



# A Balancing Act

Considerations for the  
expansion of liquefied natural  
gas projects in Nigeria

IISD REPORT



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### **A Balancing Act: Considerations for the expansion of liquefied natural gas projects in Nigeria**

June 2024

Written by Bathandwa Vazi and Richard Bridle

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## Executive Summary

Nigeria, a major exporter of oil and gas, is at a pivotal economic juncture. After sustaining a major fall in economic output during the COVID-19 pandemic, the GDP adjusted for inflation has reached its pre-crisis levels, despite continued challenges and unstable employment in the oil and gas sector. Nigeria's government revenues include a significant and declining contribution from oil exports and a smaller but growing contribution from liquefied natural gas (LNG) exports. LNG export increases have been driven by increased international interest, following disruptions in Russian gas supply to the European Union (EU). The expansion of LNG exports poses multifaceted risks and challenges. As the EU grapples with gas supply disruptions due to the Ukraine conflict, it is seeking alternative sources by fostering bilateral deals with African nations, including Nigeria. While this presents opportunities, it also poses significant risks, especially considering global shifts toward clean energy. Nigeria faces a potential balancing act between its declining oil revenues, stagnant energy access initiatives, and rising unemployment, and meeting its commitments to the 2016 Paris Agreement.<sup>1</sup>

LNG plant and pipeline expansion occurs over a minimum of 5 years, with the operationalization of such plants needing another 3 to 5 years before they can produce gas. By 2050, global economies have committed to meeting “net zero” targets (Net Zero Tracker, 2024). Though there has been a sharp increase in demand for LNG from Europe since 2020, projections by the International Energy Agency show that around 2030, the demand will begin to drop. Noting that Nigeria is not the only LNG supplier in the market, it risks expanding its LNG infrastructure to compete with larger LNG suppliers. The eventual transition to a low-carbon world could make LNG assets that are unable to operate profitably so-called “stranded” assets, mirroring challenges faced by other fossil fuel-producing infrastructure. For this reason, Nigeria needs to balance its LNG development aspirations with global targets for net-zero emissions by 2050 by ensuring it will not lock its economy into fossil fuel reliance and that it balances its domestic energy needs with its export market development intentions.

This paper evaluates the expansion of the LNG industry in Nigeria to date and assesses the risks associated with the impact of this expansion on the country's environment, economy, and society. It does this by responding to three questions, namely: a) What is the viability of LNG expansion on Nigeria's economy? b) What are the socio-economic and energy supply impacts of LNG? and c) What risks will the LNG expansion pose should it fall short of envisaged expectations?

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<sup>1</sup> The Paris Agreement (2016) is a legally binding international treaty on climate change. Adopted by 196 Parties at the UN Climate Change Conference (COP 21) in Paris, France, on December 12, 2015, it entered into force on November 4, 2016. Its overarching goal is to hold the increase in the global average temperature to well below 2°C above preindustrial levels and pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels (United Nations Framework Convention on Climate Change, 2015).



## Key Findings

### Social and Environmental Impacts

Gas development has not yet provided significant economic or energy access benefits in Nigeria, aside from generating revenues from exports. On the contrary, LNG development—and oil industry development more generally—is often cited as a factor in driving conflict, theft, and lawlessness in the areas where it operates (George-Ikoli et al., 2024). The gas sector has also been marred by ongoing environmental issues that the government seeks to manage through policy and regulations; these issues include gas flaring, greenhouse gas emissions, and health issues associated with emissions.

### Economic Concerns

Nigeria, the sixth-largest global LNG exporter with a 6% market share in 2022, is rapidly expanding its LNG production capacity, partially to take advantage of the supply shocks resulting from Russia's invasion of Ukraine. The government has declared 2021–2030 the “Decade of Gas,” indicating the priority given to gas development as part of Nigeria's economic strategy. The Russia–Ukraine war has, at least temporarily, increased European LNG demand, offering the potential for additional fossil fuel-based revenue. Thus, despite the historical focus on oil, Nigeria is now looking to expand its LNG terminals. However, this will require further investments in infrastructure that are likely to become “stranded” amid global decarbonization efforts.

