

Ouki, Mostefa A.

**Working Paper**

## Prospects for a potential African gas renaissance en route to a "just energy transition"

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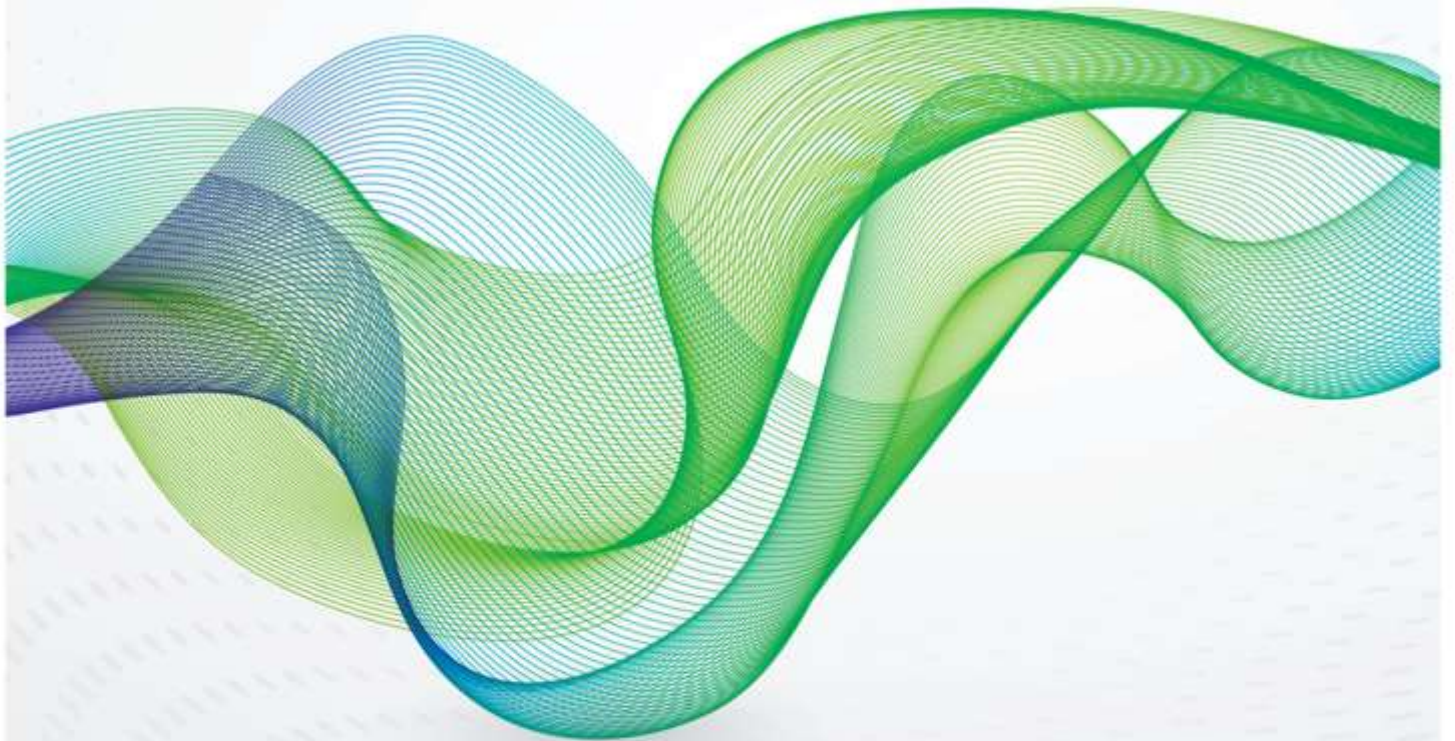
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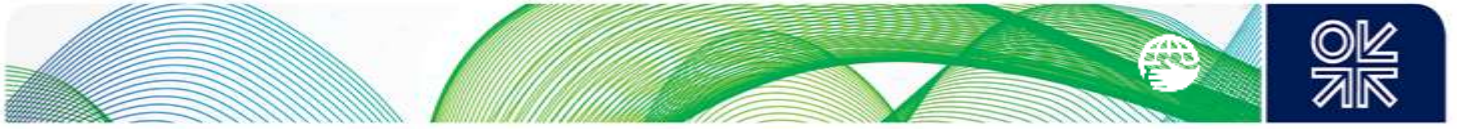
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September 2023

# Prospects for a potential African gas renaissance en route to a 'just energy transition'



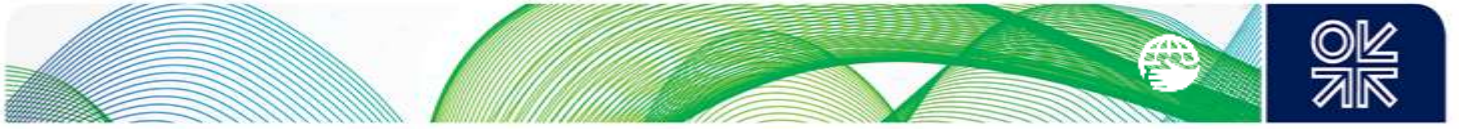


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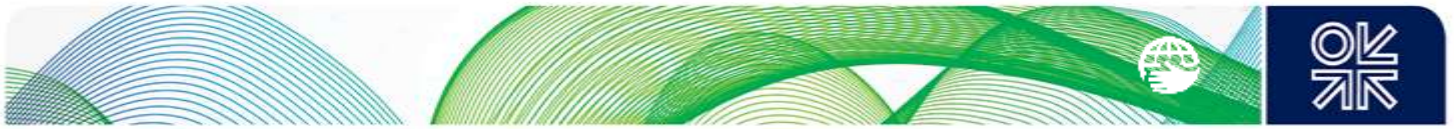
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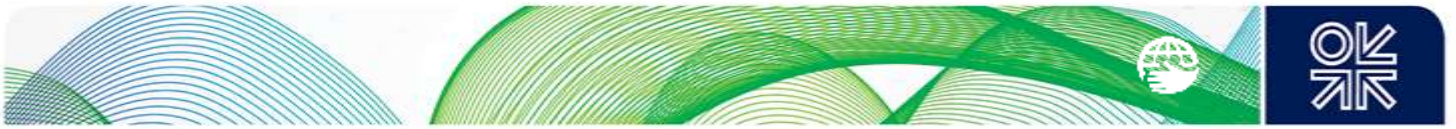
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## Introduction

The impact of the Russia-Ukraine war on the natural gas trade, *inter alia*,<sup>1</sup> continues to be felt well beyond Europe's borders. As the accelerated decarbonisation of the world's economies is being pushed forward, Europe's unexpected interest in alternative sources of gas imports to replace Russian gas has triggered a temporary wave of political enthusiasm for African gas.<sup>2</sup> Such European interest in gas has been given a cautious welcome in Africa. But it has provided another opportunity for African policymakers to reiterate their deep frustration about the restricted flows of international hydrocarbon investments in Africa.

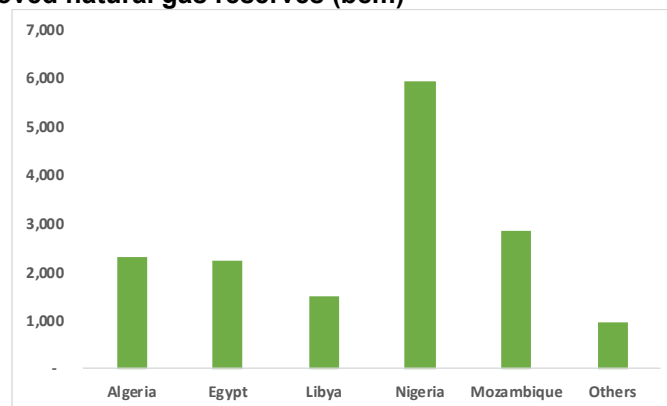
Attracting investments in African oil and gas projects was a complicated process even before the rise of investment restrictions due to new international decarbonisation measures. This is caused by problems related, for example, to existing legal, fiscal, and regulatory frameworks; creditworthiness of domestic energy utilities; domestic energy pricing policies; and political risks.

Faced with uncertain investment prospects in the energy sector which would address Africa's persistent low level of energy access, African countries are attempting to leverage the present interest in African gas to fully monetise their natural gas resources or reserves. The potential emergence of a new global 'golden age' for natural gas was explored a couple of times during the last decade,<sup>3,4</sup> but regions like Africa have yet to experience it. Could the fallout of the Russia-Ukraine war and its impact on international gas markets bring about the start of a structural change in Africa's natural gas scene? This paper focuses on two key questions: will the natural gas crisis in Europe serve as a catalyst for wider gas developments in Africa, and what are the implications for the continent's 'just energy transition'?

## 1. Uneven natural gas endowment and developments

The African continent includes more than fifty countries but as indicated in Figure 1, five of them (Nigeria, Algeria, Egypt, Libya, and Mozambique) hold more than 90 per cent of Africa's proved reserves of natural gas. Sizeable gas deposits have also been discovered in Tanzania, Mauritania, and Senegal.

**Figure 1: Africa's proved natural gas reserves (bcm)**



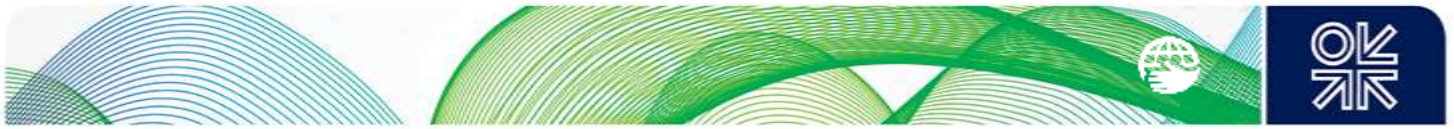
Source: OPEC and Energy Institute, 2023

<sup>1</sup> The adverse impact of disruptions in Russian/Ukrainian fertiliser and cereal supplies on international food supply chains, especially those covering some parts of Africa, is another important consequence of this war.

<sup>2</sup> Ouki, Mostefa (2022a). "African gas supplies to Europe: between hopes and hard realities", Oxford Institute for Energy Studies, July. <https://www.oxfordenergy.org/publications/african-gas-supplies-to-europe-between-hopes-and-hard-realities/>

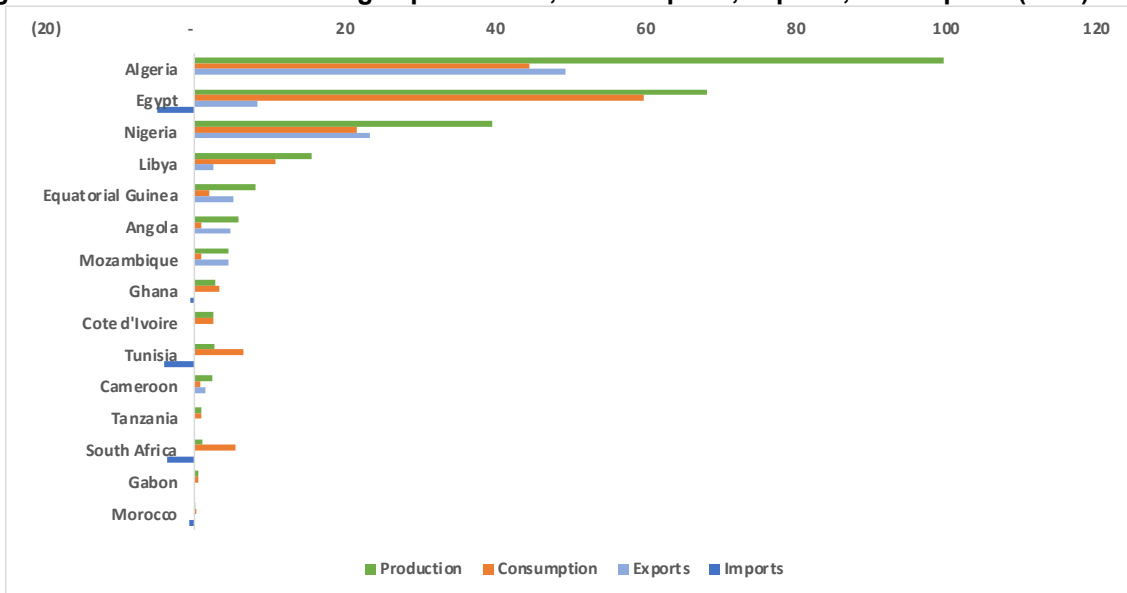
<sup>3</sup> International Energy Agency (2011). "Are we entering a golden age of gas?", World Energy Outlook Special Report. <https://www.iea.org/news/iea-special-report-explores-potential-for-golden-age-of-natural-gas>.

<sup>4</sup> International Energy Agency (2012). "Golden rules for a golden age", World Energy Outlook Special Report. <https://www.iea.org/reports/golden-rules-for-a-golden-age-of-gas>



Four countries in North and West Africa (Algeria, Egypt, Libya, and Nigeria) account for over 80 per cent of the continent’s total gas production and consumption. Smaller volumes of gas are presently produced and consumed in about a dozen other African countries (see Figure 2). Less than ten African countries are presently exporting gas by cross-border gas pipelines or LNG tankers or both.

**Figure 2: Africa’s 2022 natural gas production, consumption, exports, and imports (bcm)**



Source: IGU, 2023

Africa’s new gas developments are mainly located outside the existing gas producing countries. Over 80 per cent of new gas reserves/resources are situated in new hydrocarbon development areas.<sup>5</sup> Most of the green field gas development projects are expected to take place in sub-Saharan Africa and are planned to start up during the second half of this decade and beyond, as shown in Table 1.

**Table 1: Sub-Saharan Africa’s planned gas development projects**

Country	Projects and Project Expansions	Planned start-up
Mozambique	Onshore LNG and FLNG projects (*)	2028 - 2030
Mauritania-Senegal	Grand Tortue Ahmeyim (GTA) LNG Phase 2	2027
Republic of Congo	Marine XII Fast track FLNG	2025
Gabon	small LNG project, Cap Lopez oil terminal	2026
Tanzania	LNG & Domestic projects	2031 - 2035
Senegal	Yakaar Domestic & LNG projects	2028 - 2034
Mauritania	Bir Allah LNG	2035
South Africa	Brulpadda and Luiperd – Domestic project	2027 - 2031

Source: African Energy Chamber<sup>6</sup> and other sources

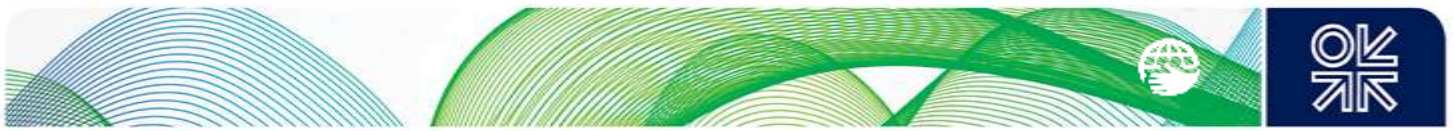
(\*): includes Mozambique LNG, Rovuma LNG, and Coral Sul LNG expansion.

