas Decarbonization Charter, demonstrating a stronger commitment to methane emissions.
- Civil society actors and journalists should be better informed and involved in the management of methane emissions. Their active participation can enhance transparency, make companies more accountable, and raise public awareness of the environmental and health impacts of methane emissions.

Introduction

Some pollutants, including methane, contribute directly and simultaneously to air pollution and climate change. According to UNEP's Integrated Assessment of Air Pollution and Climate Change for Sustainable Development in Africa, one million people die prematurely each year on the African continent as a result of indoor and outdoor air pollution. Methane, a greenhouse gas 86 times more potent than carbon dioxide, has contributed to around 30 percent of the rise in global temperatures since the Industrial Revolution. To tackle this problem, the international community has made methane reduction a major priority in the fight against climate change.

The energy sector—including oil, gas, coal and bioenergy production—is responsible for almost a third of man-made methane emissions. Oil and gas companies emit methane, the main component of gas, into the air by venting or flaring excess or unwanted gas, or by allowing it to escape from pipelines, liquefied natural gas (LNG) facilities or other infrastructures. Oil and gas operations contribute around 23 percent total methane emissions from human activities worldwide, and also account for a significant proportion of Africa's total emissions. This makes it a particularly significant emissions reduction target. So, with more low-cost reduction options than agriculture and waste, tackling methane emissions from fossil fuel use represents one of the best short-term opportunities for limiting the most serious effects of climate change. According to the Intergovernmental Panel on Climate Change (IPCC), if the world really wants to avoid the worst effects of climate change, it is imperative to reduce methane emissions from the fossil fuel industry.

Senegal, which became an oil producer in June 2024, aims to exploit its hydrocarbon reserves to boost its economy and reduce energy poverty. As a new producer, Senegal must proactively manage the methane emissions associated with hydrocarbon production. As highlighted in a recent NRGI briefing, Senegalese stakeholders should pay greater attention to reducing methane emissions from oil and gas operations for a number of reasons:

- **Competitiveness of oil and gas projects.** Pressure from governments, investors and customers to reduce emissions from oil and gas operations is growing. From January 2027, methane emission reduction standards will also apply to producing countries. High-emission projects are likely to receive less investment, increasing the risk of these blocks losing competitiveness and/or becoming stranded assets. In July 2023, Japan and Korea launched the CLEAN partnership for the reduction

of LNG emissions toward carbon neutrality. These two major LNG buyers, who had previously focused on security of supply, now require their suppliers to achieve near-zero methane emissions and use the latest MRV protocols for reporting.

- **Access to energy.** Investors are increasingly keen on reducing emissions in their portfolios, making it difficult to finance gas-to-power infrastructure in Senegal. To secure the investments needed for energy expansion, the country would benefit from minimizing its emissions and continuing to demonstrate a clear commitment to sustainable practices.
- **Access to international financing.** Fighting methane emissions, using rigorous and transparent measures, will strengthen Senegal's international credibility, and reinforce its voice in international negotiations. Indeed, the IMF has been urged to require rather than encourage oil and gas producing countries to impose penalties on methane emitters as a condition of access to loans from the Resilience and Sustainability Facility (RSF).
- **Lost economic benefits.** Methane reduction could increase gas production in sub- Saharan Africa by 14 percent. By way of illustration, in Nigeria, flared gas has exceeded the amount of gas supplied to the domestic market for much of the last two decades, costing around $1 billion a year in lost revenue. By capturing flared gas, leaks and rejects, Senegal could increase its revenues and optimize the use of its resources.
- **Local impact on health and the environment.** Methane emissions can affect the health and environment of communities close to extraction sites. In Senegal, although the offshore fields are far from the coast, the government, civil society actors and academics are monitoring and assessing the impact on the environment and fishing, a vital sector for many local communities, in order to protect coastal livelihoods.
- **Impact on climate change.** Although Senegal is not primarily responsible for the climate crisis, it is particularly vulnerable to its impacts. Each additional ton of greenhouse gas worsens the situation, making it essential to reduce emissions to protect the country and its citizens, while contributing to the global effort to combat climate change.

In recent years, Senegal has continued to revise its energy policy, adopting new plans and legislation to guarantee universal access to energy and support its development objectives. This represents a major opportunity to integrate this essential component of the governance of the oil and gas sector into the planning and decision-making process. A robust and informed public debate on this issue will support the strategic planning process and ongoing reforms, taking into account all national concerns.

With this briefing we aim to inform public debate by providing an overview of methane emissions management in Senegal's oil and gas sector. We focus on documenting current efforts to reduce methane emissions, the current emissions profile, major challenges and the identification of possible solutions.