### Risks to Scaling Up LNG Production if European LNG Demand Declines

Nigeria Liquefied Natural Gas Limited (NLNG), the partially state-owned enterprise managing the government's interest in LNG, recorded approximately USD 100 billion in revenues between 1999 and 2019. However, LNG production and exports are often tied to volatile market-based pricing when there are no long-term off-taker contracts, making revenue generation vulnerable to geopolitical trends. Nigeria's economic model should be diversified to mitigate these and other related risks. As Nigeria aims to increase LNG production, it encounters three key risks:

1. Replacing oil revenues with LNG
  - **Challenge:** Attempts to substitute declining oil revenues (due to declining oil production) with LNG exports may not be successful due to uncertain future demands for LNG in the global marketplace.
  - **Concerns:** Global trends favouring clean energy may clash with increased LNG investment. The shift to a low-carbon world could leave Nigeria with another fossil fuel-based income source determined by external global price fluctuations.
2. Rising fossil fuel subsidies that stifle efforts for true economic diversification





- **Challenge:** More investments in LNG development risk increasing demands for fossil fuel subsidies to support the industry, hindering true economic diversification.
  - **Concerns:** An economic downturn in the energy sector could trigger social issues. Once subsidies are initiated for job and shareholder protection, they are difficult to eliminate. The LNG projects may encounter obstacles in global and domestic gas markets, including price fluctuations, competition, demand shifts, and regulatory changes. Technical and operational issues, such as gas supply, security, and maintenance, can influence a project's long-term profitability and sustainability.
3. Having stranded LNG assets if demand for LNG declines
- **Challenge:** LNG projects require long-term contracts with a degree of revenue certainty for investment. Falling demand and low prices make them less likely to secure investment or operate profitably.
  - **Concern:** While there has been increased demand for LNG in Europe due to Russia's supply reduction, long-term demand for LNG is not certain, which may leave Nigeria with stranded assets once demand declines. To avoid potential stranded assets due to declining European demand, consideration should be given to reducing investments in LNG or at least including these scenarios in planning and decision-making exercises.

## Recommendations

### Rethink Economic Dependencies

Nigeria is reliant on oil and gas revenues and subsequently faces economic challenges due to declining oil production and a rapidly growing population. Despite LNG contributing to revenue, Nigeria needs to pay immediate attention to addressing its economic model's challenges. The expansion of LNG projects in Nigeria requires careful long-term, scenario-based, and sound financial analysis. It is also crucial to address issues related to inequality, environmental sustainability, and economic dependence on fossil fuels.

### Assessing LNG Expansion Risks

While there are regulations in place to manage gas flaring, in the longer term, the continued extraction of fossil fuels contributes to higher carbon dioxide and methane emissions. Efforts should be intensified to manage such impacts while ramping up the implementation of the Renewable Energy Roadmap. This will introduce cleaner energy sources into Nigeria's energy mix, capitalizing on potential economic opportunities that may arise and reducing emissions from gas and oil.

### Global Market Dynamics

Given the current uncertainty in global LNG demand, Nigeria must reflect carefully before approving further LNG exploration tied with export markets and investigate the domestic



use of LNG to boost its electrification efforts and employment creation. Before embarking on state-supported expansion of LNG for export, there needs to be contingency planning to account for the possibility that demand may fall as new capacity comes online or is in commercial operation. Some of the global risks can be offset with local demand generation, but for export-led projects, there remains a substantial risk.

### **Sector Diversification**

Nigeria's attempt to replace dwindling oil revenues with LNG faces challenges amid global shifts toward clean energy. Expanding LNG projects poses risks of stranded assets and increased fossil fuel subsidies, hindering true economic diversification and sustainability. Nigeria should carefully navigate the expansion of LNG projects to balance its economic growth and development aspirations with global economic dynamics. This can be achieved by supporting new industries, enhanced taxation, diversified exports, and better-targeted public spending. Nigeria must reflect carefully before approving further LNG exploration tied with export markets and investigate the domestic use of LNG to boost its electrification efforts and employment creation.

### **Energy Security**

Nigeria still has significant electricity access challenges that can be met by adding more sustainable and affordable sources of energy into its energy mix. Considering that there are already green energy plans underway, LNG expansion should not come at the expense of addressing inequality, energy access, and socio-economic challenges.



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## Abbreviations and Acronyms

<b>CO<sub>2</sub>e</b>	carbon dioxide equivalent
<b>ECOWAS</b>	Economic Community of West African States
<b>EPC</b>	engineering, procurement, and construction
<b>EU</b>	European Union
<b>GTS</b>	gas transmission system
<b>Gg</b>	gigagrams
<b>FLNG</b>	floating liquefied natural gas
<b>IEA</b>	International Energy Agency
<b>LNG</b>	liquefied natural gas
<b>MMBtu</b>	million British thermal units
<b>MTPA</b>	million tonnes per annum
<b>MWh</b>	megawatt hours
<b>NLNG</b>	Nigerian Liquefied Natural Gas
<b>NNPC</b>	Nigerian National Petroleum Company





## 1.0 Introduction

Renowned for its global role in oil and gas exports, Nigeria faces an imminent economic shift due to declining oil production, fiscal constraints, meeting the country's energy needs, and responding to environmental concerns. Simultaneously, the ongoing Russia-Ukrainian conflict has pushed the European Union (EU) to seek other sources of gas to mitigate shortages from Russia. This has led the EU into negotiations with African nations, notably Nigeria. However, for African countries in particular, ramping up gas-for-export carries some risks. Amid a growing global focus on ramping up gas production and trade in liquefied natural gas (LNG), Nigeria faces a need to balance its long-term domestic challenges and its ambitions to expand its LNG infrastructure.