Most of the gas development projects listed in Table 1 are intended to supply gas to LNG projects, but only three projects (Mozambique LNG’s Trains 1 and 2, Congo’s fast track FLNG and Gabon’s 0.7 mtpa<sup>7</sup> LNG project) have reached the final investment decision (FID) stage. The planning of these

<sup>5</sup> Global Energy Monitor (2023). “New Hubs of Gas Extraction in Africa”, February. <https://globalenergymonitor.org/wp-content/uploads/2023/02/GEM-Changing-of-the-Guard.pdf>

<sup>6</sup> African Energy Chamber (2022). “The State of African Energy 2023 – Outlook”, October. <https://energychamber.org/report/the-state-of-african-energy-2023-outlook/>

<sup>7</sup> Million tons per annum



potential LNG schemes predates the Ukraine war, but the resultant European gas crisis may have refocused attention on these gas export projects.

In North Africa, new gas discoveries have been made in recent years in Algeria and Egypt and several of them are being developed. These are smaller than the large discoveries made, for example, in the Rovuma Basin in sub-Saharan Africa, and additional supplies from these gas discoveries along with output expansion of existing fields will partly be used to compensate for declining output from aging fields and meet the demands of existing domestic and export markets, especially Europe's increased demand for non-Russian gas. Libya could significantly boost its natural gas supply if a durable solution is found to the country's internal political conflict. In fact, in terms of investment magnitude, North Africa's only major gas supply project announced so far is the Eni-led US\$8 billion gas development project, located in Libya.<sup>8</sup>

Nigeria has the potential to dominate West Africa's gas development scene. But the chronic challenges (including gas production and infrastructure problems) the country faces in providing adequate supplies of gas to its domestic and export markets continue to constrain Nigeria's gas development potential. One of its ongoing key gas projects is the expansion of the existing LNG complex with the NLNG Train 7 project expected to be completed during the second half of this decade. Also, in April 2023, Nigeria's national oil and gas company (NOC), NNPC, signed a memorandum of understanding (MoU) with Golar LNG for the development of a floating LNG (FLNG) project.<sup>9</sup> In July 2023, NNPC also announced that it had signed an agreement with the local company UTM Offshore to construct a 1.5 mpta FLNG,<sup>10</sup> and in August 2023, Golar LNG announced that it signed a heads of terms with NNPC expanding on the April 2023 MoU.<sup>11</sup>

In 2021, Nigeria's then-president announced a new 'decade of gas' to significantly boost the country's gas use over the 2020 - 2030 period and drive its economic development growth.<sup>12</sup> Similar plans have been announced in the past, without much implementation progress. Nevertheless, Nigeria, which holds Africa's largest natural gas reserves, has its largest population, and has a comparatively large, diversified economy, should play a key role in the continent's future gas supply and demand prospects.

Despite the high concentration of natural gas resources, markets, and projects within a relatively small group of African countries, the issue of indigenous gas resource development has become a wider and more sensitive political topic in Africa. It reflects a growing frustration and concern across the continent about the low levels of access to affordable energy and clean cooking and a poor economic development situation in several African countries. At present, over 80 per cent of the global population without access to electricity live in sub-Saharan Africa<sup>13</sup> and more than half of the world's poor are in Africa.<sup>14</sup>

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<sup>8</sup> Eni (2023). "Eni launches a major gas development project in Libya", press release, 28 January. <https://www.eni.com/en-IT/media/press-release/2023/01/eni-launches-a-major-gas-development-project-in-libya.html>

<sup>9</sup> Ecofin (2023). "Nigeria: la NNPC s'accorde avec Golar pour l'installation d'une infrastructure flottante de GNL", 27 April. <https://www.agenceecofin.com/gaz/2704-107790-nigeria-la-nnpc-s-accorde-avec-golar-pour-l-installation-d-une-infra-structure-flottante-de-gnl>

<sup>10</sup> Eboh, Camilus for *Reuters* (2023). "Nigeria's NNPC, local firm sign agreement on floating LNG plant", *Nasdaq* 20 July. [https://www.nasdaq.com/articles/nigerias-nnpc-local-firm-sign-agreement-on-floating-lng-plant?utm\\_source=substack&utm\\_medium=email](https://www.nasdaq.com/articles/nigerias-nnpc-local-firm-sign-agreement-on-floating-lng-plant?utm_source=substack&utm_medium=email)

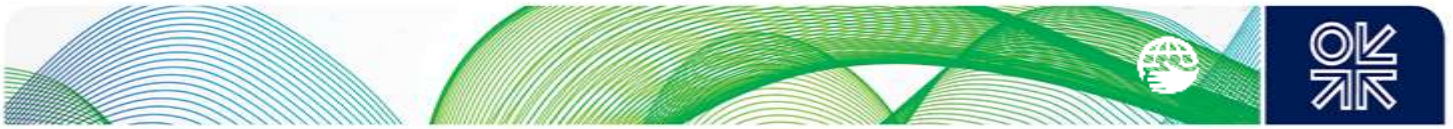
<sup>11</sup> Golar LNG (2023). "Golar LNG Limited 2023 Q2 Results – Presentation", 10 August. <https://www.golarlng.com/investors/presentations/2023.aspx>

<sup>12</sup> Anyaogu, Isaac (2023). "Analysis: Three years on, Nigeria's 'Decade of Gas' remains just a slogan", *BusinessDay*, 24 April. <https://businessday.ng/energy/oilandgas/article/analysis-three-years-on-nigerias-decade-of-gas-remains-just-a-slogan/>

<sup>13</sup> The World Bank (2023). "Tracking SDG7 – The Energy Progress Report 2023", A joint report of the IEA, IRENA, United Nations, World Bank, World Health Organization. [https://trackingsdg7.esmap.org/data/files/download-documents/sdg7-report2023-full\\_report.pdf](https://trackingsdg7.esmap.org/data/files/download-documents/sdg7-report2023-full_report.pdf)

<sup>14</sup> *The Economist* (2023). "African countries are fed up with being marginalised in global institutions", 19 June. <https://www.economist.com/middle-east-and-africa/2023/06/19/african-countries-are-fed-up-with-being-marginalised-in-global-institutions>





Among the key issues recently tabled by African policymakers and African institutions at international fora, such as the Conference of Parties (COP) on climate change, is Africa's right to develop and monetise its own natural gas resources and/or reserves within a 'just energy transition' framework.<sup>15</sup> However, this right is subject to some formidable challenges (e.g., issues related to the commercial viability of domestic gas projects and political and security risks) to fund the development and monetisation of these gas resources.

The International Energy Agency (IEA) estimates that the more than 5,000 billion cubic metres (bcm) of natural gas resources that have been discovered to date in Africa could make available 90 bcm per annum of incremental gas supplies by 2030 (equivalent to 90 per cent of Africa's current gas exports and about 60 per cent of its present domestic gas use).<sup>16</sup> However, these are natural gas resources that are yet to be developed and they will require significant and long-term investments to be proved up, developed, and monetised.

## 2. Funding Africa's gas developments

### 2.1 Financing sources for existing and new gas projects

The African Energy Chamber in its latest *State of African Energy Outlook* indicates that Africa will require about US\$ 375 billion over the next ten to twelve years to maintain existing gas production, develop new fields, and deliver gas to markets.<sup>17</sup> This substantial funding requirement, which is equivalent to about 20 per cent of sub-Saharan Africa's present gross domestic product, will be challenging to mobilize.

Over the last seven years, several large natural gas projects have been developed and/or are under development in sub-Saharan Africa. These are mainly LNG export projects and include: Coral Sul FLNG (commissioned in November 2022) and Mozambique LNG in Mozambique; Phase 1 of the Grand Tortue Ahmeyim (GTA) LNG project in Mauritania-Senegal; and Ghana's Sankofa gas development project or Offshore Cape Three Points (OCTP) project.

The largest of these projects is the US\$20 billion Mozambique LNG project. Work on this project has been suspended for security reasons, but the project's partners are presently working on a plan to resume project construction.<sup>18</sup> As shown in Table 2, Export Credit Agencies (ECAs) are the main funding sources of the Mozambique LNG project through direct loans and ECA-covered loans.

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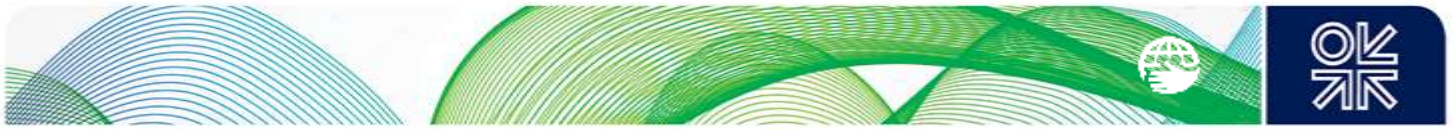
<sup>15</sup> Ouki, Mostefa (2022b). "COP27: "Time for Africa to adjust its expectations and strategy", in "COP27: Refocusing the world on the energy transition agenda", Oxford Energy Forum, Issue 133, Oxford Institute for Energy Studies, October.

<https://www.oxfordenergy.org/publications/co27-refocusing-the-world-on-the-energy-transition-agenda-issue-133/>

<sup>16</sup> International Energy Agency (2022). "Africa Energy Outlook 2022", June. <https://www.iea.org/reports/africa-energy-outlook-2022>

<sup>17</sup> African Energy Chamber (2022).

<sup>18</sup> Donaldson, Alex (2023). "Mozambique LNG partners approve plan for return of TotalEnergies operations", *Offshore Technology*, 24 May. <https://www.offshore-technology.com/news/mozambique-lng-cabo-delgado-report/>



**Table 2: Mozambique LNG project lenders<sup>19</sup>**

Lenders	US\$ billion
<i>Direct loans</i>	
US EXIM	4.70
JBIC (Japan)	3.00
UKEF (UK)	0.30
EXIM (Thailand)	0.15
African Development Bank	0.40
<i>ECA-covered loans<sup>20</sup></i>	
NEXI (Japan)	2.00
UKEF (UK)	0.85
SACE (Italy)	0.95
ECIC (South Africa)	0.80
Atradius DSB (Netherlands)	0.64

Source: FTI Consulting, 2021

For Mozambique’s first operational LNG project, the debt portion of the US\$8.9 billion<sup>21</sup> Coral Sul FLNG scheme, reported as US\$4.7 billion,<sup>22</sup> was financed through ECA-covered loans, direct loans from South Korea’s ECA, and a pool of international commercial banks, as shown below.

**Table 3: Lending sources of Coral Sul FLNG project**

Lenders
<i>ECA-covered loans</i>
BPI (France)
KEXIM (South Korea)
Ksure (South Korea)
Sace (Italy)
Sinosure (China)
<i>Direct loans</i>
KEXIM (South Korea)
Pool of commercial banks

Source: Eni, 2017

In West Africa, the US\$4.6 billion Phase 1 of the Mauritania-Senegal GTA LNG project is reported to be ‘fully equity financed’. However, it is indicated that the next phases of this GTA project, if approved and implemented, would be ‘100 per cent project financed’.<sup>23</sup> In Ghana, the US\$7.7 billion Sankofa Gas Project, commissioned in 2019, has been developed exclusively to supply Ghana’s domestic gas

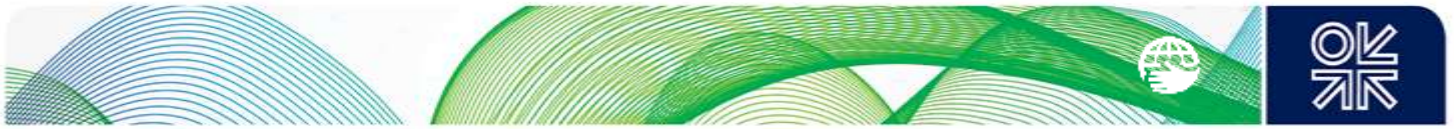
<sup>19</sup> Hébréard, Patrick and Emmanuel Grand (2021). “Project Financing – Review of Mozambique LNG”, FTI Consulting. <https://www.fticonsulting.com/emea/-/media/Files/emea--files/insights/articles/2020/nov/covid-19-project-financing-review-mozambique-lng.pdf>

<sup>20</sup> ECA cover of commercial loans.

<sup>21</sup> AidData: A Research Lab at William & Mary university, Virginia, USA. <https://china.aiddata.org/projects/57395/>

<sup>22</sup> Eni (2017). “Eni achieves financial close for Coral South FLNG”, press release, 06 December. <https://www.eni.com/en-IT/media/press-release/2017/12/eni-achieves-financial-close-for-coral-south-flng.html>

<sup>23</sup> Kosmos Energy (2020). Kosmos Energy’s presentation at “Credit Suisse Energy Conference”, 02 March.



market. Its funding has benefitted from strong financial support from the World Bank Group's agencies, and the United Kingdom's ECA, UK Export Finance (UKEF), was also a key financing source.<sup>24</sup>

Export Credit Agencies and the World Bank have therefore been instrumental in the financing of most of the above-mentioned African gas development projects. Interestingly, the latest estimated cost of the planned Tanzania LNG project is equivalent to the total cost of these four sub-Saharan African projects, which are already significant African projects.<sup>25</sup> Despite the temporary European interest in natural gas, future African natural gas projects will find it difficult to draw the same level of involvement from ECAs and from key multilateral development agencies, for the reasons listed below.

In December 2017, the World Bank announced at the One Planet Summit that the '*World Bank Group will no longer finance upstream oil and gas, after 2019*', with some exceptions regarding upstream gas projects in poorest countries '*where there is a clear benefit in terms of energy access for the poor and the project fits within the countries' Paris Agreement commitments*'.<sup>26</sup> In Europe, the European Investment Bank (EIB) announced in November 2019 that it would '*end financing for fossil fuel energy projects from the end of 2021*'.<sup>27</sup> More recently, regarding the development of Mozambique's natural gas resources, the World Bank's vice president for Eastern and Southern Africa stated that '*our view is that we can support it if there are no other options that are least cost, and this is in the context of a clearly articulated transition plan*'.<sup>28</sup> However, it is unlikely that the EIB will consider such exceptions for natural gas projects.<sup>29</sup>

Even for some of the projects presented above, where there has been a significant ECA/multilateral financial involvement, the funding of African oil and gas developments, especially in sub-Saharan Africa, has always been difficult. This challenging financing situation predates the international focus on decarbonisation, the Covid-19 pandemic, Europe's natural gas crisis, and the fallout from the ongoing war in Ukraine.

Although the participation of international oil and gas companies (IOCs) and independents has increased significantly in North and West Africa over the last three decades, the oil price collapse of 2014 heralded the start of a decline in the level of international funding of hydrocarbon projects. IOCs have divested, or are divesting away, from some African hydrocarbon assets for reasons including environmental,<sup>30</sup> political, and security risks. More recently and post-pandemic, the level of global upstream hydrocarbon capital expenditures has started to recover as shown in Figure 3.

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<sup>24</sup> The World Bank (2018). "Sankofa Gas Project", January.