Current landscape of methane emissions in Senegal

Senegal today, like most African countries, is a low emitter and should be given priority in the allocation of the global carbon budget. Although online data sources on methane emissions are scarce (and not wholly reliable), Senegal emits very little methane. Indeed, in 2023, Senegal's annual methane emissions amounted to 390 kilotons, or just 0.1 percent of total global methane emissions. The main sources of methane emissions in Senegal are the agriculture, waste and energy sectors. Methane emissions from the energy sector account for just 3 percent of Senegal's methane emissions. And even here, the bulk of methane emissions from the energy sector come from bioenergy, which will account for 92 percent of methane emissions from the energy sector in 2023.

Methane emissions from the oil and gas sector are therefore low and will break down as follows in 2023:

Table 1. Methane emissions in 2023 by type and source in Senegal

Type	Total methane emissions (kt)	Fugitive methane emissions (kt)	Methane emissions by controlled release (kt)
Gas pipelines andLNG facilities	0.05	0.02	0.03
Onshore gas	0.03	0.01	0.02
Onshore oil	0.34	0.07	0.27
Other (oil and gas)	NA	NA	0.75

Sources of methane emissions in oil and gas extraction

Methane emissions in the oil and gas industry come from several sources at the plant level:

Equipment leaks. Valves, compressors, pipelines and other equipment can leak methane, which is often difficult to detect and control.

Flaring. Flaring is the practice of burning off excess gas to prevent the risk of explosion. Although necessary for safety, flaring produces significant emissions of greenhouse gases and atmospheric pollutants. These environmental impacts make flaring a controversial practice, underlining the need for more responsible and sustainable alternatives.

Evaporation losses. During storage and transport, methane can evaporate from tanks and other containers, contributing to overall emissions.

Accidental release and equipment failure. Technical failures and accidents can lead to significant methane releases into the atmosphere.

Degasification. This practice consists of releasing the associated gas directly into the atmosphere without burning it. Degasification is particularly problematic because unburned methane has a global warming potential 25 times greater than that of carbon dioxide over a 100-year period (World Bank, 2023).

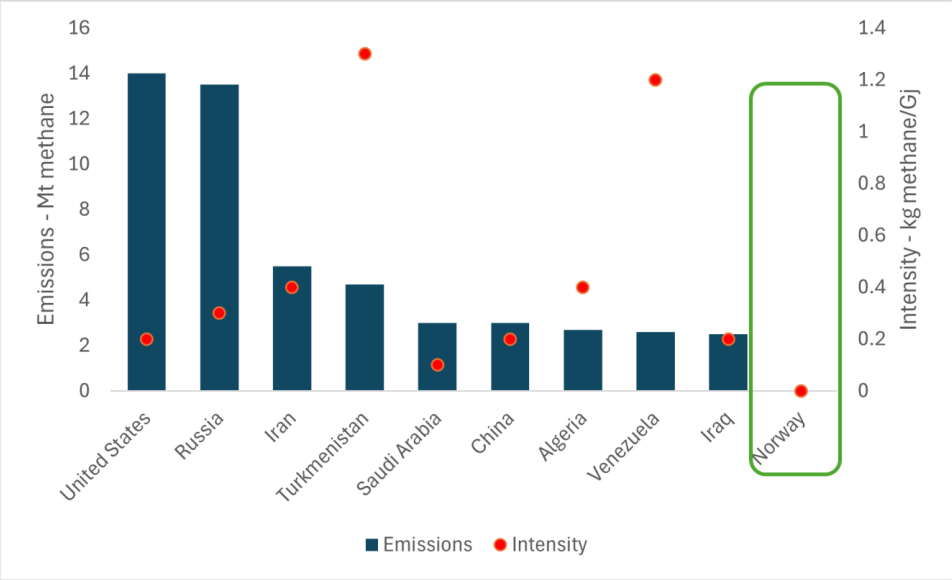
These different sources of methane emissions highlight the environmental challenges facing the oil and gas industry, and the need to implement more sustainable and efficient practices to minimize climate impact.

Onshore oil and other oil and gas sources are the main contributors to methane emissions by controlled release, while pipelines and LNG facilities, as well as onshore gas, have lower total methane emissions. Although International Energy Agency data do not clearly specify the sources of Senegal's emissions, it is possible that it concerns African Refining Company (SAR), a PETROSEN subsidiary that processes crude oil into refined products. If this is the case, SAR will be instrumental in improving the monitoring of methane emissions and the implementation of emission reduction measures.

Oil operations are expanding rapidly, with several projects underway or planned in the country. The extraction of the first barrel of oil is generating legitimate enthusiasm among stakeholders, and the country is counting on its hydrocarbon reserves to generate significant revenues and support its development objectives, aspiring to reduce its dependence on fuel imports and mitigate greenhouse gas emissions by substituting heavy fuel oil with gas for electricity generation.