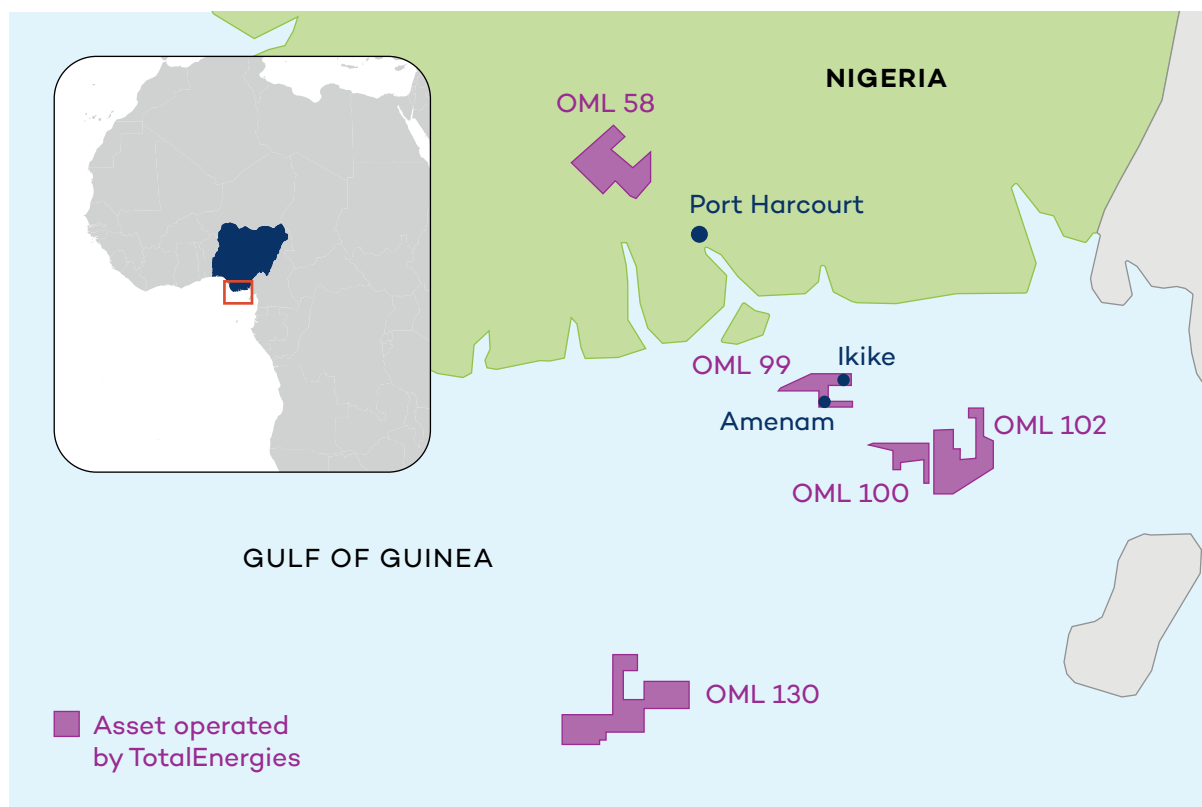
Nigeria is the world's sixth-largest LNG exporter, with a 6% market share in 2022 (Energy Connects 2022), producing an annual capacity of 22.5 million tonnes (Blakeway, 2024; Energy Connects, 2022) with plans for further expansion. Despite opportunities, Nigeria also faces ongoing multidimensional poverty, necessitating investments in electrification infrastructure to improve access. Furthermore, global decarbonization efforts call for reduced fossil fuel use, which will accelerate after 2030. Debates remain ongoing regarding emission responsibilities for African nations amid a diminishing LNG market. This report explores Nigeria's position in its quest to expand its LNG infrastructure by responding to three questions:

- What is the viability of LNG expansion in Nigeria's economy?
- What are the socio-economic and energy supply impacts of LNG?
- What risks will the LNG expansion pose should it fall short of envisaged expectations?