<https://thedocs.worldbank.org/en/doc/969011518200591340-0100022018/original/BriefsGuaranteesGhanaSankofa.pdf>

<sup>25</sup> Okafor, Chinedu (2023). "African countries are already booking stakes in Tanzania's \$42 Billion LNG project", *Business Insider Africa*, 13 May. [https://africa.businessinsider.com/local/markets/african-countries-are-already-booking-stakes-in-tanzanias-dollar42-billion-lng/yjk7kkm?utm\\_source=substack&utm\\_medium=email](https://africa.businessinsider.com/local/markets/african-countries-are-already-booking-stakes-in-tanzanias-dollar42-billion-lng/yjk7kkm?utm_source=substack&utm_medium=email)

<sup>26</sup> World Bank (2017). "World Bank Group Announcement at One Planet Summit", 12 December.

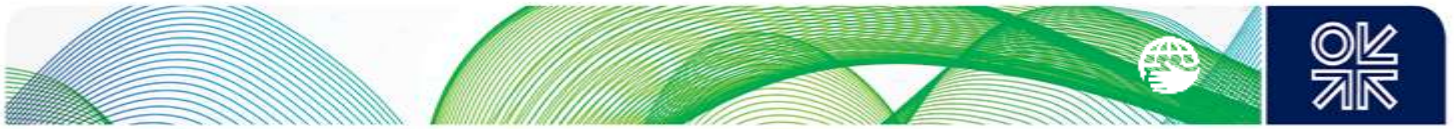
<https://www.worldbank.org/en/news/press-release/2017/12/12/world-bank-group-announcements-at-one-planet-summit>

<sup>27</sup> European Investment Bank (2019). "EU Bank launches ambitious new climate strategy and Energy Lending Policy." <https://www.eib.org/en/press/all/2019-313-eu-bank-launches-ambitious-new-climate-strategy-and-energy-lending-policy>

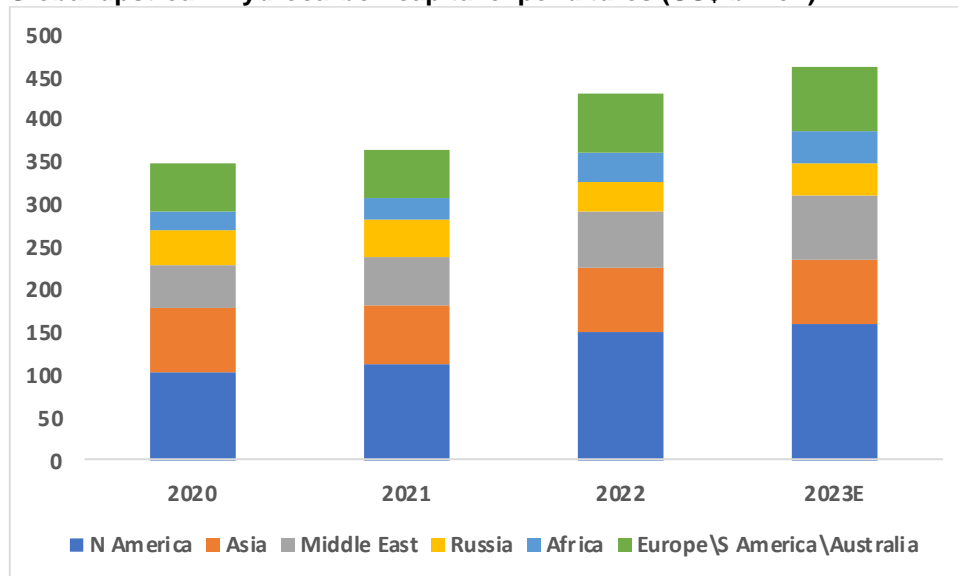
<sup>28</sup> Hill, Matthew (2023). "World Bank to support African natural gas development to boost energy security", *Bloomberg*, 13 March. <https://www.worldoil.com/news/2023/3/13/world-bank-to-support-african-natural-gas-development-to-boost-energy-security/>

<sup>29</sup> Pilling, David and Camilla Hodgson (2022). "European Investment Bank resists pressure to fund gas projects", *Financial Times*, 20 September 2022. <https://www.ft.com/content/b00ea2e5-78a0-46c5-b2b0-33e6a40b96af>

<sup>30</sup> Chason, Rachel (2023). "Big Oil is selling off its polluting assets — with unintended consequences", *The Washington Post*, 27 March. <https://www.washingtonpost.com/world/2023/03/27/shell-nigeria-niger-delta-oil/>



**Figure 3: Global upstream hydrocarbon capital expenditures (US\$ billion)**



Source: Rystad Energy<sup>31</sup>

Around two-thirds of these recent global upstream investments were located in three regions: North America, Asia, and the Middle East. In Africa, although the aggregated level of upstream capital expenditures also began to recover in 2021, Africa’s share of total global upstream hydrocarbon investments remains below 10 per cent. Furthermore, a large part of the recent rise in the value of global upstream investments reflects the impact of higher costs of the projects’ capital expenditures. This is crucial since investment attractiveness will depend, *inter alia*, on project cost-competitiveness.<sup>32</sup>

In Africa, IOCs and independents provide the bulk of hydrocarbon investments, while just a few NOCs, like Algeria’s Sonatrach, attempt to finance a major part of the growing investment gap. But this is not sustainable, as hydrocarbon-exporting states with large populations are overwhelmed by the urgent need to fund several socio-economic sectors of their economies. Africa’s NOCs and even its private indigenous hydrocarbon companies are unable to fully fund the development of the continent’s natural gas reserves and/or resources.

There are also initiatives to mobilize funding regionally, like the recent initiative by the African Export Import Bank (Afreximbank) to establish an African energy bank jointly with the African Petroleum Producers’ Organization (APPO) which would finance African energy projects.<sup>33</sup> Such initiatives are encouraged by African policymakers, but these sources of funding are insufficient to finance large multibillion dollar oil and gas projects. Therefore, adequate levels of international hydrocarbon investment flows are necessary to develop Africa’s natural gas potential, especially in new gas provinces in sub-Saharan Africa, and to boost existing gas production in both North and West Africa.

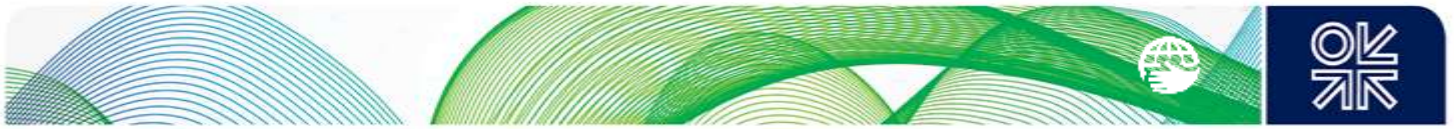
Apart from the impact of the more recent international decarbonisation measures, the underlying causes of this challenging hydrocarbon investment situation in Africa are not new.<sup>34</sup> Unfortunately, current difficult global economic and financing conditions are unlikely to make funding energy projects in Africa

<sup>31</sup> African Energy Chamber (2022).

<sup>32</sup> International Energy Agency (2023a). “World Energy Investment 2023”, June. <https://www.iea.org/reports/world-energy-investment-2023>

<sup>33</sup> Afreximbank (2022). “Joint Communique between Afreximbank and APPO on the need for the establishment of an African energy bank”, 16 May. <https://www.afreximbank.com/joint-communique-between-afreximbank-and-appo-on-the-need-for-the-establishment-of-an-african-energy-bank/>

<sup>34</sup> See for example, Cust, James and Albert Zeufack, eds. (2023). “Africa’s Resource Future: Harnessing Natural Resources for Economic Transformation during the Low-Carbon Transition”, The World Bank. <https://openknowledge.worldbank.org/entities/publication/5b962927-b2d3-4ea3-a884-971c2b11bbd3>



any easier. In fact, the International Monetary Fund's director of the Africa department has recently stated that Africa will face a 'brutal funding squeeze'.<sup>35</sup>

## 2.2 Financing challenges of Africa's future gas projects

As indicated earlier, export credit agencies (ECAs) and multilateral development agencies (MDAs) played a key role in the case of the four major African gas development projects outlined above. The role of ECAs and MDAs has been essential in several other African energy infrastructure projects as international commercial banks' unsecured lending remains very limited in Africa. But key funding from ECAs and MDAs could be interrupted or become more problematic to mobilize. Their funding of fossil fuel projects is presently being challenged by environmental non-government organizations (NGOs).<sup>36</sup> Projects' compliance with environmental, social, and governance (ESG) principles is increasingly scrutinized not only by NGOs, but also by shareholders and boards of different funding institutions,<sup>37</sup> including a rising number of banks.<sup>38</sup> This could slow down or discourage altogether natural gas project investments or financing in Africa.

It is difficult for African countries to mitigate adverse exogenous factors, but a meaningful and sustainable improvement of Africa's internal investment and lending environment would significantly help de-risk potential gas projects. To fulfil their expectations of fully developing their gas resources/reserves, Africa's policymakers will have to continue to address the fundamental financing barriers energy projects have been facing for decades in Africa. They may not have another chance to do this as stricter clean energy agendas progress across the globe.

These project barriers are well known and a vast amount of work on how to tackle them has been developed, presented, and discussed by multilateral development agencies, financing institutions, and project advisors with various African policymakers when projects are considered for funding.<sup>39</sup> These include problems related to: existing legal, fiscal, and regulatory frameworks; creditworthiness of domestic energy utilities; domestic energy pricing policies; ESG issues; currency convertibility, and political and security issues. Unfortunately, there has not been any significant and sustained progress yet in addressing these chronic financing obstacles. It should be noted, though, that there have been some energy sector reforms, such as the electricity tariff reforms carried out in several African countries.<sup>40</sup>

There have also been adjustments to some African hydrocarbon laws to improve investment terms and conditions, and some countries have reduced or removed gas price subsidies in some sectors. For example, in 2022, Algeria's Sonatrach signed three production sharing agreements governed by the new 2019 hydrocarbon law for an expected total investment of about US\$ 6 billion.<sup>41</sup> In Gabon, a new Hydrocarbon Code was adopted in 2019 to promote upstream oil investments. It is reported that several

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<sup>35</sup> *The Economist* (2023). "Abebe Aemro Selassie on Africa's brutal funding squeeze", London, 18 May.

<https://www.economist.com/by-invitation/2023/05/18/abebe-aemro-selassie-on-africas-brutal-funding-squeeze>

<sup>36</sup> Tobin, Sam (2023). "UK's \$1.15 bln funding for Mozambique LNG project is lawful - court", *Reuters*, 13 January.

[https://www.reuters.com/business/energy/uks-115-bln-funding-mozambique-lng-project-lawful-court-2023-01-13/#:~:text=UK's%20%241.15%20bln%20funding%20for%20Mozambique%20LNG%20project%20is%20lawful%20%2Dcourt,-By%20Sam%20Tobin&text=LONDON%2C%20Jan%2013%20\(Reuters\),by%20Friends%20of%20the%20Earth](https://www.reuters.com/business/energy/uks-115-bln-funding-mozambique-lng-project-lawful-court-2023-01-13/#:~:text=UK's%20%241.15%20bln%20funding%20for%20Mozambique%20LNG%20project%20is%20lawful%20%2Dcourt,-By%20Sam%20Tobin&text=LONDON%2C%20Jan%2013%20(Reuters),by%20Friends%20of%20the%20Earth)

<sup>37</sup> Burkhardt, Paul (2023). "Total's Mozambique LNG Revival Risks Throwing \$4.7 Billion Loan Into Review", *Bloomberg News*, 22 May.

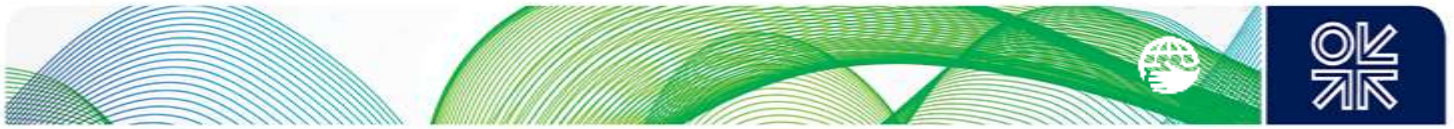
[https://www.bnnbloomberg.ca/total-s-mozambique-lng-revival-risks-throwing-4-7-billion-loan-into-review-1.1923409?utm\\_source=substack&utm\\_medium=email](https://www.bnnbloomberg.ca/total-s-mozambique-lng-revival-risks-throwing-4-7-billion-loan-into-review-1.1923409?utm_source=substack&utm_medium=email)

<sup>38</sup> Net-Zero Banking Alliance: Industry-led, UN-convened. <https://www.unepfi.org/net-zero-banking/>

<sup>39</sup> See for example a summary of some of the earlier work conducted by the World Bank in Santley, David; Schlotterer, Robert; and Eberhard, Anton (2014). "Harnessing African natural gas: a new opportunity for Africa's energy agenda?", The World Bank, 23 October. <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/858091468203694236/harnessing-african-natural-gas-a-new-opportunity-for-africas-energy-agenda>

<sup>40</sup> International Energy Agency (2022).

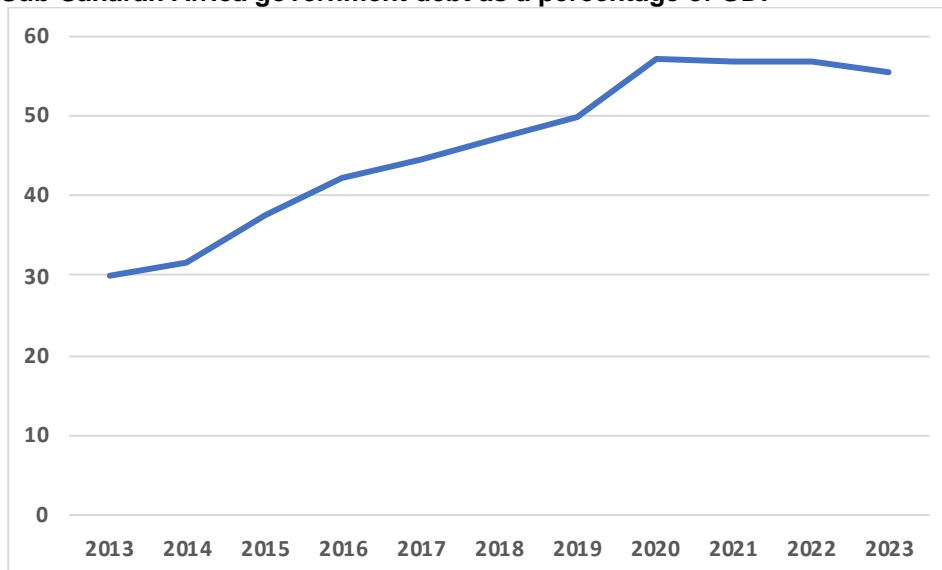
<sup>41</sup> Sonatrach (2023). "Realisations 2022 – Resultats preliminaires", July. [https://sonatrach.com/wp-content/uploads/2023/03/Bilan-d\\_activit%C3%A9-2022-fr.pdf](https://sonatrach.com/wp-content/uploads/2023/03/Bilan-d_activit%C3%A9-2022-fr.pdf)



'new oil production-sharing deals were signed' following the promulgation of this new code.<sup>42</sup> Other African countries (e.g., Nigeria which passed the Petroleum Industry Act of 2021<sup>43</sup>) have also adjusted or enacted new hydrocarbon laws. But this adjustment process has not yet resulted in a notable increase in hydrocarbon investments in Africa. It has been slow and more reactive than proactive in a rapidly changing energy environment presently dominated by decarbonisation objectives and priorities.