However, this transition to producer status also raises concerns about increasing emissions, both direct and indirect. International experience shows that many producers have seen their methane emissions increase dramatically in the early years of oil and gas development. One well documented example from Africa is Nigeria, where methane emissions rose by 3.8 times in the first ten years after oil production began in 1957, compared with the previous decade, which had itself seen a 2.6-fold increase. In Nigeria, flared gas alone has outstripped domestic gas supply for much of the last two decades, costing the government around $1 billion a year in revenue (although this situation has improved recently). Nigeria suffered from a regulatory deficit at the start of production, with ineffective controls on the practices of oil and gas companies. Many other countries also saw their national methane emissions increase significantly from the start of production. In the case of Equatorial Guinea, this was a 14-fold increase in the first 10 years, compared with a 6- fold increase in the previous ten years. Indeed, these countries' emissions remain low overall, but they have missed out on the opportunity to make their oil and gas cleaner, along with the associated benefits. At the same time, some countries have been proactive enough to produce net methane emission projects. Norway is now proving that it is possible to implement projects with net zero methane emissions operations.

Figure 1. Total methane emissions and methane production intensity in oil and gas operations in select oil and gas producers, 2022



In Senegal, environmental and social impact studies for BP and Woodside oil and gas projects provide an estimate of the companies' expectations in terms of future emissions, and give an idea of their declared efforts to promote modern, environmentally friendly operations. For the first phase of the Grand Tortue Ahmeyim (GTA) project, if all the measures announced in the environmental and social impact study are implemented correctly, BP would expect methane emissions of 1,092 tons per year.

Table 2. Methane Emissions Identification Matrix for Phase 1 of the GTA Project

Sources of methane emissions at GTA project sites (T/year)							
Project activity chains	**Installation of equipment and subsea pipeline**	**Construction and installation of the LNG hub terminal near the coast**	**FNL G**	**Connection and commissioning activities FPSO**	**Start-up flaring**	**Total emission by phase**	**References**
Drilling phase	4.77	1.4		1.8		17.97	V1-EIES - GTA-P.2-37
Operations phase		44	38	30	959	1,072	V1-EIES - GTA-P.2-38
Planned closure phase	**0.54**	**1.52**		**0.18**		**2.24**	V4-EIES-GTA-P.201
Total methane emissions						**1,092.21**	

Source: GTA Environmental and Social Impact Assessment, Volume 1 and Volume 4

This profile shows that the operations phase is the main source of methane emissions, mainly due to the extensive activities involved in building and operating

the LNG hub terminal and associated facilities. The drilling phase also contributes significantly, albeit less than operations. Measures to mitigate methane emissions would be crucial, particularly during the operational phases, in order to minimize environmental impact.

For the Sangomar field, Woodside has said that methane emissions will peak at 7.2 kilotons during the commissioning phase, followed by a stable level of methane emissions at 4.3 kilotons per year. This corresponds to 55 and 33 respectively of the current estimate of annual methane emissions from Senegal's energy sector (based on IEA data for 2023). The main sources of methane emissions expected from the facility are flaring (methane leakage), degasification of cargo tanks and fugitive process emissions.

Table 3. Methane emissions of phase 1 of Sangomar project

Activities	Source of emission	Methane Estimated emission quantity (T)	References
Drilling phase	Estimated flaring volumes during drilling and completion operations	144	EIES-Woodside/P.349
	Total atmospheric emissions associated with drilling activities	9	EIES-Woodside/P.350
	Estimated flaring volumes during commissioning activities	3,955	EIES-Woodside/P.351
Installation and commissioning phase	Total atmospheric emissions associated with vessel use during installation and commissioning	7	EIES-Woodside/P.352
	Estimated discharges from cargo tanks	3,236	EIES-Woodside/P.352
	Total atmospheric emissions associated with flaring during operations	876	EIES-Woodside/P.354
Production and FPSO operations phase	Estimated atmospheric emissions associated with fuel consumption during operations	74	EIES-Woodside/P.354
	Estimated atmospheric emissions associated with transport during operations	1	EIES-Woodside/P.355

tanks on the FPSO **Estimated cargo tank ventilations**	**86**	**EIES-Woodside/P.355**
Estimated cargo tank ventilations	3,236	EIES-Woodside/P.356

Source: Environmental and social impact assessment of the Sangomar project

This profile highlights that the first phase of the Sangomar project generates mainly methane emissions during its operational phases, notably through significant contributions from flaring, fuel consumption and venting activities associated with production operations and FPSO activities. To mitigate the project's environmental impact, Senegalese authorities and companies must manage and reduce these emissions.