## 2.0 LNG Projects

Figure 1. LNG projects operated by TotalEnergies



Source: LNG Prime Staff, 2023.<sup>2</sup>

Nigeria has six independent LNG trains producing a total of approximately 22 million tonnes per annum (MTPA),<sup>3</sup> mainly for export, as of January 2024. All six trains are located at a 2.27 km<sup>2</sup> plant on reclaimed land on Bonny Island (Pepple & Egba, 2021) along the Nigerian coastline. The engineering, procurement, construction, installation, testing, and commissioning schedule for Train 7 could be about 4 years, while the operations of the train could be up to 25 years and beyond (Nigeria LNG Limited [NLNG], 2019). Total Energies has a 15% stake in NLNG plants, Shell has a 25.6% stake, and Eni holds 10.4% (LNG Prime Staff, 2023). Table 1 shows the capacity and date of entry into service (between 1999 and 2007) of all six LNG plants. Nigeria's LNG operations (extraction, pipelines, and plants) are predominantly located in the Niger Delta region (Echedu et al., 2022).

<sup>2</sup> TotalEnergies Upstream Nigeria Limited operates OML 130 with a 24% interest, in partnership with China National Offshore Oil Corporation CNOOC (45%), Sapetro (15%), Prime 130 (16%), and the Nigerian National Petroleum Company (NNPC) as the concessionaire of the Production Sharing Contract.

<sup>3</sup> Million tonnes per annum (MTPA) is a unit of measurement used specifically for quantifying the production or transportation capacity of natural gas. It represents the amount of natural gas that can be produced, processed, or transported each year.



**Table 1.** Nigeria LNG projects in operation

Train	Date of entry into service	Additional components	Capacity (MTPA)	Ownership
1	February 2000	Gas Transmission System	3.2	NLNG (NNPC, 49%), Shell (25.6%), TotalEnergies (15%), Eni SpA (10.4%).
2	August 1999		3.2	
3	November 2002	Natural Gas Liquids Handling Unit, condensate Stabilization and Liquefied Petroleum Gas production unit	3.2	
4	November 2005		4.1	
5	February 2006		4.1	
6	December 2007	Additional liquefied petroleum gas storage and jetty facilities	4.1	

Source: Authors' survey.

NLNG has long-term gas supply agreements with three joint ventures and uses six gas transmission systems (GTSs) to transport gas to the NLNG complex. GTS-1, 2, 4, and Bonny Non-Associated Gas are onshore, while GTS-3 and 5 are offshore. These projects have strong ties to Europe, both financially and through export connections. Additionally, there is a growing trend of “mini-LNG” projects, such as Greenville LNG, which has been operating three LNG trains since 2019, primarily serving the domestic market (Global Fossil Infrastructure Tracker, 2022). Additionally, Axxela has reportedly been awarded an engineering, procurement, and construction (EPC) contract for another mini-LNG project (Axxela, 2021). Nigeria also signed a Memorandum of Understanding for a gas export partnership through Nigeria’s Riverside LNG and Germany’s Johannes Schuetze Energy Import AG. Under the accord, Nigeria will supply 850,000 tonnes of natural gas to Germany annually, which is expected to rise to 1.2 million, with the first exports planned for 2026 (Onuah, 2023).

## 2.1 Projects in Development

Nigeria LNG has begun construction on a seventh train at Bonny Island, with a planned capacity of 8 MTPA, and five more trains are being planned (Global Energy Monitor, 2024). A survey of media announcements and a review of the literature on LNG projects in development is presented in Table 2.



**Table 2.** LNG projects in planning

Project	Project developers	Proposed capacity (MTPA)	Status	Sources
Bonny Train 7	NNPC, Shell, Total,	8	EPC awarded in 2020	Esau, 2022.
Brass LNG	NNPC (49%), ConocoPhillips (17%), TotalEnergies (17%), and Eni SpA (17%)	10	Shelved in 2007; development restarted in 2022	Global Fossil Infrastructure Tracker, 2022.
Nbwa Doro offshore FPSO	Statoil, Shell	5	Not available	Akintoye et al., 2016.
Olokola	NNPC, Chevron Nigeria, BG, and Shell	20	Presumed cancelled	Akintoye et al., 2016; Global Energy Monitor, 2021.
West Niger Delta (Western LNG)	NNPC, ConocoPhillips, Chevron Texaco	5	Not available	Akintoye et al., 2016.
Golar FLNG	NNPC, Golar LNG	Not available	Not available	Elliot, 2023.
Yoho Field/ UTM Offshore FLNG	NNPC, UTM Offshore, Golar LNG	Not available	Heads of terms signed	Offshore Technology, 2023.
Ogbelle gas plant and Onne port	Riverside LNG and Johannes Schuetze Energy Import AG	0.85 – 1.2	Export partnership deal signed, project in planning phase	Africa Oil and Gas Report, 2023.