African economies also suffer from an additional challenging situation, namely the adverse impact of the debt burden in several sub-Saharan African countries (see Figure 4 below) on the financing of new energy projects, especially with the recent rapid escalation of interest rates.

**Figure 4: Sub-Saharan Africa government debt as a percentage of GDP**



Source: IMF, 2023

Although the government debt-to-GDP ratios of several major developed economies surpass those of some indebted sub-Saharan African countries, the fundamental difference between the two groups of economies is how the risk associated with the debt is assessed, especially by international credit rating agencies.<sup>44</sup> The debt risk of developed economies is considered by these agencies as lower risk than that of many African economies. Thus, the importance of mitigating this 'African financial risk' by de-risking investment projects, especially by addressing the above-mentioned endogenous constraints, is a key priority for African governments.

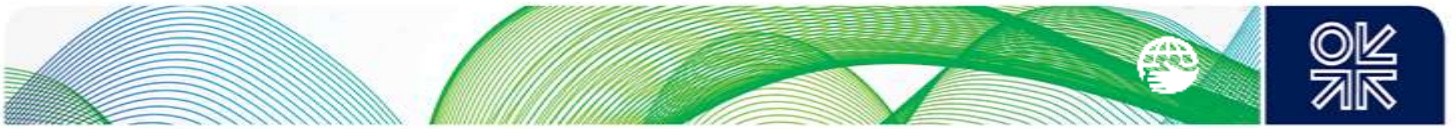
The above brief review of some of the main financing challenges that new African gas development projects will face underlines the urgent need for internal action to harness the continent's potential natural gas resources. Subsequently there is the need to focus on project risks directly linked to gas markets or the gas monetisation options under consideration for these projects.

<sup>42</sup> *Energy Capital & Power* (2023). "Gabon's New Hydrocarbons Code: A bold step into the future", 12 April. <https://energycapitalpower.com/gabon-hydrocarbons-code-a-bold-step-into-the-future/>

<sup>43</sup> Federal Republic of Nigeria (2021). "Petroleum Industry Act, 2021", *Official Gazette*, 27 August.

<http://www.petroleumindustrybill.com/wp-content/uploads/2021/09/Official-Gazette-of-the-Petroleum-Industry-Act-2021.pdf>

<sup>44</sup> African countries are asking for the revisiting of the assessment approaches of these credit rating agencies. See, United Nations Economic Commission for Africa (2023). "African regulators urged to supervise credit rating agencies: This is to avoid erroneous assessments that discourage investment on the continent", *Africa Renewal*, 04 August. <https://www.un.org/africarenewal/magazine/august-2023/african-regulators-urged-supervise-credit-rating-agencies>



### 3. Gas monetisation considerations

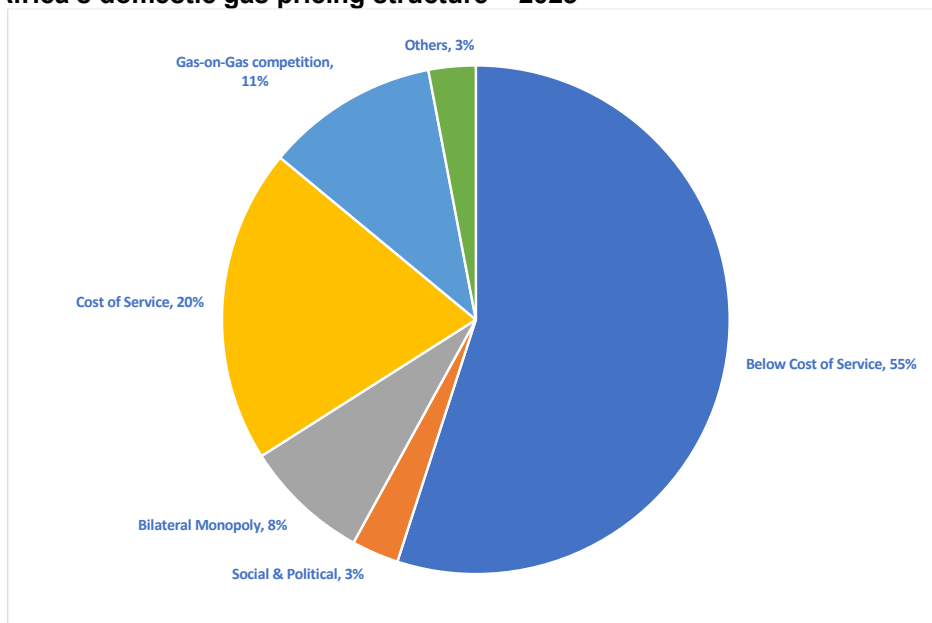
#### 3.1 Domestic gas market limitations

Most of the new African gas development projects announced to date are export-oriented schemes with a share of the gas produced allocated to the domestic market (usually for electricity generation). The export focus is consistent with what is happening in other gas producing regions of the world. Globally, about 50 per cent of all upstream gas projects which have been approved over the last five years are driven by LNG export projects.<sup>45</sup>

Certain African policymakers or interest groups argue that the gas resources' use should be limited to the domestic market only or priority should be given to the domestic use of gas over gas exports.<sup>46</sup> But in many cases, without the critical gas export driver, investments needed to develop natural gas reserves, especially large gas deposits, would be difficult to mobilize or not forthcoming at all. As explained earlier, this is due to the high project risks and the barriers that characterise several African domestic energy markets (e.g., small to very small market size, lack of gas infrastructure, poor creditworthiness, price subsidies, affordability, legal/fiscal/regulatory constraints, and political/security issues).

Natural gas price subsidies exist in many of Africa's natural gas markets, especially in North Africa. The International Gas Union's latest wholesale gas price survey shows that about 55 per cent of Africa's natural gas consumption is set at prices below the cost of gas supply and close to 11 per cent represents social, political, and bilateral monopoly prices. Only 20 per cent of the gas consumed is clearly priced based on the cost of service of gas supply and 11 per cent on gas-on-gas competition, as shown in Figure 5.<sup>47</sup> Although energy price subsidies are not an exclusive characteristic of energy markets in developing countries, they have a very adverse financial and environmental impact on Africa's economies.

**Figure 5: Africa's domestic gas pricing structure – 2023**

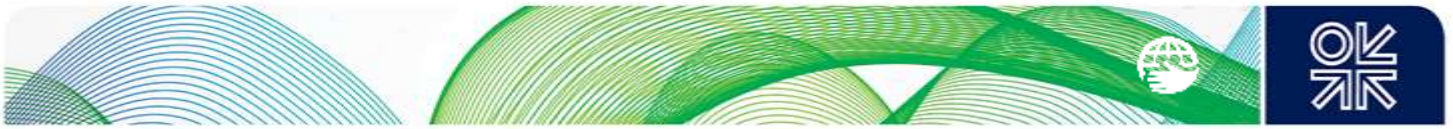


Source: IGU, 2023

<sup>45</sup> IEA (2023b). "Outlooks for gas markets and investments", April. <https://www.iea.org/reports/outlooks-for-gas-markets-and-investment>

<sup>46</sup> Adekoya, Femi (2021). "NAPE asks operators to prioritise domestic gas utilisation above export", *The Guardian* (Nigeria), 01 December. <https://guardian.ng/business-services/nape-asks-operators-to-prioritise-domestic-gas-utilisation-above-export/>

<sup>47</sup> International Gas Union (2023). "Global Wholesale Gas Price Survey 2022."

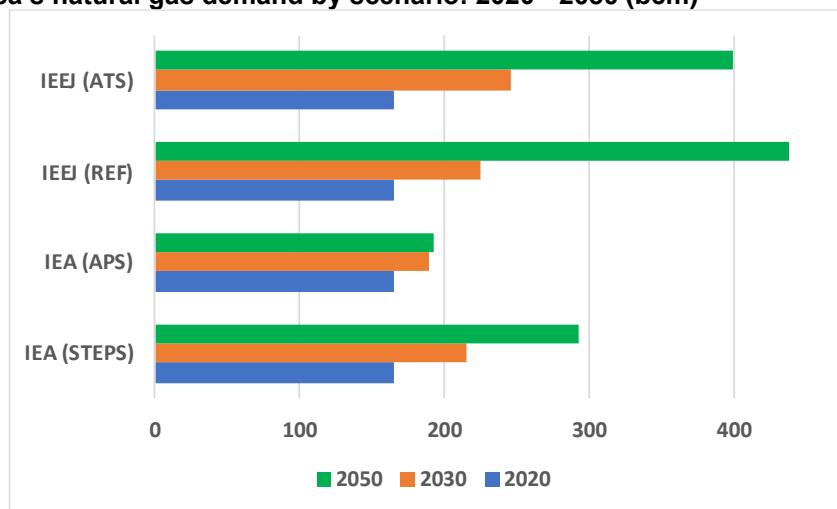


Most of new gas resource holders in sub-Saharan Africa have domestic gas markets that can only absorb a small share of the gas that could be developed. Compared to other regions, Africa's consumption of natural gas is limited. The whole continent's current total gas use of 160 bcm is equivalent to only one-third of Europe's present gas consumption.

According to the United Nations, 'more than half of global population growth between now and 2050 is expected to occur in Africa. Africa has the highest rate of population growth among major areas. The population of sub-Saharan Africa is projected to double by 2050'.<sup>48</sup> With these fast-growing population levels, depending on the availability of commercially viable domestic gas markets and development of adequate natural gas infrastructure, there should be potential for a higher level of domestic natural gas use, especially in subregions endowed with natural gas resources.

A report prepared by the IEA, in cooperation with the Institute of Energy Economics of Japan (IEEJ) for the G7,<sup>49</sup> indicates that Africa's potential natural gas demand under different IEA and IEEJ scenarios could vary between 187 - 246 bcm by 2030 and between 193 - 437 bcm by 2050, as shown in Figure 6. The higher growth rates shown under the IEEJ scenarios reflect its assessment that in developing regions like Africa, natural gas with its relatively low carbon content is expected to play a more predominant role under both their Reference Scenario (REF) and Advanced Technologies Scenario (ATS).

**Figure 6: Africa's natural gas demand by scenario: 2020 - 2050 (bcm)**



Source: IEA, 2023

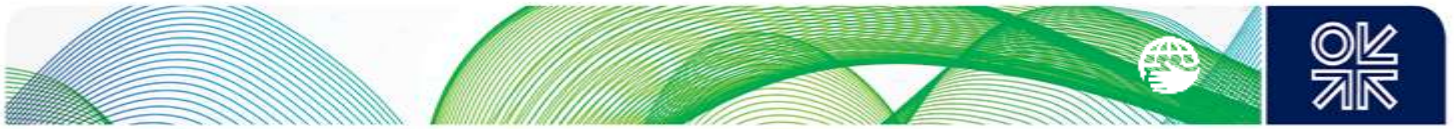
These regionally aggregated scenarios do not, however, show important differences between African subregions. As pointed out earlier, a small number of North and West African countries account for over eighty per cent of Africa's present gas consumption.

In terms of gas demand by sector, more than half of the gas consumed in Africa is used to generate electricity (see Figure 7). In the long-term, prospects for higher gas demand growth would be limited in North Africa's power sector compared to other African subregions, as explained below. It should be noted, though, that Libya's current gas-to-power use is considerably reduced because of the country's on-going internal political conflict. This demand could jump significantly in a post-conflict period. However, moderate demand growth is expected in North Africa's other gas-producing countries. This is due to the already large share of natural gas in the power sector's generating fuel mix (over 95 and

<sup>48</sup> United Nations (2022). "Global issues - Population." <https://www.un.org/en/global-issues/population#:~:text=More%20than%20half%20of%20global,projected%20to%20double%20by%202050>

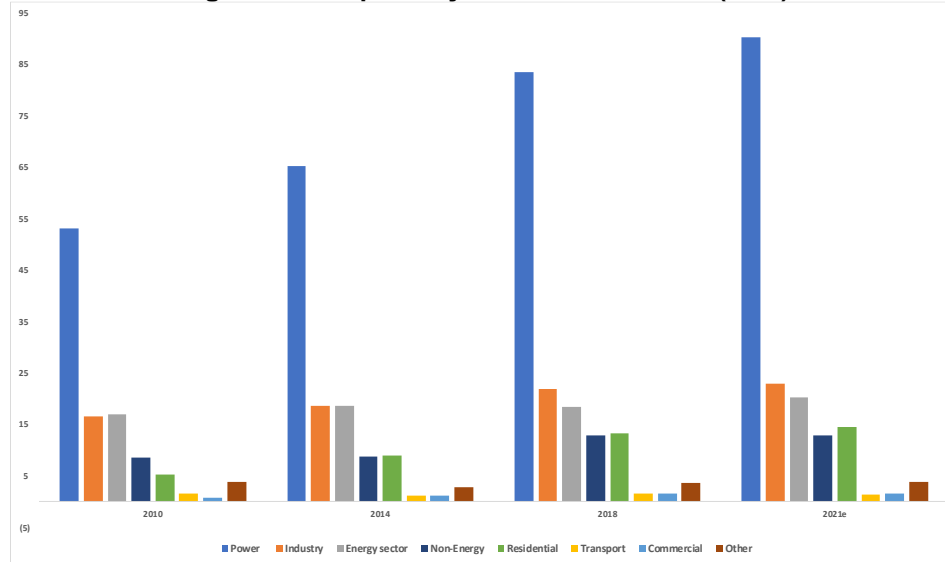
<sup>49</sup> International Energy Agency (2023b).





70 per cent in Algeria and Egypt, respectively) and the future gradual reduction of energy price subsidies.

**Figure 7: Africa’s natural gas consumption by sector: 2010 - 2021 (bcm)**



Source: IEA

Demand-side management measures such as the gradual removal of energy price subsidies for both electricity and natural gas, or more targeted subsidies and related energy efficiency actions will slow down demand growth. In North Africa’s largest gas consuming countries, Algeria and Egypt, the financial burden of energy price subsidies is unsustainable. In 2014, Egypt started implementing a significant reform of its natural gas pricing system by increasing domestic gas prices and gradually removing subsidies, especially for non-power gas users. The price for gas supplies to the power sector more than doubled between 2013 and 2014 from US\$ 1.25 per MMBtu to US\$ 3.0 per MMBtu, but was still set at a level lower than that of gas supplied to industry.<sup>50</sup>

This gas price for electricity generation, which remains at 2014 levels,<sup>51</sup> has not constrained the power sector’s gas consumption. But in the long-term, gas demand growth rates are expected to be reduced due to the already high gas penetration in this sector and the gradual reduction of domestic gas price subsidies. Moreover, since the second half of the 2010s, Egypt, as part of an extended agreement with the International Monetary Fund (IMF), has been gradually reducing its electricity tariff subsidies.<sup>52</sup> This electricity tariff reform will reduce future electricity demand growth. Given that over 70 per cent of Egypt’s electricity is generated from gas-fired units, this will also moderate the power sector’s gas demand growth.