The Ministry in charge of Environment and Petroleum are currently finalizing the strategic environmental assessment of Senegal's oil and gas sector. This exercise, which includes emissions modeling, should contribute to a better estimate of methane emissions from the oil and gas sector, and to the implementation of effective mitigation strategies and policies.

In the oil and gas industry, the risk of underestimating methane emissions is significant, in addition to the persistent underestimation in emissions reporting. Studies and reports confirm this phenomenon. The disparity between predicted and actual emissions underlines the need for rigorous monitoring and effective measures to ensure proper management of methane emissions.

The first phases of the GTA and Sangomar projects are the only operational facilities in Senegal. The Yakaar-Teranga project, located entirely in Senegalese waters with reserves comparable in size to the GTA project, is awaiting a final investment decision. Its exploitation will most likely lead to a significant increase in methane emissions due to plans to convert gas into electricity, a process involving pipelines and the use of additional facilities.

Senegal is integrating the future phases of GTA and Sangomar into its energy planning. The final investment decision for the second phase of GTA, originally scheduled for 2022, has been postponed due to delays and structural changes. The government is now targeting 2025 for this approval, although Rystad Energy

analysts believe it could be delayed until 2026. In Rystad's view, the final investment decision for the third phase could be delayed until 2032. For Sangomar, gas production is planned for the second phase, for which the final investment decision has not yet been taken. In addition, other gas projects could emerge in Senegal, although the 2020 licensing round did not result in additional licenses. In light of these upcoming developments, the government, PETROSEN and companies must rigorously consider emission-reducing technologies in the Yakaar-Teranga projects, as well as in future phases of GTA and Sangomar, before reaching the final investment decision. This will not only help keep Senegal in the circle of low-emission countries, but also increase the competitiveness of its oil and gas projects.

With the imminent expansion of Senegal's energy sector, including the introduction of new gas projects, Senegalese authorities must take preventive measures to minimize environmental impact.

Moreover, a public opinion survey on methane conducted by the Global Methane Hub (GMH) highlighted the urgent need for awareness and action on methane emissions, particularly in Senegal, where familiarity with methane remains low. This will require strong political will and the government to implement strict regulations to ensure that companies effectively take into account emission reduction mechanisms.

Senegal's commitment and actions to reduce methane emissions in the oil and gas sector: progress and next steps

Unlike countries like Nigeria and Ghana, which have explicitly incorporated targets for reducing methane emissions from the oil and gas sector into specific national policies, Senegal's ambitions in this respect are not yet explicitly expressed in a strategic planning document. Neither the Nationally Determined Contribution (NDC), nor the previous Energy Sector Development Policy Letter (ESDPL), nor any of the other documents we consulted explicitly mentioned methane emission reduction targets for the oil and gas sector. Fortunately, these documents are currently being renewed as part of a new planning cycle by the Ministries in charge of environment and energy. Also, a long-term low-emission development strategy is currently being drawn up, offering an opportunity to express political will more explicitly.

A number of methane initiatives nevertheless signal a degree of political will, although communication challenges remain.

Legal and regulatory framework

Article 133 of Law no. 2023-15 of August 2, 2023 on the Environmental Code laid down the principle of banning flaring except in the exceptional cases listed exhaustively in the same article (such as exploration operations, well testing, maintenance and emergency situations). The article also announced that the implementation procedures, including administrative and penal sanctions, will be set by decree (currently being drafted). This provision echoes and reinforces the ban on flaring already expressed in the appendix to the 2019 Petroleum Code, although none of these regulations specifically accounts for methane emissions. Until now, the Petroleum Code has favored an indirect approach, referring to standards drawn up by other bodies without incorporating them directly into environmental legislation. The new Environmental Code also sets out the "polluter pays" principle.

This principle aims to internalize the environmental costs of economic activities by making those who generate them responsible. It can be implemented through various mechanisms, such as pollution taxes,emission quota systems creating a market for emission permits, and financial subsidies and incentives, among others. Senegal has already begun to explore carbon taxation. A study by the Social and Economy Research Consortium (CRES) in Senegal showed that such taxation, with various revenue recycling options, could be the most effective tool for aligning the country's economic needs and development priorities. This is due to its low administrative cost and direct price signal to issuers.

One of the most imminent milestones in the implementation and operationalization of best practices in methane emissions reduction is that of the application decrees for the new environmental code. The Ministry in charge of Environment is currently developing the application decrees for the environmental code, which will clarify emergency situations, for example, where flaring is permitted.