Table 2 indicates substantial potential for LNG capacity, contingent on finalizing export offtake agreements and favourable global LNG export markets. Given the scale of these developments, assessing the industry’s past impacts and associated risks becomes crucial. Notably, the NNPC and Delta State government have inked an agreement to pioneer Nigeria’s inaugural Floating Liquefied Natural Gas (FLNG) project. Notably, the FLNG project is a partnership between UTM Offshore (with a 72% equity share), NNPC (a 20% stake), and Delta State (an 8% stake) (African Energy Chamber 2023). The capacity is projected at 1.8 billion tonnes per year and valued at USD 2.1 billion. The final investment decision is expected to be taken before Q1 2024, with construction to begin in 2025 (African Energy Chamber, 2023).

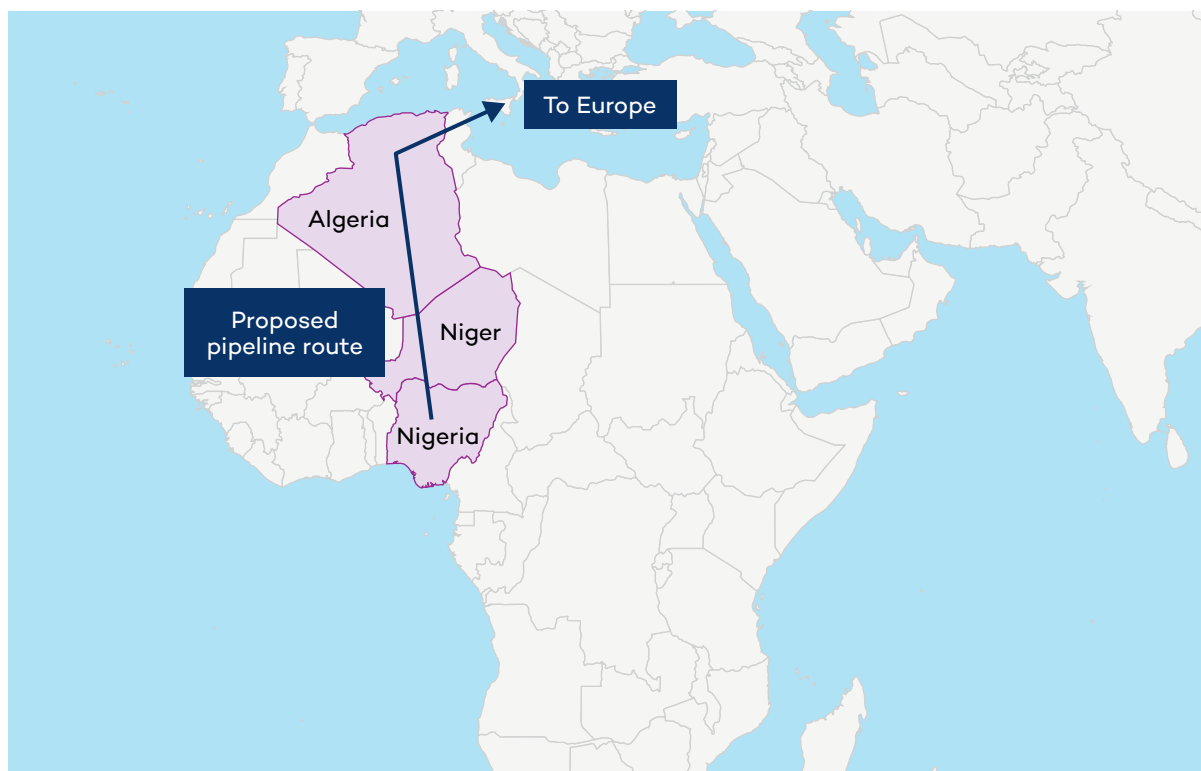


## 2.2 New Gas Pipelines as Part of the LNG Infrastructure Expansion

Nigeria has been engaged in discussions and negotiations to develop pipelines that will transport gas to Europe via the Trans-Atlantic or Trans-Saharan pipeline routes, in addition to export via LNG shipments. These pipelines, if built, will give Nigerian gas access to the European market.