In Algeria, domestic gas prices are heavily subsidised causing an important adverse impact on the country’s public finances.<sup>53</sup> Attempts to reform Algeria’s domestic energy pricing system have previously been postponed to ‘*maintain the existing social contract, and the eventual loss of purchasing*

<sup>50</sup> Ouki, Mostefa (2018). “Egypt – a return to a balanced gas market?”, OIES, June.

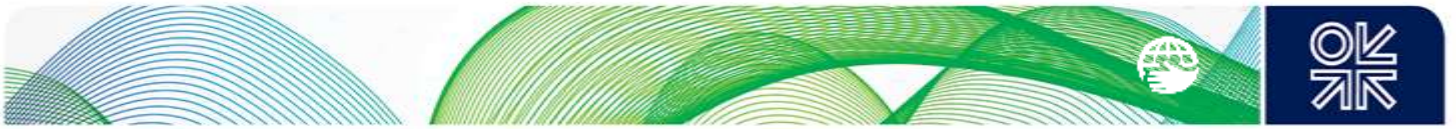
<https://www.oxfordenergy.org/publications/egypt-return-balanced-gas-market/>

<sup>51</sup> Egypt’s Gas Regulatory Authority website accessed in July and August 2023. <https://www.gasreg.org.eg/natural-gas-pricing/>

<sup>52</sup> International Monetary Fund (2018). “2017 Article IV Consultation, Second Review Under the Extended Arrangement Under the Extended Fund Facility, And Request for Modification of Performance Criteria. Country Report No. 18/14. [www.imf.org/~media/Files/Publications/CR/2018/cr1814.ashx](http://www.imf.org/~media/Files/Publications/CR/2018/cr1814.ashx)

<sup>53</sup> *Algerie Eco* (2021). “Attar: le gaz est vendu en Algérie dix fois moins cher que dans d’autres pays”, 11 February.

<https://www.algerie-eco.com/2021/02/11/attar-le-gaz-est-vendu-en-algerie-dix-fois-moins-cher-que-dans-dautres-pays/>



power due to the inflation that could result from reviewing the subsidy system.<sup>54</sup> However, reform of the subsidy system continues to draw attention. Algeria's 2022 Finance Law refers to a draft law for a revision of the prices of products that are subsidised, including targeted subsidy measures.<sup>55</sup>

In the medium- to long-term, as hydrocarbon export revenues start to decline due to a drop in Europe's imports of hydrocarbons, large North African gas producers/exporters, which rely heavily on these revenues, will have to focus more on the issue of reduction of domestic energy (natural gas and electricity) price subsidies and on the formulation of more targeted subsidies. In addition to this future reduction or further reduction of price subsidies, the already high level of natural gas use in these countries will limit their gas demand growth. It does not mean that there will be a sudden drop in natural gas consumption in these countries, as substitutes for fossil fuels, namely renewable sources of energy, will take time to change North Africa's energy mix. But because of the already high natural gas penetration in the sub-region, the growth rate of North African gas use will be lower than what it has been over the last three decades or so.

Therefore, the new growth potential for significant development and/or expansion of Africa's domestic gas markets is likely to take place in sub-Saharan Africa's new gas provinces. In a continent where about 600 million people (mainly in sub-Saharan Africa) still do not have access to electricity, this natural gas use will primarily be for the generation of electricity.

### Gas-to-power monetisation

The future rate of growth of this gas-to-power usage will essentially depend on the prospects for natural gas development funding and how fast the introduction of renewable energy generating capacity will evolve in sub-Saharan African countries (in both gas producing and non-gas producing nations). It will also depend on how much of the so-called repressed or suppressed African electricity demand can be converted into financially viable demand and whether investments in generation, transmission, and distribution infrastructure can be mobilised to cover this unmet demand. Nevertheless, strong growth of gas demand for electricity generation is expected to take place during this decade, and probably beyond, in the sub-Saharan African subregions where natural gas penetration is relatively low.<sup>56</sup>

Based on renewable energy developments to date, Africa's clean electrification is still not materializing at the necessary speed and scale. The latest data published by the International Renewable Energy Agency (IRENA), show that between 2000 and 2020, Africa received only 2 per cent of all international renewable energy investments, and that close to 80 per cent of the investments over the 2010 - 2020 period were made in four countries, of which only two countries are in sub-Saharan Africa (South Africa and Kenya).<sup>57</sup> Furthermore, 'concessional finance (grants and low-cost project debt)', which is critical for several sub-Saharan African economies, remains extremely limited. In 2020, it accounted for only 1 per cent of renewable energy finance provided by development finance institutions.<sup>58</sup> A 2021 study shows that *'the share of non-hydro renewables in African electricity generation is likely to remain below 10% in 2030, although this varies by [sub]region.'*<sup>59</sup>

Nevertheless, this very slow renewable energy investment pace does not mean that African gas-to-power projects are in a much better funding situation. The adverse combination of decarbonisation

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<sup>54</sup> Boukenia, Salah (2023). "Algeria's Social Subsidies: Between Financial Thresholds and Accounting Budgets." Arab Reform Initiative, 14 February. <https://www.arab-reform.net/publication/algerias-social-subsidies-between-financial-thresholds-and-accounting-budgets/>

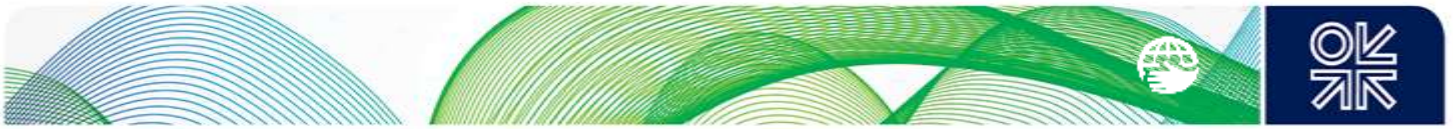
<sup>55</sup> *Algerie Presse Service* (2022). "Révision des subventions publiques: une commission nationale constituée vers fin mai", 24 April. <https://www.aps.dz/economie/138940-revision-des-subventions-publiques-une-commission-nationale-constituee-vers-fin-mai>

<sup>56</sup> Fulwood, Mike (2023). "A New Global Gas Order? (Part 1): The Outlook to 2030 after the Energy Crisis", OIES, July. <https://www.oxfordenergy.org/publications/a-new-global-gas-order-part-1-the-outlook-to-2030-after-the-energy-crisis/>

<sup>57</sup> IRENA (2023). "Global landscape of renewable energy finance 2023", February. <https://www.irena.org/Publications/2023/Feb/Global-landscape-of-renewable-energy-finance-2023>

<sup>58</sup> IRENA (2023).

<sup>59</sup> University of Oxford (2021). "Africa's electricity unlikely to go green this decade", 11 January. <https://www.ox.ac.uk/news/2021-01-11-africa-s-electricity-unlikely-go-green-decade>



constraints and the poor credit rating of sub-Saharan African power projects poses a daunting challenge. In fact, there is a serious concern that sub-Saharan Africa will neither fully benefit from its indigenous gas resources nor receive enough investments to develop its vast renewable energy potential. This would mean an increasing reliance on highly polluting generating fuels (coal,<sup>60</sup> diesel, and fuel oil) for those who can afford them and on traditional fuels for the less fortunate. This would result in an environmentally and socially damaging scenario for a region such as Africa which is highly vulnerable to the effects of climate change.

In 2022, operational distributive diesel generator capacity in Africa was estimated at between 45 GW<sup>61</sup> and 100 GW<sup>62</sup>, which is between two and five times bigger than Africa's existing solar and wind energy installed capacity, which has the added disadvantage of not being dispatchable like diesel generators. In remote and rural areas isolated from the national electricity grid, part of this diesel generator capacity could be replaced by small renewable energy schemes and/or even small gas-to-power projects, if close enough to gas supply network or sources.

But many of these diesel generators are used in urban areas already covered by an electricity grid. The abnormally high use of generators is explained by the fact that in several African countries, the grid-based electricity supply is highly unreliable due to chronic generation and network infrastructure problems.<sup>63</sup> Sub-Saharan Africa's rapid urbanisation is putting even more pressure on centralized grids. Although local distributive electricity systems in remote areas would help, a meaningful expansion of the use of gas in the power sector will depend on how rapidly the challenges encountered by large grid-based electricity supply systems will be addressed.

### Non-power monetisation potential

In its latest *Africa Energy Outlook*, the IEA states that 'Africa's industrialisation relies in part on expanding natural gas use'.<sup>64</sup> More recently, it indicated that globally 'industry is the most resilient sector for natural gas demand across all scenarios'.<sup>65</sup> Under the IEA's Stated Policies Scenario (STEPS), subsectors such as manufacturing and petrochemical industries, including gas-based chemicals (fertilisers and methanol), account for a large part of natural gas demand growth over the 2021 to 2030 period.

In Africa, current gas consumption by industries for energy and non-energy (feedstock) usages is highly concentrated in four countries (Algeria, Egypt, Nigeria, and South Africa). There are no reported new major gas-based industry projects planned in these countries which have financing in place. There are, however, several African green ammonia projects that have been announced,<sup>66,67</sup> although none have yet had an FID announced. Interestingly, another form of low-carbon ammonia, blue ammonia, is being proposed as an alternative to LNG exports.<sup>68</sup> But the higher production cost of this, compared to grey

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<sup>60</sup> At present, coal is mainly consumed in South Africa, Morocco, Zimbabwe, and Botswana.

<sup>61</sup> International Energy Agency (2022).

<sup>62</sup> Wood Mackenzie (2022). "Utility evolution in Africa to reshape global electricity demand", 17 March.

<https://www.woodmac.com/press-releases/Utility-evolution-in-Africa-to-reshape-global-electricity-demand/>

<sup>63</sup> Hee Eun Lee, Woo Young Kim, Hyo Kang, and Kangwook Han (2022). "Still lacking reliable electricity from the grid, many Africans turn to other sources", *Afrobarometer* Dispatch No. 514, 08 April. <https://www.afrobarometer.org/wp-content/uploads/2022/04/ad514-pap10-still-lacking-reliable-electricity-from-the-grid-many-africans-turn-to-alternative-sources-afrobarometer-10april22.pdf>

<sup>64</sup> International Energy Agency (2022).

<sup>65</sup> International Energy Agency (2023b).

<sup>66</sup> Stevenson, Peter (2022). "Egypt Continues Green Hydrogen/Ammonia Drive as India's ReNew Power Inks \$8bn MoU", *MEES*, 08 April.

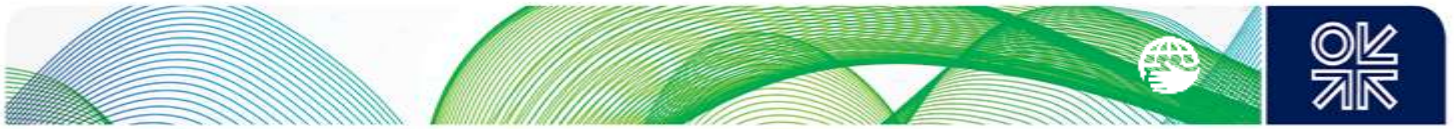
<https://www.mees.com/2022/8/5/corporate/egypt-continues-green-hydrogenammonia-drive-as-indias-renew-power-inks-8bn-mou/c898bb40-14b7-11ed-9d79-09d1e832a7d9>

<sup>67</sup> Prisco, Jacopo (2023). "\$4.6 billion plant in South Africa will make 'the fuel of the future'", *CNN*, 25 July.

<https://edition.cnn.com/2022/10/18/africa/green-ammonia-hive-energy-scnc-climate-spc-intl/index.html>

<sup>68</sup> Čučuk, Aida (2023). "WoodMac: Gas resource holders in LNG vs. ammonia dilemma", *Offshore Energy*, 19 June 19.

[https://www.offshore-energy.biz/woodmac-gas-resource-holders-in-lng-vs-ammonia-dilemma/?utm\\_source=substack&utm\\_medium=email](https://www.offshore-energy.biz/woodmac-gas-resource-holders-in-lng-vs-ammonia-dilemma/?utm_source=substack&utm_medium=email)



ammonia, remains a key commercial barrier unless carbon reduction policies and significant cost reduction of low-carbon ammonia production become more effective.

For non-power usages, among the main gas monetisation proposals that often emerge at the planning stage of gas projects in Africa and other regions, is the development of gas-based industries such as nitrogenous fertiliser and methanol projects.<sup>69</sup> These are large capital-intensive projects that could be challenging to implement if the gas resource base is limited, gas feedstock prices are not competitive compared to low-cost gas areas like some parts of the Middle East, and if there is a lack of infrastructure.

Proponents of such gas-based monetisation schemes tend to put forward the argument that these 'domestic' gas-based industry projects would benefit the national economy. To be viable and financeable these gas-based projects, which have limited linkages to the rest of the economy,<sup>70</sup> need to be export-oriented. They are capital- rather than labour-intensive with limited economic diversification and employment benefits. Moreover, heavily subsidising feedstock gas prices to attract investments in these gas-based industries could be considered as the equivalent of subsidising direct gas exports. This results in an unsustainable proposition for some sub-Saharan African economies, even if a share of these domestically produced nitrogenous fertilizers is used locally in agriculture.

The question of food security is extremely critical for many African countries. The negative impact of the war in Ukraine on fertiliser prices was very evident in some countries. Thus, it is important to assess the long-term economic and financial viability of developing large green-field, capital-intensive projects to produce domestically nitrogenous fertilisers to determine whether it is preferable to produce these fertilisers locally or to import them from international markets and/or from within the region.

Africa's current fertiliser production is equivalent to twice the continent's present fertiliser consumption. Meanwhile, about 90 per cent of sub-Saharan Africa's fertiliser consumption is met by imports from outside Africa.<sup>71</sup> Logistical, commercial, and trade barriers continue to constrain the development of a much more balanced intra-African fertiliser commerce. New African institutions, like the African Continental Free Trade Area (AfCFTA) created in 2020, will help address some of these barriers given that ensuring food security is a top African priority. As indicated by the head of the AfCFTA, '*there are so many factors that contribute to the low level of intra-Africa trade. Some of them are beyond our mandate as a trade secretariat. However, we are using the AfCFTA as a trade policy tool to overcome such barriers...*'<sup>72</sup>

Other considered non-power gas monetisation projects include the use of gas by energy-intensive industries such as steel and cement production.<sup>73</sup> With a rapidly growing population and increasing urbanisation, the African continent has a high demand for such products.