Government and private sector involvement in international initiatives

Senegal has recently signed up to several initiatives, signaling a growing political will to bring methane emissions under control. One is the Global Methane Pledge, through which Senegal has pledged to make a voluntary contribution to reducing global methane emissions by 30 percent (compared with 2020 levels) by 2030. The Climate and Clean Air Coalition (CCAC), which provides secretariat services for the Global Methane Pledge, is supporting the French Ministry of the Environment and Ecological Transition with a project to build the capacity of Senegalese ministries to assess and reduce emissions of short-lived climate pollutants (SLCPs). The project includes the development of a National SLCP Plan and a National Methane Roadmap to update the 2025 NDC. This roadmap will identify SLCP mitigation measures and the ways and means of implementing them in certain areas, such as energy. In accordance with the United Nations Framework Convention on Climate Change (UNFCCC), Senegal will also be required to submit a biennial transparency report (RTB) by 31 December 2024. This report it should include: information on National Inventory Reports, and progress in implementing the NDC (including mitigation and adaptation policies and measures, climate change impacts and adaptation, financial support, technology development and transfer, as well as capacity building needs and improvements).

The government has also joined the Global Flaring and Methane Reduction Partnership (GFMR) with the World Bank, aimed at reducing emissions from flaring,

venting and methane leaks. Recently, the Senegalese government also joined the New Producers for SustainableEnergy (NPSE), which supports the sustainable development of new oil and gas producers like Senegal by facilitating the sharing of knowledge and experience. Senegal has twice sent a diverse delegation of officials to train and acquire the skills needed to develop plans to reduce methane emissions in the oil and gas sector.

In addition to government initiatives, oil and gas companies are actively involved in various global initiatives such as The Oil & Gas Methane Partnership 2.0,Oil and Gas Decarbonization Charter (OGDC), Oil and Gas Climate Initiative (OGCI), Methane Guiding Principles (MGP), WorldBank Zero Routine Flaring by 2030 Initiative (ZRI) managed by GFMR.

Global initiatives to reduce methane emissions

Oil and Gas Decarbonization Charter (OGDC)

Launched by the COP28 Presidency and the Kingdom of Saudi Arabia at COP28 in Dubai, signatories commit to achieving net-zero operations (scopes 1 and 2) by 2050, ending routine flaring by 2030, and achieving near-zero upstream methane emissions by 2030 (with a methane intensity of 0.2%). Signatories also commit to adopting industry best practices for emissions reduction, including investing in the energy system of the future, increasing transparency, measurement and independent verification of GHG emissions, aligning with industry best practices to accelerate the decarbonization of operations by 2030, and reducing energy poverty.

Oil and Gas Methane Partnership 2.0 (OGMP 2.0)

OGMP 2.0 is a measurement-based reporting framework under the auspices of the United Nations Environment Programme. Members must annually report methane emissions from their operated and non-operated assets, define and disclose an emissions reduction target (either an absolute emissions target or an intensity target) and submit implementation plans. OGMP 2.0 has been designed to help members make progress via a multi-year process with rigorous deadlines, requiring a finer and better understanding of emissions.

Members join a "community of practice" that includes technical workshops and peer-to- peer exchanges on the transition to measurement-based methane emissions reporting.

Oil and Gas Climate Initiative (OGCI)

A CEO-led initiative bringing together leading oil and gas companies. Members' commitments include net-zero operations (scopes 1 and 2), the end of systematic flaring by 2030, and near-zero upstream methane emissions by 2030 (methane intensity of 0.2%).

Methane Guiding Principles

A partnership of companies and international organizations that promotes collaboration and the sharing of practical tools and guidelines to enable methane reduction.

World Bank Zero Routine Flaring by 2030 Initiative (ZRF)

Launched in 2015, the ZRF Initiative commits governments and oil companies to ending systematic flaring by 2030 at the latest. Participating governments and oil companies commit to report annually on their flaring and progress under the Initiative. Commitments are monitored through a variety of means, including government and company reports and satellite observations.

The table below lists the companies operating in the Senegalese sedimentary basin that have signed up to these initiatives.

Table 4. Commitments to emission reduction initiatives by companies operating in the Senegalese sedimentary basin

Oil and gas companies in Senegal	OGMP 2.0	OGDC	OGCI	MGP	ZFI
BP	Yes	Yes	Yes	Yes	Yes
Fortesa	No	No	No	No	No
Kosmos	No	No	No	No	No
Oranto	No	No	No	No	No
Petronas	Yes	Yes		Yes	Yes
Petrosen	No	No	No	No	No
Totalenergies	Yes	Yes	Yes	Yes	Yes
Trace Atlantic	No	No	No	No	No
Woodside*	Yes	Yes		Yes	Yes

**Woodside also participates in other initiatives such as ASEAN MLP, Scope 3 emissions reduction (Midstream Initiative), Advancing Global Methane Reduction, Methane Taskforce (AEP) and the Methane Taskforce (IPIECA).*

Improving the transparency and quality of reporting in the energy sector is crucial to sustainable resource management and to meeting stakeholder expectations. Oil company reporting challenges include insufficient coverage of unlisted companies and national oil companies, the increased need for audits to improve confidence and data quality. The EITI, with its new reporting requirements and multi-stakeholder structure, will play a key role in improving methane emissions reporting in the hydrocarbon sector.