The Trans-Saharan deal signed with Algeria and Niger under the regional trade partnership (Economic Community of West African States [ECOWAS]<sup>4</sup>) is estimated to be 4,128 km long (Rédaction Africanews, 2023) and will ferry up to 30 billion m<sup>3</sup> of gas a year from Nigeria, through Niger and Algeria, into Europe (Sofiullahi, 2024). These pipeline developments began 20 years ago but have been reviewed recently. The cost of the Trans-Saharan gas pipeline is estimated at USD 21 billion (Holleis & Schwikowski, 2022). However, this pipeline is at risk of failing to materialize because, after Niger's coup in 2023, the new government withdrew from ECOWAS, entrenching uncertainties about the success of this pipeline and increasing the likelihood that any infrastructure that has already been laid will be stranded (Sofiullahi, 2024).

**Figure 2.** The Nigeria–Niger–Algeria proposed pipeline



Source: Authors' own adapted from Maps: Africa (showcaves.com).

<sup>4</sup> ECOWAS was established by 15 African states and signed as the ECOWAS Treaty on May 28, 1975, in Lagos, Nigeria.





## 3.0 Impacts of LNG Projects to Date

Mineral resource extraction is inherently environmentally destructive, though governments tend to accept this impact in return for the promise of economic development and new revenue streams. The financial gain aspiration seldom meets expectations. Much of the income from fossil fuel extraction is captured by partner companies, often of foreign origin (Global Energy Monitor, 2022). In theory, economic activities tied to the oil and gas sector can stimulate demand in other sectors—industries that rely on oil and gas, such as petroleum refining, chemical manufacturing, and energy production, benefit directly from energy generated from oil or gas (Scott & Pickard, 2023). These sectors drive economic growth and provide employment opportunities. However, it is often difficult to track the actual economic costs (as they are frequently either under-reported or miscalculated). This section underscores the social, environmental, and economic consequences of current LNG operations, forming the foundation for the potential risks associated with further industry expansion.

### 3.1 Social Impacts

#### 3.1.1 Vandalism and Theft

Though NLNG projects have faced criticism for their lack of socio-economic development in host communities, the presence of NLNG<sup>5</sup> in Bonny Island (and generally all the states located in close proximity to the River State) generated economic activity, including more jobs in comparison to the rest of the country (NLNG Limited, 2021). Notably, significant social issues arise during gas transportation from the shore into inland gas (liquefaction) plants. These issues include pipeline vandalism (in order to facilitate the theft of transported gas and crude oil, which is often transported in the same routes as the gas, and fire outbreaks (Bello & Nwaeke, 2023). These occurrences have also been the basis for some conflict in the affected areas (Bello & Nwaeke, 2023). These issues lead to supply disruptions and pipeline shutdowns in LNG operations (Oladipo, 2023).

#### 3.1.2 Inequality, Employment, and Energy Access

Despite Nigeria being the largest producer of gas in Africa, with large natural gas reserves estimated at 5.6 trillion m<sup>3</sup> by 2021 (Statista, 2021), it faces significant economic challenges. With approximately 70% of Nigeria's population living in rural areas, the country's per capita annual income has remained low, at around USD 2,000 per person. The country has high poverty levels, with about 63% (133 million) of the population considered multi-dimensionally poor (Nigeria Bureau of Statistics, 2022). Nigeria also has the highest number of people without access to grid electricity globally (Uzoho, 2023). The power sector is primarily supplied by natural gas (70.5% in 2022) (Sasu, 2022), and the remainder comes from hydropower (World Bank, 2023). The government launched its energy transition plan at

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<sup>5</sup> The government parastatal NLNG leads the planning and project implementation work for LNG in Nigeria, managing all revenue income and expenditure. It is thus responsible for all employment, skills development, and other small business initiatives in this sector (NLNG, 2024).



the 26th UN Climate Change Conference (COP 26), detailing its net-zero emissions by 2060 objectives; however, by declaring this decade the decade of gas, Nigeria remains committed to developing its gas sector (Climate Action Tracker, 2022).