In the steel industry, in addition to its use as a source of heat or as an electricity generation fuel, natural gas plays a key role as a reductant agent in the direct reduction iron process. But Africa's existing steel production capacity is under-utilised or cannot be fully utilised for non-commercial and commercial reasons (e.g., low-cost imports from China). As a result, most African countries, especially in sub-Saharan Africa, are heavily dependent on imports to meet their steel demand needs.<sup>74</sup>

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<sup>69</sup> DNV KEMA (2013). "Angola and Mozambique Gas Monetization for Economic Development: Gas Based Industry Feasibility Study", African Development Bank, 30 June. <https://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/Angola-Mozambique - Gas Monetization for Economic Development - Project Study.pdf>

<sup>70</sup> Unless there is a significant downstream integration of the petrochemicals chain to add value to the primary products supplied by these gas-based industries instead of exporting them, which is not the case of most sub-Saharan economies.

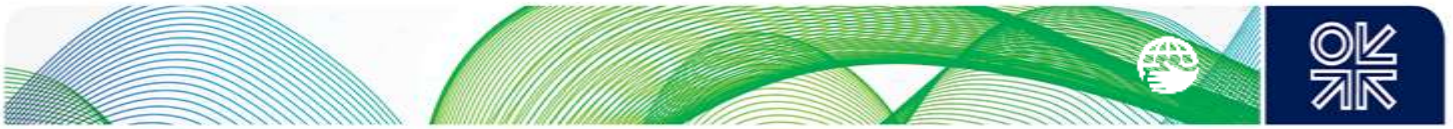
<sup>71</sup> Malpass, David (2022). "A transformed fertilizer market is needed in response to the food crisis in Africa", The World Bank, 21 December.

<https://blogs.worldbank.org/voices/transformed-fertilizer-market-needed-response-food-crisis-africa>

<sup>72</sup> Freedman, Jennifer (2023). "AfCFTA's Ali: Watch for More African Trade Thanks to Guided Trade Initiative", IISD, 15 January. <https://www.iisd.org/articles/policy-analysis/african-trade-initiative>

<sup>73</sup> International Energy Agency (2022).

<sup>74</sup> IEA (2022).



Cement is produced in Africa, and Nigeria is the continent's largest producer. Africa has a cement production capacity that is equivalent to 5 per cent of total global cement production. However, Africa's installed production capacity is much bigger than its current production due to several constraints, such as maintenance, availability of parts, and access to foreign currency.<sup>75</sup>

In Africa's large gas producing countries, natural gas is used by the cement industry. Yet despite its lower emissions levels compared to coal and fuel oil, the use of natural gas in cement production is not the best option for gas monetisation (compared to its use in electricity generation) when gas resources are limited, especially when the gas price is subsidised. However, as the cement industry is one of the world's largest sources of industrial air pollution, adequate environmental regulations should be in place and enforced when gas prices are no longer subsidised. These regulations will prevent the switch from natural gas to cheaper and more polluting fuels, like coal,<sup>76</sup> encourage strict emission controls, and ultimately lead to the decarbonisation of cement production.<sup>77</sup>

Energy-intensive industries require gas supplies that are competitively priced. Thus, there has been a tendency in some countries to subsidise the price of gas supplies to encourage new investments and/or expansions of these energy-intensive industries. Again, this is a challenging approach for developing economies that are already heavily indebted and with limited natural gas resource potential. In this situation, gas allocation priority is given to the power sector. Wherever there is a larger natural gas supply potential and adequate availability of gas infrastructure capacity, gas supplies to energy-intensive industries can be considered but should not be subsidised.

### The gas infrastructure challenge

The lack of funding and timely development of natural gas infrastructure remains a key constraint for many of Africa's existing and potential new gas producing countries. Apart from North Africa's large gas markets (Algeria and Egypt), where extensive natural gas transmission and distribution networks have been built over several decades, the rest of Africa has relatively limited gas pipeline transportation capacity.

There have been attempts in Africa to develop a national gas infrastructure that would boost gas monetisation, like the long-term efforts behind Nigeria's 'Natural Gas Master Plan'<sup>78</sup> initiated in the early 2000s. The development of a nationwide natural gas infrastructure was one of the key components of this master plan, but most of the plan's infrastructure targets have yet to be achieved. This is due mainly to policy/regulatory constraints and related lack of funding of the plan's gas infrastructure projects.

Because of the small size of many African domestic gas markets and their risks, as outlined above, there are limited commercial incentives to extend natural gas infrastructure beyond existing gas supply project boundaries or nearby offtakers. This constrains domestic gas demand growth. In some sub-Saharan African gas-producing countries, new state-owned gas companies have been set up to develop, own, and operate national gas infrastructure, and market the gas domestically. But these entities lack the necessary funding to fully undertake such activities and are faced with financially fragile

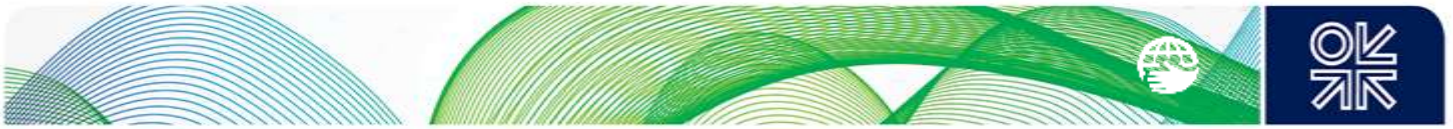
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<sup>75</sup> *Asoko Market Insight* (2023). "Nigeria's Cement Market", 07 June. [https://www.asokoinsight.com/content/market-insights/nigeria-cement-market?utm\\_source=mailchimp&utm\\_medium=newsletter&utm\\_content=news&utm\\_campaign=bespoke\\_research](https://www.asokoinsight.com/content/market-insights/nigeria-cement-market?utm_source=mailchimp&utm_medium=newsletter&utm_content=news&utm_campaign=bespoke_research)

<sup>76</sup> For example, in Egypt, when gas price subsidies were removed for gas supplies to cement plants, these plants switched to coal, a much more environmentally harmful fuel.

<sup>77</sup> Singla, Veena (2022). "Cut Carbon and Toxic Pollution, Make Cement Clean and Green", NRDC, 18 January. [https://www.nrdc.org/bio/veena-singla/cut-carbon-and-toxic-pollution-make-cement-clean-and-green#:~:text=Making%20cement%20also%20emits%20a,\(NOx\)%20and%20carbon%20monoxide](https://www.nrdc.org/bio/veena-singla/cut-carbon-and-toxic-pollution-make-cement-clean-and-green#:~:text=Making%20cement%20also%20emits%20a,(NOx)%20and%20carbon%20monoxide)

<sup>78</sup> Yar'adua, Abubakar L. (2007). "The Nigerian Gas Master-Plan", NNPC, 26 November. [https://nesgroup.org/download\\_policy\\_drafts/Presentation%20on%20the%20Nigerian%20Gas%20Master%20Plan\\_1661855587.pdf](https://nesgroup.org/download_policy_drafts/Presentation%20on%20the%20Nigerian%20Gas%20Master%20Plan_1661855587.pdf)



domestic customers (especially in the power sector) which have payment issues and end up accumulating debt.<sup>79</sup>

Gas infrastructure development would benefit from private sector participation or public-private schemes, provided that an adequate regulatory and fiscal framework is put in place and the poor creditworthiness of potential domestic gas offtakers is addressed. It should be stressed that the lack of adequate electricity infrastructure (transmission and distribution) is also a key constraint for Africa's gas demand growth, as the power sector is the main user of natural gas.

The lack of natural gas infrastructure has led to the development of initiatives to consolidate gas demand and optimise the use of gas infrastructure, as presented below.

### Aggregating potential gas demand

Aggregating natural gas demand through the development of industrial hubs to capture economies of scale and mobilise funding is a concept that has been considered for both energy and non-energy sector developments, including the very recent interest in low-carbon hydrogen clusters. In Africa, this concept has regularly been incorporated into governments' economic development policies and strategies to attract investments and stimulate industrial development. But analysis of the performance of Africa's industrial hubs shows 'uneven and mixed outcomes'.<sup>80</sup>

As expected, natural gas producing countries focus on the leveraging of their indigenous gas supplies in the planning and development of industrial parks. But as with any industrial development initiative, challenges could constrain the building and performance of such parks. For example, in Nigeria, the Lekki Free Zone, where Africa's largest refining and gas-based fertiliser complex is sited,<sup>81</sup> has suffered from long delays in the development of its gas supply infrastructure.<sup>82</sup>

The concept of aggregating gas demand centres is critical to the viability of domestic gas utilisation projects in small size markets as it allows the anchoring of gas demand, but the inherent low level of industrial development in many sub-Saharan African countries makes it difficult to successfully develop industrial hubs or parks and thus capture the sought-after economies of scale and foreign direct investments in domestic gas monetisation projects. Yet, in large African economies with relatively larger gas markets like in Algeria, Egypt, Nigeria, and South Africa, oil and gas focused industrial parks or zones do exist and could be expanded while new ones could be developed.

## 3.2 Uncertain gas export prospects

In new natural gas provinces like the Rovuma basin in southern/eastern Africa (Mozambique and Tanzania) and the MSGBC basin (Mauritania, Senegal, Gambia, Guinea Bissau, and Guinea Conakry) in West Africa, where the domestic gas markets range from small to very small, countries need to rely on natural gas exports to finance the development and monetisation of their large natural gas resources.

Europe is presently Africa's main gas export destination, accounting for about 90 per cent of Africa's total gas exports (pipeline and LNG) in 2022. Considering Europe's decarbonisation commitments, in the long term the level of gas supplies to Europe is likely to be reduced. New sub-Saharan African gas export projects expected to come onstream at the end of this decade and beyond will need to compete in other regional gas markets.

Despite Europe's recent enthusiasm for more non-Russian gas supplies, it is very complicated for gas buyers in Europe to underwrite new capital-intensive gas export projects in Africa by signing long-term

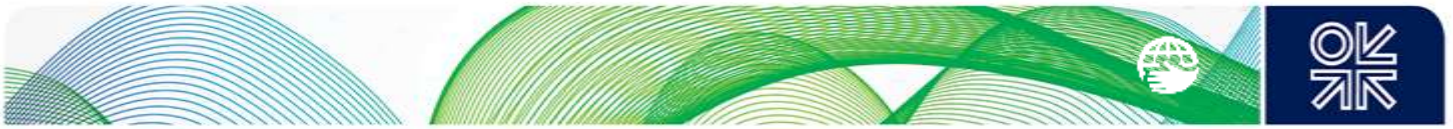
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<sup>79</sup> Adogla-Bessa, Delali (2020). "Debt owed Ghana Gas nears \$1 billion – PIAC report", *Citi Newsroom*, 26 November. <https://citinewsroom.com/2020/11/debt-owed-ghana-gas-nears-1-billion-piac-report/>

<sup>80</sup> Arkebe Oqubay (2022). "African Industrial Hubs and Industrialisation: Diversity, Unevenness, and Strategic Approach", SARCHI Industrial Development Working Paper Series, June. <https://www.uj.ac.za/wp-content/uploads/2021/10/sarchi-wp-2022-10-oqubay-june-2022-1.pdf>

<sup>81</sup> Dangote fertiliser website. <https://fertiliser.dangote.com/>

<sup>82</sup> Arkebe Oqubay (2022).



gas contracts due to the uncertainty over Europe's long-term gas demand. Globally, the few new long-term gas contracts that have been secured so far are mainly for LNG supplies to Asia. Since it is unlikely that large new African LNG export projects could attract funding by relying only on spot and short-term gas trade, international portfolio players<sup>83</sup> and traders could potentially act as intermediaries for new African gas supplies to Europe.<sup>84</sup> But long-term contractual purchase commitments remain crucial.

Unless African gas exporters adopt a more flexible contractual framework, European gas importers are likely to focus more on flexible contracts with US LNG suppliers.<sup>85</sup> Additionally, US LNG projects have indicated that they are looking to use certified 'responsibly sourced gas' (RSG) to reduce upstream gas emissions and use renewable sources of electricity at their LNG plants.<sup>86,87</sup> Although adding to the cost of LNG exports, this additional characteristic - if it can be independently measured and verified - could favour US LNG imports in the long term as Europe expands its decarbonisation measures to include natural gas imports.

Nevertheless, there is great uncertainty about the level of natural gas demand in Europe after 2030 when the bulk of the above-mentioned African LNG projects are planned to come on stream. Europe's decarbonisation agenda will undoubtedly reduce Europe's future gas demand, but estimates of this demand decline, starting from around 2030/2035, vary significantly among institutions and their retained scenarios.<sup>88</sup> But overall, the message is clear: Europe's current gas appetite is temporary<sup>89</sup> and competitors like US LNG exporters will continue to target this already established market. In 2022, 13 per cent of Europe's gas imports originated from the US, which was Europe's third largest source of total gas imports (pipeline gas and LNG) after Norway and Russia and by far its largest LNG supplier.

However, this does not mean that the flows of African gas to Europe will stop. There will still be opportunities for existing and new gas exporters in Africa to market their gas in Europe, albeit in smaller volumes and under more flexible terms and conditions.

Beyond 2030, new African gas export projects, especially in southern/eastern Africa, are likely to be more focused on Asian gas markets. In fact, the largest of these projects, the Mozambique LNG project, has signed several offtake agreements, mainly with Asian clients.<sup>90</sup> The competition for a share of these higher-growth gas markets will be fierce and the high price sensitivity of clients such as those in South Asia will be very challenging.

A predicted wave of new LNG projects expected to be commissioned by the second half of this decade could temporarily put downward pressure on gas prices in international gas markets.<sup>91</sup> Thus, new African LNG export projects need to focus on the cost-competitiveness of their gas supplies to secure

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<sup>83</sup> For example, the output (2.5 mtpa) of the first phase of Mauritania-Senegal's GTA LNG project has been sold to BP marketing. But it is not clear if this approach would work for bigger LNG projects.