Accountability actors in Senegal need disaggregated data at national or, ideally, project level to verify whether companies are meeting their commitments, rather than aggregated global reports with limited usefulness to local stakeholders. It is encouraging that some companies in Senegal have signed up to these initiatives, but the lack of participation by major players such as Kosmos and PETROSEN raises concern.

Strategies and technologies planned for the GTA and Sangomar projects

This section explores some of the strategies and technologies developed in the development plans validated by the Senegalese government to reduce methane emissions and improve the environmental management of oil and gas projects.

Technologies in GTA's FLNG and FPSO

BP expects to design, build and operate the Floating Production Storage and Offloading (FPSO) and Floating Liquefied Natural Gas (FLNG) units in such a way so as to reduce the use of flaring on a regular basis. It is clearly stipulated in the environmental and social impact studies that no flaring will be carried out during routine operations, but a night burner equipped with a nitrogen purge system will be used during normal operations. Although costly, this nitrogen purge system offers the advantage of greater safety by reducing the risk of fire (as nitrogen is inert) and greater operational reliability by reducing production interruptions. Above all, this system helps reducing fugitive methane emissions. It enables precise control of methane evacuation, directing it towards recovery or controlled combustion systems. Without this purge, oil operations risk unexpected methane leaks that are difficult to control. The Senegalese government must ensure that the GTA project's nitrogen purging system meets the highest standards of safety, efficiency and environmental protection, in accordance with the engineering documents, the flaring and purging philosophies for the FPSO and FLNG, and the independent audits and inspections provided for in the environmental and social impact study.

Reinjected gas at Sangomar

Although the first phase of the Sangomar project focuses primarily on oil production, it also includes a significant amount of associated gas. This gas will be reinjected during this initial phase, pending a reassessment of utilization options after two years of production. Woodside will use this period to assess the feasibility of extracting non-associated gas in future phases, given the complexity of the reservoirs. This strategy demonstrates a commitment to minimizing flaring. However, The government and Woodside will need to make a rapid operational decision after this period to avoid a situation where they must choose between flaring and extraction. Current planning envisages the use of Sangomar gas as early as 2027 to supply the Malicounda power plant. The government must therefore align this timetable with the completion of the Senegal Gas Network (RGS), PETROSEN subsidiary responsible for transporting this gas. According to the IEA's assessment, the RGS is still seeking financing, making this coordination even more essential.

Procedures for methane emissions monitoring in ongoing project development

The government has said in a interview it has put in place procedures to monitor methane emissions from ongoing projects, underlining the importance of compliance and transparency. These procedures, which include requests for authorizations from the relevant authorities, are designed to ensure compliance with current regulations. Detailed reports are also required before and at the end of the flaring process to provide accurate data on actual emissions. Greater transparency on these procedures and the content of these reports is essential to inform public debate on this issue and support the effective evaluation of methane emission reduction measures. By adhering to these monitoring practices, oil and gas companies can demonstrate their commitment to reducing methane emissions.

Ministries in charge of Environment and Energy should precisely define “emergency situations” within the framework of routine flaring regulation in Senegal to ensure uniform application of the regulations.

Barriers to methane emissions management in Senegal

We commend the Senegalese government's proactive approach to methane. Despite Senegal's minimal responsibility for climate change, and even before the start of hydrocarbon production at scale, authorities are exploring how to minimize methane emissions. International partners should support Senegalese authorities with technical and financial support, especially as Senegal can learn from the experiences of established producers such as Nigeria. To succeed, however, the country must overcome certain fundamental challenges. In this section, we explore some of these obstacles to effective emissions management in the upstream oil and gas sector.

Transparency challenges in methane emissions reporting

The principle of transparency, reflected in the agreements of the UNFCCC to which Senegal is party, is reinforced by the rules set out in Article 13 of the Paris Agreement. The rules for implementing these agreements, detailed in the Katowice climate package, increased countries' obligations in terms of data collection and quality, establishing a new transparency framework for Nationally Determined Contributions (NDCs). However, the main challenge in this new global transparency context is the poor capacity of many countries to measure, report and verify progress in implementing their NDCs.

During oil and gas operations in Senegal, the government monitors emissions by using metering systems available at all facilities; these are backed up by inspections carried out by the government. Companies periodically send reports to the relevant authorities and submit annual reports including measurements of methane and greenhouse gas emissions. Senegal also has an national MRV system, and in an interview a representative of the Ministry of Energy, Petroleum and Mines reported that the ministry also has an MRV system for each project, and is developing a specific MRV system for the hydrocarbons sector.