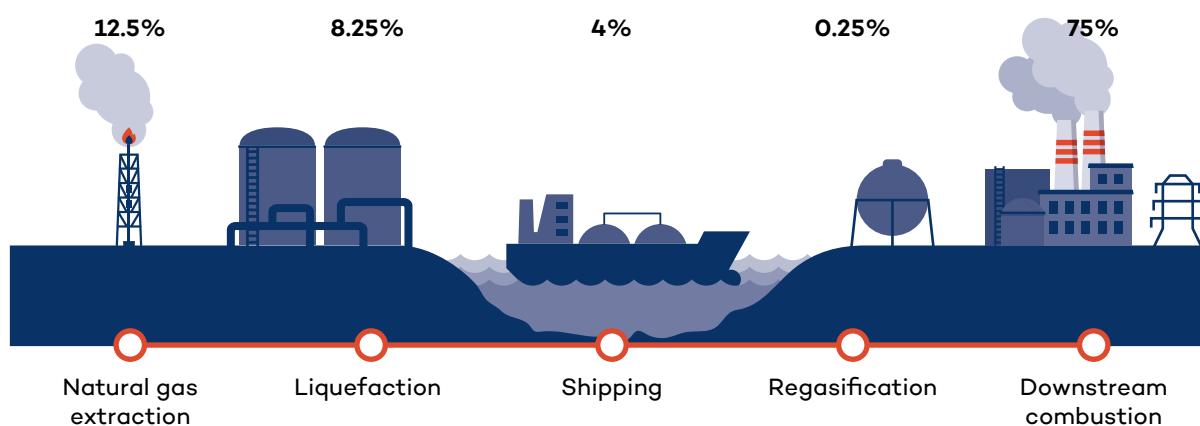
## 3.2 Environmental Impacts

### 3.2.1 Gas Flaring

Gas flaring is an outcome of burning “associated” gas that accompanies oil production, and venting is the releasing of that burned gas into the air rather than capturing it through a pipeline (International Energy Agency [IEA], 2020). Emissions from the oil and gas sector, including emissions from venting and methane leaks, accounted for about one third of greenhouse gas emissions in Nigeria’s energy sector; emissions were dominated by methane (94%) (Federal Ministry of Environment 2021). Gas flaring contributes to reduced gas outputs as it constitutes approximately 70% of the country’s total gas production, including from the oil sector, resulting in a potential annual loss valued at approximately USD 11 billion (Alola et al., 2023). Despite various governance improvements and government regulations, the issue of gas flaring has persisted (Aigbe et al., 2023). Gas that would otherwise be flared could be captured for other energy-related uses to minimize the venting that accompanies flaring, which is responsible for the emissions (PwC, 2019).

### 3.2.2 Emissions From the LNG Value Chain

Figure 3. Carbon emissions in the LNG supply chain



Source: Authors own adapted from Herbert Smith Freehills, 2021.

The energy-intensive processes of LNG extraction, liquefaction, transportation, and regasification involve the use of fossil fuel-based energy. The natural gas production in Nigeria typically contains 85%–99% methane. Nigeria’s national inventory report reveals a 56% increase in carbon dioxide emissions (462,884 Gg) from 2000 to 2017 (Federal Ministry of Environment, 2021), and methane emissions (182,686 Gg carbon dioxide equivalent [CO<sub>2</sub>e]) increased by 23% in the same period. While direct data for LNG emissions in Nigeria is



unavailable, methane gas combustion in the LNG value chain contributes significantly to overall emissions (Federal Ministry of Environment, 2021). Figure 3 shows typical emissions in the LNG value chain based on international benchmarks. Note that methane leaks and flaring can considerably increase upstream emissions. Environmental impacts arising from emissions within the LNG value chain include loss of farmlands, health-related issues, and marine life depletion (Afinotan, 2022).

## 3.3 Economic Concerns

### 3.3.1 The LNG Business Case

LNG has been traditionally sold through long-term contracts; however, the spot market has become more active, accounting for about 35% of the global trade by 2022. Though LNG prices continue to drop in key markets like Europe and Asia, they were re-estimated<sup>6</sup> to average USD 14 million British thermal units (MMBtu) in 2023 and USD 22.6 MMBtu in 2024, falling from USD 17.74 compared with an estimated USD 35.4 MMBtu in 2022 (Cochintu, 2024). These prices remain above production costs for some projects but fall short of covering project expenses once capital and loan repayments are considered. Noting that Nigeria's LNG expansion has been driven mainly by European LNG demand, Europe's LNG demand has been steadily decreasing and has not fully recovered to its pre-COVID and pre-Russia-Ukraine war levels (Cochintu, 2024). When including additional costs that are part of its value chain, LNG remains an expensive energy source with high upfront investment in upstream and liquefaction capacity, along with specialized storage facilities and vessels (Hafner & Luciani, 2022, 40–55). Long-term contracts still dominate the LNG market, with the largest investment chunk taken up by transportation costs, complicating efforts to supply international markets. The viability of an LNG plant requires careful planning and sound economic analysis (Daudu et al., 2023).