<sup>84</sup> Losz, Akos; Chyong, Kong; and Ira B. Joseph (2023). "Beyond Spot vs. Long Term: Europe's LNG Contracting Options for an Uncertain Future", Commentary, CGEP, June. <https://www.energypolicy.columbia.edu/publications/beyond-spot-vs-long-term-europes-lng-contracting-options-for-an-uncertain-future/>

<sup>85</sup> *Oil & Gas Journal* (2023). "Venture Global becomes largest long-term LNG supplier to Germany with new agreement", 23 June. [https://www.ogj.com/pipelines-transportation/lng/article/14295508/venture-global-becomes-largest-longterm-lng-supplier-to-germany-with-new-agreement?utm\\_source=OGJ+Daily&utm\\_medium=email&utm\\_campaign=CPS230623048&o\\_eid=1095D4489278F2V&rdx\\_id=nt\[pull\]=omeda|1095D4489278F2V&oly\\_enc\\_id=1095D4489278F2V](https://www.ogj.com/pipelines-transportation/lng/article/14295508/venture-global-becomes-largest-longterm-lng-supplier-to-germany-with-new-agreement?utm_source=OGJ+Daily&utm_medium=email&utm_campaign=CPS230623048&o_eid=1095D4489278F2V&rdx_id=nt[pull]=omeda|1095D4489278F2V&oly_enc_id=1095D4489278F2V)

<sup>86</sup> *LNG Journal* (2023). "LNG outlook - the challenges ahead", 20 July. <https://lngjournal.com/index.php/shipping-news-old/item/109007-lng-outlook-the-challenges-ahead>

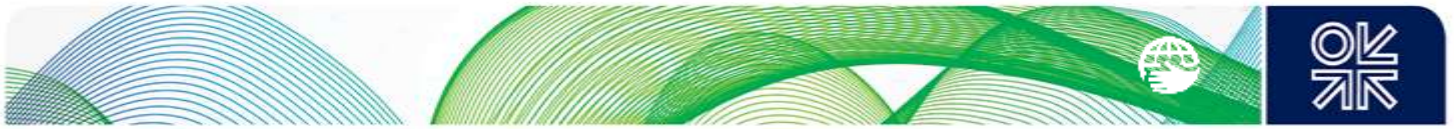
<sup>87</sup> It should be noted that RSG is different from actions taken by gas producers to "reduce their carbon footprint, mitigate emissions, and minimise environmental and social impacts." See Oh, Eunji and Eugene Kim (2021). "Responsibly sourced gas (RSG): a primer - RSG is gaining traction in the US." Wood Mackenzie, 18 October. <https://www.woodmac.com/news/opinion/responsibly-sourced-gas-rsg-a-primer/>

<sup>88</sup> International Energy Agency (2022). "World Energy Outlook", October. <https://www.iea.org/reports/world-energy-outlook-2022>

<sup>89</sup> European Commission (2022). "REPowerEU: Joint European Action for more affordable, secure and sustainable energy", 08 March. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2022%3A108%3AFIN>

<sup>90</sup> *NS Energy*. "Mozambique LNG Project." <https://www.nsenerybusiness.com/projects/area-1-mozambique-lng-project/>

<sup>91</sup> Fulwood, Mike (2023).



long-term import demand commitments. International natural gas prices can fluctuate with significant amplitudes, as seen over the last three years, and African LNG exporters must be ready to mitigate this unavoidable variable price risk.

In addition to a shrinking European gas market, existing and potential new African gas exporters targeting Europe will have to lower the carbon intensity of their gas projects and eventually invest in abatement of their gas production, as explained in the next section.

## 4. Energy transition implications

Africa is a very diverse continent. African countries have different political, economic, financial, population, geographical, and natural resource endowment characteristics and consequently, energy transition strategies and pathways will reflect this diversity. In this paper, we focus on the specific energy transition implications of natural gas developments in Africa's existing and potential new gas producing countries. These are very important issues to address if Africa is to continue to develop and monetise its natural gas potential.

### 4.1 A highly polarized energy transition debate

In addition to the use of liquid and traditional fuels or coal, and hydro in some cases, African countries that are not endowed with natural gas resources will continue to attempt to develop renewable sources of energy, wherever and whenever it is possible to mobilize investments in these clean energy alternatives. But this pathway remains a challenging one to implement in a continent with the world's lowest level of access to electricity and clean cooking. In Africa's existing and potential new gas producing countries, natural gas will inevitably play, or continue to play, a dominant role in their energy mix and their energy transition pathways. However, Africa's future development and monetisation of its natural gas resources/reserves seems to be caught between two diametrically opposed views.

First, there is the anti-fossil fuel position, expressed mainly by non-African institutions and some African NGOs, which pushes for an unrealistic immediate halt of investments in hydrocarbon development projects in Africa. Interestingly, this is not dissimilar to the position of some anti-gas export resource nationalists which advocated 'leaving the gas in the ground' if it could not be exclusively monetised domestically. These views were not motivated by environmental or climate change reasons. Today, this 'leave the gas in the ground' position is strongly advocated by several international and African NGOs, but obviously for totally different reasons that focus on the exclusive development of renewable sources of energy.<sup>92</sup>

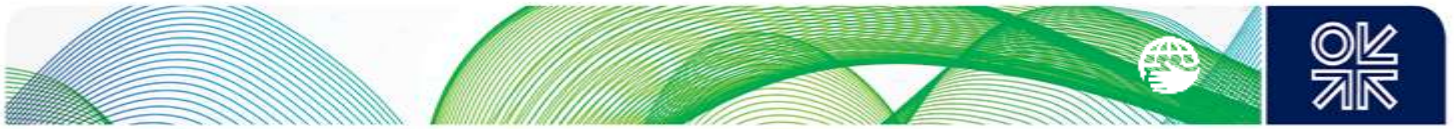
Then there is the position of the African countries which hold existing and potential new gas resources/reserves and are dismayed by this extreme anti-fossil fuel view. These developing economies, who emit only a small fraction (3 - 4 per cent) of the world's greenhouse gas emissions, strongly believe that they have the right to benefit from their indigenous natural gas resources. The African Union in its 2022 Common Position made it very clear that '*Africa will continue to deploy all forms of its abundant energy resources including renewable and non-renewable energy to address energy demand*'.<sup>93</sup> However, it would be unrealistic and unwise for African policymakers to assume that the development of Africa's natural gas potential would follow old patterns of gas resource developments and ignore or underestimate international pressure to decarbonise economies and the impact of ESG compliance.

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<sup>92</sup> Geuskens, Isabelle and Henriette Butijn (2022). "Locked Out of a Just Transition: Fossil Fuel financing in Africa", March. <https://www.banktrack.org/download/locked-out-of-a-just-transition-fossil-fuel-financing-in-africa/07-md-banktrack-fossil-fuels-africa-rpt-hr-1.pdf>

<sup>93</sup> African Union (2022). "Africa Speaks with Unified Voice as AU Executive Council Adopts African Common Position on Energy Access and Just Energy Transition", *press release*, 22 July. [https://au.int/sites/default/files/pressreleases/42071-pr-PR-The\\_Executive\\_Council\\_Adopted\\_African\\_Common\\_Position\\_on\\_Energy\\_Access\\_and\\_Transition.pdf](https://au.int/sites/default/files/pressreleases/42071-pr-PR-The_Executive_Council_Adopted_African_Common_Position_on_Energy_Access_and_Transition.pdf).





## 4.2 Preparing for a sustainable transition

A more realistic and balanced approach to fair energy transition pathways for African economies needs to emerge. There is also a fundamental question that should be posed, namely how the rent from the exploitation of a country's natural gas resources will be sustainably managed and benefit the economy. A recent World Bank study shows that '*poverty has deepened in resource-rich sub-Saharan African countries.*'<sup>94</sup> This brings up the old debate on whether natural resources are a blessing or a curse for an economy.<sup>95</sup> But this is a subject that is beyond the scope of this paper.

The energy transition implications of a future boost in gas development projects in Africa are not limited to the integration of a few megawatts of renewable energy on the perimeter of a hydrocarbon project or in the surrounding areas, or the formulation of nature-based solutions to offset greenhouse gas (GHG) emissions from hydrocarbon projects. It is essentially about how gas producing countries and oil and gas companies can work together to meaningfully and verifiably reduce the level of GHG emissions generated by existing and potential new gas projects.

Although Africa's level of GHG emissions is much lower than that of other regions of the world, the investment and trade barriers resulting from future decarbonisation measures imposed by the European Union and some key financing institutions on the production and exports of natural gas will force African gas producers to prepare for this existential threat.

Addressing the following issues, as shown below, is fundamental for the preparation of a more sustainable energy transition: associated gas flaring; methane emissions, and eventually the need to abate natural gas supply using Carbon Capture and Storage (CCS) or Carbon Capture, Utilisation and Storage (CCUS) technology.

### Associated gas flaring and methane emissions

Over the last twenty years, one of the environmental topics that has attracted a lot of attention regarding the production of hydrocarbons and resulted in the launching of international and national initiatives is the reduction of routine<sup>96</sup> flaring of associated gas. Associated gas flaring has an adverse climate change impact because of the carbon dioxide (CO<sub>2</sub>) emissions resulting from this flaring and the methane emissions from incomplete combustion during flaring. It is also a major source of pollution for communities living near the producing areas and undoubtedly a wasteful burning of valuable natural resources.

Based on satellite data compiled by the World Bank-led Global Gas Flaring Reduction (GGFR) partnership, a total of 139 bcm of gas was flared globally in 2022 at upstream oil and gas facilities and LNG liquefaction plants.<sup>97</sup> These flaring estimates show that seven African hydrocarbon producing countries were among the top twenty gas flaring countries in the world. (It should also be mentioned that some of these estimates are contested by hydrocarbon producing countries who report lower gas flaring levels.)

According to GGFR, in 2022 Africa's oil and gas producers flared a total of about 30 bcm or the equivalent of about 20 per cent of the continent's natural gas consumption. As shown in Figure 8, Africa's largest hydrocarbon producers are also the biggest sources of gas flaring. Obviously, flaring volumes mainly reflect the country's level of crude oil production, but also the availability of required infrastructure and equipment to mitigate routine gas flaring, and the identification of viable markets to monetise the recovered gas.

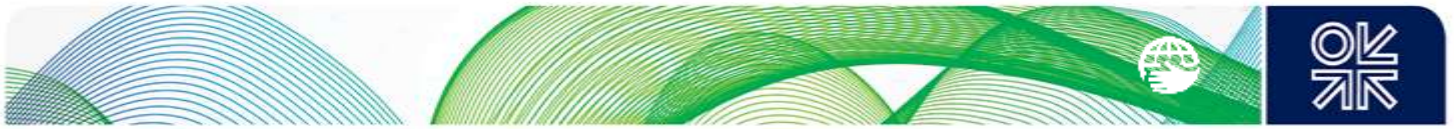
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<sup>94</sup> Cust, James and Albert Zeufack, eds. (2023).

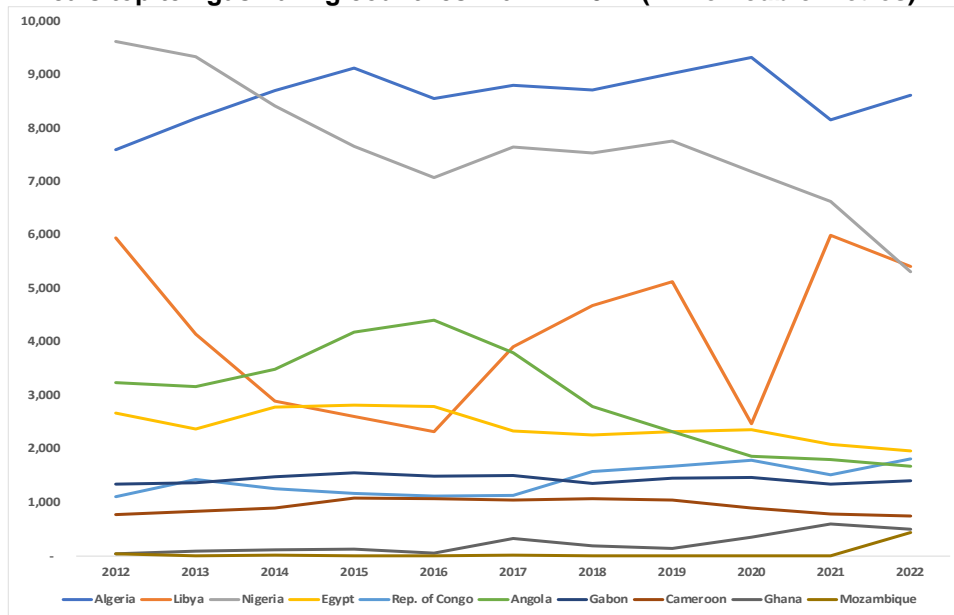
<sup>95</sup> Gelb, Alan et al. (1988). "Oil windfalls - blessing or curse", The World Bank Group, October. <http://documents.worldbank.org/curated/en/536401468771314677/Oil-windfalls-Blessing-or-curse>

<sup>96</sup> Emergency or non-routine flaring occurs during operational upsets as an emergency safety measure.

<sup>97</sup> GGFR (2023). <https://www.worldbank.org/en/programs/gasflaringreduction/global-flaring-data>



**Figure 8: Africa's top ten gas flaring countries: 2012 – 2022 (million cubic metres)**



Source: GGFR, 2023

In 2015, the World Bank launched the ‘Zero Routine Flaring by 2030’ initiative<sup>98</sup> and several African oil and gas producing countries, through their governments and/or NOCs, have endorsed this initiative.<sup>99</sup> Some African countries have included measures to reduce or stop routine flaring in their hydrocarbon laws and regulations, but the effectiveness and enforceability of these measures is being questioned, as flaring continues in most countries.

Methane emissions are another concern that affect hydrocarbon operations. According to the Intergovernmental Panel on Climate Change (IPCC), methane is the second most important anthropogenic greenhouse gas after CO<sub>2</sub> with a much bigger global warming potency even though CO<sub>2</sub> has a longer-lasting impact.<sup>100</sup> Given the serious impact of this most potent greenhouse gas, several key African oil and gas producing countries have joined international initiatives such as the *Global Methane Pledge* to cut methane emissions by 30 per cent by 2030.<sup>101</sup> In 2022, the African Development Bank published a report on ‘Methane in Africa’. The report is based on a high-level analysis of four key sectors that are responsible for anthropogenic methane emissions in Africa. It shows that the oil and gas sector generates close to 50 per cent of ‘*all analysed anthropogenic methane emissions, despite just 17 of 54 African countries operating in this sector*’.<sup>102</sup>

Although this issue of methane emissions has been acknowledged by Africa’s hydrocarbon producers and announcements have been made regarding the measurement, reporting and verification of these emissions, much effort remains to be deployed to address this urgent critical issue. Otherwise, Africa’s claim that natural gas can play a significant ongoing role in the low-carbon energy transition could be seriously undermined.<sup>103</sup>

<sup>98</sup> <https://www.worldbank.org/en/programs/zero-routine-flaring-by-2030/about>

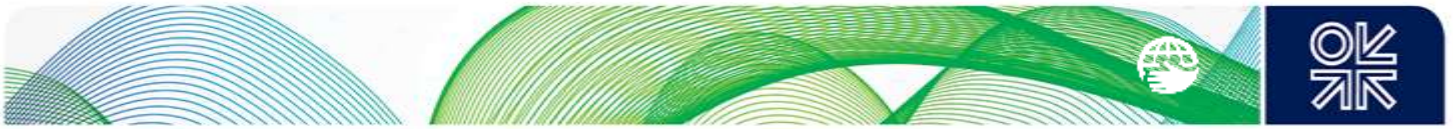
<sup>99</sup> <https://www.worldbank.org/en/programs/zero-routine-flaring-by-2030/endorsers>

<sup>100</sup> IPCC (2021). “Climate Change 2021: The Physical Science Basis”, 07 August. <https://www.ipcc.ch/report/ar6/wg1/>

<sup>101</sup> <https://www.globalmethanepledge.org/>

<sup>102</sup> African Development Bank (2022). “Methane in Africa – A high-level assessment of anthropogenic methane emissions in Africa with case studies on potential evolution and abatement”, August. <https://www.afdb.org/en/documents/methane-africa-high-level-assessment-anthropogenic-methane-emissions-africa-case-studies-potential-evolution-and-abatement>

<sup>103</sup> Stern, Jonathan (2022). “Measurement, Reporting, and Verification of Methane Emissions from Natural Gas and LNG Trade: creating transparent and credible frameworks”, Oxford Institute for Energy Studies, January.