While the development of these MRV systems is essential in the long term, in the short-term Senegal must develop more practical systems for tracking progress. A solid baseline, against which a company can track progress, is complex and takes a lot of time and effort to produce. On the way to better data, company executives often discover that their emissions are actually much higher than they initially thought—even in the U.S., where methane measurement is most developed. Focusing solely on these MRV systems therefore risks discouraging action. Senegalese officials should therefore define short-term targets to monitor and demonstrate progress, including the detection, management and prevention of super-emitter events; the cessation of non-routine flaring and venting; and leak detection and repair activities to address fugitive emissions.

An Energy Information System (SIE) is housed at the Ministry of Energy, Petroleum and Mines. Some reports point out that not all SIE staffs are trained in climate change issues. The SIE faces major challenges, including an inadequate budget, a lack of funding for data collection, the absence of a web portal for data access, and a lack of suitable IT tools and logistics. To remedy these shortcomings, Ministry of Energy, Petroleum and Mines officials should build capacity in the production, processing and analysis of greenhouse gas inventory data; characterize industrial energy consumption and emissions according to the Intergovernmental Panel on Climate Change (IPCC) guidelines.

Despite these initiatives in favor of greater transparency, significant challenges remain:

- **Independent, systematic verification of methane emission estimates.** Without external auditing, it is difficult to guarantee the accuracy of data from operators, who may underestimate emissions to reduce their liability. It is crucial to reinforce MRV systems with regular third-party audits to ensure data integrity. In addition, the EU methane regulation, which was provisionally approved by EU legislative bodies at the end of 2023, stipulates that from January 2027, all domestic and imported gas must comply with strict MRV standards. This includes demonstrating equivalent or better compliance with EU standards, which requires independent third-party verification of emissions data. This measure is designed to increase the transparency and reliability of reporting, and to ensure that data supplied by gas suppliers meet high standards of accuracy. The regulations specify that third-party verification must be carried out by accredited bodies independent of the operators and importers subject to the regulations. This is crucial to mitigate any potential conflict of interest and ensure unbiased reporting. To address potential concerns about compliance with reporting requirements or unsubstantiated challenges to government estimates by companies, the Senegalese government could implement the International

Monetary Fund's (IMF) innovative proposal to base methane royalties on oil and gas production levels and assumed emission rate factors. The burden of proof to demonstrate lower than default emission rates would fall on companies; once they prove lower emissions, they would receive a refund from the government. Senegal's participation in the IMF's new Resilience and Sustainability Facility (RSF) for climate change mitigation should result in valuable financial and technical support to implement these and other measures.

- **No legal requirement for companies to share their estimation methodologies.** Without this transparency, the data companies provide may be biased and difficult to verify, which can lead to underestimation of actual emissions and can compromise reduction efforts. Furthermore, differences in methodologies between companies make the comparison and aggregation of national data complex, hindering accurate reporting and the government's ability to develop emission reduction strategies. Authorities could improve data transparency and accuracy for public decision-makers by imposing regulations requiring companies to share their methodologies. Moreover, the government should work with operators to harmonize data management systems.
- **Poor quality of data on methane emissions in Senegal.** To achieve this, the government should put in place mechanisms to validate data at several levels and ensure that data from the country's monitoring and assessment systems meet the standards set by IPCC . This process will better inform policies and actions aimed at mitigating the effects of climate change and promoting sustainable development in Senegal.
- **Insufficient transparency requirements.** The EITI has an important role to play in enhancing transparency. Indeed, requirements 2.1 b, c, e and 3.4 of the 2023 standard encourage states and companies to disclose their GHG policies and emissions. Future EITI reconciliation reports could provide more information on emissions profiles and the state's GHG reduction commitments. More importantly, this would help strengthen companies' accountability. It would also make it possible to check how companies' annual emissions compare with the estimates included in earlier environmental and social impact assessments.

Ultimately, improving the transparency and quality of data on methane emissions in Senegal is essential to effectively inform policies and actions aimed at mitigating the effects of climate change and promoting sustainable development.