## CCS \ CCUS

In the long-term, Africa will find it difficult to expand its existing gas potential and develop new gas resources or reserves without paying attention to international decarbonisation measures. Investments in unabated gas projects could be more constrained and even prohibited under certain international jurisdictions. Considering that most of the new gas export projects to be developed in Africa are expected to come onstream at the end of this decade and beyond, the issue of unabated gas is an existential threat for gas producers. This is especially the case for Africa's gas exporters who are targeting Europe's energy markets and who are competing with US and Qatari LNG exporters, which have invested and/or will soon be investing in lower carbon operations, including CCS facilities.<sup>104</sup>

The question of abatement of future natural gas supplies has drawn the attention of African energy stakeholders and the use of CCS or CCUS technology is topping their energy transition agenda.<sup>105</sup> But this aspiration has yet to be translated into concrete actions. According to the IEA's CCUS projects database, as of 24 March 2023, there were no oil and gas-related CCUS projects planned to be operational in Africa by 2030.<sup>106</sup> A new major gas project in Libya to be developed by Libya's NOC jointly with Eni, does include the construction of a CCS facility,<sup>107</sup> while the Egyptian government has announced the development in partnership with Eni of a pilot CCS project at an onshore hydrocarbon field.<sup>108</sup> But these planned CCS investments are just a small fraction of what existing and potential new gas African producers would require to start seriously addressing the question of natural gas abatement. At present, the financing of CCS facilities would require strong support from all stakeholders, including government and companies directly involved in hydrocarbon developments.

It is important to mention that the first hydrocarbon-related African CCS project was launched in Algeria in 2004 to extract and store CO<sub>2</sub> from the gas produced in the In Salah area in southwest Algeria. This US\$ 2.7 billion In Salah CCS project with a capture capacity of 1 - 1.2 million tonnes per annum was developed by the In Salah Gas joint venture partnership, which was initially formed of Algeria's Sonatrach, BP<sup>109</sup> and Equinor (formerly Statoil). The aim of the project was to reduce the high CO<sub>2</sub> content of the gas, but the project was suspended in 2011 'due to concerns about the integrity of the seal'.<sup>110</sup> This first African CCS experience was stopped after seven years of operation, but it shows that CCS projects could be developed by partnerships of national and international companies operating in African gas producing countries. In the long-term, it is not unrealistic to consider that Africa's natural gas producers could gradually develop CCS or CCUS capacity to reduce their carbon footprint and monetise their existing and yet-to-be developed gas potential.

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<https://www.oxfordenergy.org/publications/measurement-reporting-and-verification-of-methane-emissions-from-natural-gas-and-lng-trade-creating-transparent-and-credible-frameworks/#:~:text=Contact,Measurement%2C%20Reporting%2C%20and%20Verification%20of%20Methane%20Emissions%20from%20Natural%20Gas,COP26%20Conference%20in%20November%202021.>

<sup>104</sup> Presley, Jennifer (2023). "QatarEnergy Awards \$10 Billion Contract for North Field Expansion Project", *Journal of Petroleum Technology*, 16 May. [https://jpt.spe.org/qatarenergy-awards-10-billion-contract-for-north-field-expansion-project?mkt\\_tok=ODMzLUxMVC0wODcAAAGLzKHmLzG1T8lMfgstUvZol7nY-zlCfTz\\_-1WIB31hWQsu3PTAAWG0qp4bQawD5hFerovFIYufdcyOCSZAhSsuBoQPef5ycKS4Dmf260pbwezgw](https://jpt.spe.org/qatarenergy-awards-10-billion-contract-for-north-field-expansion-project?mkt_tok=ODMzLUxMVC0wODcAAAGLzKHmLzG1T8lMfgstUvZol7nY-zlCfTz_-1WIB31hWQsu3PTAAWG0qp4bQawD5hFerovFIYufdcyOCSZAhSsuBoQPef5ycKS4Dmf260pbwezgw)

<sup>105</sup> Ayuk, NJ (2023). "Carbon Capture, Utilization, and Storage: Game-Changing Technology for Africa", *Energy Capital & Power*, 22 February. <https://energycapitalpower.com/carbon-capture-ccus-tech-africa/>

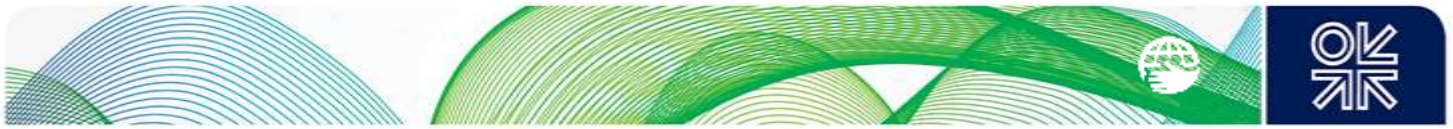
<sup>106</sup> IEA (2023c). "A worldwide database of CCUS projects", 24 March. <https://www.iea.org/data-and-statistics/data-tools/ccus-projects-explorer>

<sup>107</sup> Eni (2023).

<sup>108</sup> In Egypt, the government announced the development of a pilot CCS project at the Meleiha field in the Western Desert. See *Enterprise* (2022). "Oil Ministry announces launch of Egypt's first pilot carbon capture project with Eni + raft of other green energy initiatives", 08 May. <https://enterprise.press/stories/2022/05/08/oil-ministry-announces-launch-of-egypts-first-pilot-carbon-capture-project-with-eni-raft-of-other-green-energy-initiatives-70415/>

<sup>109</sup> In February 2023, Eni acquired bp's assets in the In Salah Gas project.

<sup>110</sup> IEEFA (2022). "The Carbon Capture Crux: Lessons Learned", September. <https://ieefa.org/resources/carbon-capture-crux-lessons-learned>



## Carbon pricing policies

For a long time, the development of carbon pricing policies in Africa was considered very challenging or premature. Apart from South Africa, which is the first African country to establish and implement a carbon tax policy,<sup>111</sup> there is an almost complete absence of carbon pricing policies or initiatives in Africa, as indicated in Table 4. This is in part explained by the relatively low level of Africa's carbon emissions and the continent's severe lack of data measurement, reporting, and verification of emissions, in addition to issues of transparency and policy compliance.

**Table 4: Africa's carbon pricing initiatives and policies<sup>112</sup>**

Country	Initiative/Policy
South Africa	Carbon tax implemented
Botswana	Carbon tax under consideration
Senegal	Carbon tax under consideration
Morocco	Carbon tax under consideration
Nigeria	ETS (*) under consideration
Gabon	ETS under consideration

Source: World Bank, 2023

(\*): Emissions Trading System

For African gas producing and exporting countries, there was also the argument that Africa's economic development is the continent's overriding policy priority. But this economic growth priority has now been redefined to include sustainable economic development principles endorsed by African countries. In 2015, African leaders adopted the United Nations' *2030 Agenda for Sustainable Development*.<sup>113</sup> However, the African Development Bank's latest sustainable development report indicates that Africa is struggling to meet this Agenda's sustainable development goals.<sup>114</sup>

As illustrated in Table 4, there are very limited efforts deployed at a country level to develop and implement carbon pricing initiatives or policies. Regionally, an *Africa Carbon Markets Initiative* was launched last year at the COP 27 in Egypt,<sup>115</sup> but it is too early to assess the status of its progress.

Although several non-African countries are also failing to develop and implement effective carbon pricing policies, including developed economies that have announced ambitious decarbonisation policies, the African continent's natural gas producers/exporters face an existential threat because of the severe financial impact of future international decarbonisation measures.

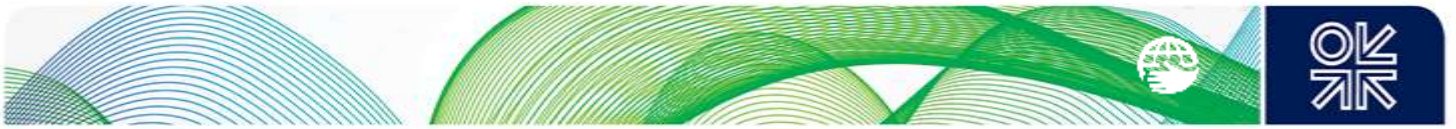
<sup>111</sup> International Monetary Fund (2023). "South Africa carbon pricing and climate mitigation policy)", IMF African department, 06 June. [https://www.elibrary.imf.org/view/journals/002/2023/195/article-A003-en.xml#:~:text=The%20official%20carbon%20tax%20rate,%E2%80%93322%20\(Figure%203\).](https://www.elibrary.imf.org/view/journals/002/2023/195/article-A003-en.xml#:~:text=The%20official%20carbon%20tax%20rate,%E2%80%93322%20(Figure%203).)

<sup>112</sup> <https://carbonpricingdashboard.worldbank.org/>

<sup>113</sup> United Nations (2015). *Transforming Our World: The 2030 Agenda for Sustainable Development*, 15 October. <https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf>

<sup>114</sup> African Development Bank (2022). "Africa Sustainable Development Report 2022", November. <https://www.afdb.org/en/documents/2022-africa-sustainable-development-report>

<sup>115</sup> Climate Champions (2022). "Africa Carbon Markets Initiative launched to dramatically expand Africa's participation in voluntary carbon market", 08 November. <https://climatechampions.unfccc.int/africa-carbon-markets-initiative/>



## Conclusions

Africa's natural gas endowment is unevenly distributed among a relatively small group of countries in the continent's northern, western, and southern/eastern subregions. Despite this high gas resource concentration, Africa's right to develop its indigenous gas resource has become a wider and highly sensitive political topic due to the focus on net zero emission scenarios requiring a halt of fossil fuel investments.<sup>116</sup> It reflects Africa's deep frustration and concern about the significant lack of access to affordable energy and clean cooking and a persistent poor economic development situation in several parts of the continent.

A number of new African gas development projects are presently at the planning or implementation stage, mainly in sub-Saharan Africa. However, a large funding gap continues to affect Africa's potential development and monetisation of its natural gas resources or reserves. Until recently, export credit agencies (ECAs) and multilateral development agencies (MDAs) played a key role in the financing of Africa's gas development projects. But project compliance with environmental, social, and governance or ESG principles is increasingly being scrutinized not only by NGOs, but also by the shareholders and boards of different funding institutions, including ECAs and MDAs, and commercial banks.

Financing of energy projects in several African countries continues to be considered risky. Therefore, the de-risking of potential gas projects will greatly improve their potential project funding. Some efforts have been made in this sense, for example, by revisiting hydrocarbon laws to provide more incentives and reducing the level of administrative bureaucracy. Nevertheless, a lot of work remains to be done and more quickly to attract funding.

In a continent where over 40 per cent of the population has no access to electricity, there is unquestionably potential for natural gas demand growth, especially in sub-Saharan Africa's new gas provinces with nascent domestic gas markets. But the identification of realistic and financeable gas monetisation options is important. At present, most of Africa's new gas development projects are export oriented. This is contested by some parties who advocate an exclusive domestic gas monetisation route or a 'leave the gas in the ground' policy. These alternatives have their socio-economic and environmental benefits and drawbacks. A 'no more gas investments' scenario would in theory favour a rapid and substantial increase in Africa's clean electrification. Unfortunately, because of a limited level of investment in African renewable projects, the share of variable renewable energy in Africa's electricity supply mix will remain low until at least the end of this decade.

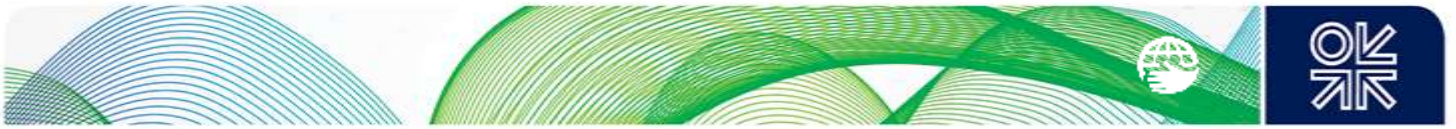
Regarding the export-driven focus, there are also internal and external constraints. In sub-Saharan Africa, most of new gas resource holders have domestic gas markets that can only absorb a small share of the gas potential that could be developed. Without the gas export driver, the funding of new gas development projects would be very challenging. Yet there are a lot of uncertainties about the number of commercially viable gas export opportunities after 2030, especially in Europe, due mainly to the future adverse impact of international decarbonisation measures on gas demand.

Although African countries are determined to develop and use their indigenous hydrocarbon resources, they are also fully aware of the challenges facing future funding of hydrocarbon projects for both domestic and/or export purposes. Thus, there are concerns that their economies would neither fully benefit from their indigenous natural gas resources nor receive enough investments to develop their vast renewable energy potential. This would lead to a highly undesirable scenario of an increasing reliance on more environmentally harmful fuels like coal, diesel, and fuel oil for those who can afford them and on traditional fuels for the less fortunate.

Europe's natural gas crisis has stimulated an unexpected interest in Africa's natural gas potential. In fact, natural gas as a fuel (and feedstock) has been temporarily rehabilitated by various international

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<sup>116</sup> International Energy Agency (2021). "Net Zero by 2050 - A Roadmap for the Global Energy Sector", May. <https://www.iea.org/events/net-zero-by-2050-a-roadmap-for-the-global-energy-system>



institutions and agencies like the G7 group of countries,<sup>117</sup> the European Union,<sup>118</sup> and the International Energy Agency. However, African countries endowed with natural gas resources/reserves should not be under the illusion that this short to medium term security of gas supply situation could slow down the international decarbonisation agenda, especially in Europe, and allow a return to the old ways of exploiting hydrocarbon resources.

It would be unrealistic and unwise for Africa's existing and potential new hydrocarbon producers to overlook the issue of lowering the carbon intensity of their operations and not address seriously the issues of gas flaring, methane emissions, and the need for future gas abatement, while at the same time aspiring to attract investments and financing to develop and monetise their indigenous hydrocarbon resources. Fortunately, this is something African gas producing countries have acknowledged through the endorsement of global initiatives like the World Bank-led Zero Routine Flaring by 2030 initiative and the Global Methane Pledge. Now, the most difficult part is to convert these endorsements into concrete and effective actions.

Africa's natural gas renaissance is inevitably challenging. It is, however, achievable within the context of a fair energy transition, where natural gas plays a key role, and importantly if it is internally driven. African policymakers need to address all the internal barriers to the funding of gas projects and be fully engaged in the sustainable development and utilisation of their countries' indigenous natural gas resources. They have, perhaps, one last chance to make this African 'golden age' of gas happen.

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<sup>117</sup> METI (2023). "G7 Climate, Energy and Environment Ministers' Communiqué, G7 Ministers' Meeting on Climate, Energy and Environment", Sapporo, Japan, 16 April. <https://www.meti.go.jp/press/2023/04/20230417004/20230417004-1.pdf>

<sup>118</sup> Abnett, Kate (2022). "EU parliament supports 'green' label for gas, nuclear investments", *Reuters*, 06 July. <https://www.nasdaq.com/articles/eu-parliament-supports-green-label-for-gas-nuclear-investments>