Involvement of PETROSEN

Methane management in the energy sector is a complex issue requiring a multi-dimensional approach and the involvement of various stakeholders. Effective management of methane emissions requires inter-institutional cooperation and an

integrated approach combining environmental, energy and maritime policies to ensure coherent management. Coordination between the various actors is often complex and if poorly managed can lead to inefficiencies. In Senegal, several institutions are involved in the management of methane emissions in the energy sector, with different roles as shown in the table below:

Table 5. Institutions and their functions

Institutions	Functions
Ministry of Energy, Petroleum and Mines	Implementation and supervision of government policies relating to the hydrocarbons sector
French Ministry of the Environment and Ecological Transition (MEDDTE)	Formulation and implementation of environmental monitoring and pollution prevention policies in all sectors
National Maritime Affairs Agency (ANAM)	Implementation of maritime policy and application of international conventions, maritime codes and regulations
DIREC (EnvironmentalRegulations and Control Department)	Implementation of the government's environmental policy, protection against pollution and nuisance
GTI (Interministerial working group)	Coordination of inter-institutional actions to reduce methane emissions
National Committee on Climate Change (COMNACC)	Consultation and coordination body that supports the Ministry in charge of the Environment in implementing the UNFCCC

The diversity of the actors involved in Senegal's approach to dealing effectively with methane emissions shows that the government recognizes the multidimensional nature of methane management. However, national oil companies (NOCs) including PETROSEN need to play a greater role in managing methane emissions from the oil

sector. Proactive management of methane emissions by NOCs not only helps slow global warming, but also avoids economic losses associated with gas flaring and leakage, while meeting the growing expectations of investors and regulators in terms of environmental performance. This is all the more important as NOCs play a crucial role in helping states to exercise effective project control to regulate the pace and means of production. This is one reason why NOCs have received greater attention in recent years. At COP28, fifty companies, including 30 NOCs, among them 6 African NOCs (notably Angola's Sonangol, Nigeria's NNPC and Namibia's Namcor), signed a decarbonization charter pledging to reduce Scope 1 and 2 emissions to zero, achieve a methane intensity of 0.2 percent, and eliminate routine flaring by 2030.

In Senegal PETROSEN has a broad mandate that encompasses not only upstream, but also transport and downstream through its subsidiaries RGS and PETROSEN TS. A key player in the hydrocarbon sector, PETROSEN has not yet signed the decarbonization charter and would benefit from stepping up its involvement in methane emissions management for the reasons specified above. By adopting proactive methane management practices, PETROSEN can both strengthen its position on the world stage by attracting international investment and technology partnerships, and meet its environmental responsibilities. Indeed, PETROSEN can access various financing opportunities for methane reduction.

Low contribution from civil society

Civil society actors can play an important role in the management of methane emissions through monitoring, awareness-raising and advocacy. By monitoring industrial activities and demanding data transparency, they help to identify sources of emissions and hold companies accountable. In addition, by raising public awareness of the environmental and health impacts of methane and advocating for more sustainable policies and practices, civil society actors can lobby for concrete measures to reduce emissions. Yet civil society organizations, think tanks and academics in Senegal are not yet sufficiently aware of the importance of methane emissions and their impact on the climate. Although environmental and health issues are at the heart of the concerns of several Senegalese CSOs, very few of them focus specifically on methane emissions. These CSOs have limited knowledge of methane emissions, particularly those from the hydrocarbon industry. During interviews with representatives of some organizations, it became clear that they aspire to greater participation in the Senegalese government's strategic planning processes for reducing methane emissions. They would like to be more closely consulted and involved in the development of plans to combat methane emissions,

in order to contribute fully to national objectives and commitments. This situation calls for more in-depth dialogue and capacity-building to enable these stakeholders to better understand, monitor and take action in line with Senegal's methane emissions commitments.

Furthermore, Senegalese media can play a crucial role in managing methane emissions by raising public awareness of environmental impacts and monitoring corporate practices. They can also mobilize public opinion to support measures to reduce methane emissions, and contribute to dialogue between stakeholders to promote transparency and accountability.

Conclusion

Managing methane emissions in Senegal is a major issue as the country continues the development of its oil and gas industry. Although Senegal is currently a low emitter of methane, the planned expansion of this sector raises concerns about its future impact on emissions.

This growth could affect the competitiveness of Senegalese projects and have environmental repercussions. The government must tap the growing political will to engage proactively and reduce these emissions to shape national strategies to ensure coordinated and effective action. This implies rigorous monitoring, the adoption of innovative technologies and effective environmental management practices. In addition, data transparency and the guarantee of independent audits are crucial elements in ensuring the effectiveness of emission reduction measures. At the same time, PETROSEN's must become more proactive and civil society actors must commit more to reinforce accountability and encourage a transition toward more sustainable policies.

Ultimately, reducing methane emissions in Senegal is crucial not only to mitigating the effects of climate change, but also to fostering sustainable and resilient economic development. Collective action and a long-term vision are needed to ensure a cleaner, more prosperous future for all Senegalese. The Senegalese authorities must act now to avoid repeating the past mistakes of other countries, such as Nigeria, in terms of methane emissions, and to adopt preventive and sustainable measures to ensure responsible energy development in Senegal.

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