### 3.3.2 Oil and Gas Revenue Dependency

In 2023, the Nigerian government anticipates total revenues of over NGN 10.4 trillion (USD 6.7 billion<sup>7</sup>). Oil revenues amounting to NGN 2.2 trillion constitute the largest share, followed by state-owned companies contributing NGN 3.8 trillion. Though LNG is significant, with NGN 74 billion (USD 48.9 million) in revenues (KPMG, 2023), it is notably smaller. Most of Nigeria's states rely on oil revenues for over 50% of their total income, except for Ogun State and Lagos (Chinery & George-Ikoli, 2022). The country's heavy dependence on oil revenues exposes the government to substantial risks associated with a potential decline in oil production and exports. Carbon Tracker projects a 69% reduction in Nigeria's fossil fuel revenues over the next two decades if global energy trends shift to a low-carbon pathway (Coffin & Grant, 2021).

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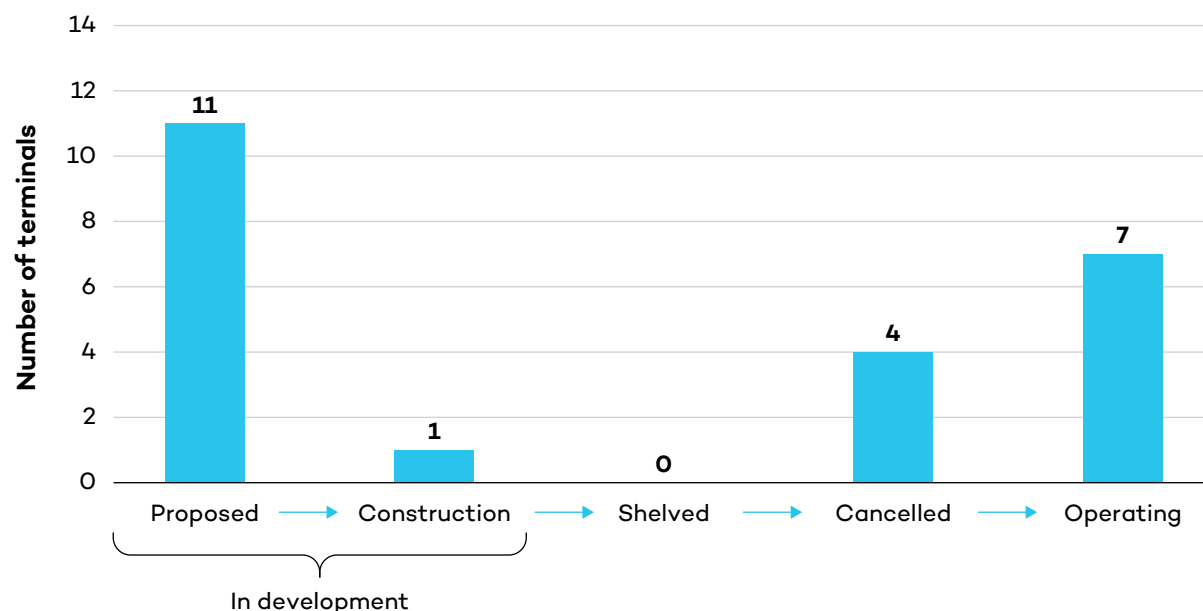
<sup>6</sup> Prices have been converted from USD/kcf to USD/MMBtu. Prices are not directly linked to the breakeven analysis provided below.

<sup>7</sup> Amount calculated based on Nigerian Central Bank rates as of September 2, 2024.



### 3.3.3 High Capital Costs for Proposed LNG Infrastructure

**Figure 4.** Nigerian LNG terminal infrastructure for export



Source: Developed with data from Global Energy Monitor, 2023.

Liquefaction terminals account for over half of the total investment for an LNG project. The total extraction value chain includes the gas treatment unit, liquefaction unit, storage, and offsite utility costs for all power required in the liquefaction process (Hafner & Luciani, 2022). Liquefaction costs increased significantly over the last decade, doubling from USD 404 per tonne to over USD 1,000 per tonne between 2000 and 2017 (Hafner & Luciani, 2022). Nigeria has about nine new proposed LNG terminals. Forecasts reveal that Africa’s proposed gas infrastructure will require approximately USD 127.4 billion; USD 8 billion is already committed to the construction of ongoing projects. Nigeria has committed the most to construction and requires USD 18.5 billion in total (Global Fossil Infrastructure Tracker, 2022). Investment in LNG export terminals far exceeds projected export revenues (Global Fossil Infrastructure Tracker, 2022).



**Table 3.** Capital expenditure estimate for LNG export terminals by country

<b>Country</b>	<b>Proposed (USD billion)</b>	<b>Construction (USD billion)</b>	<b>Proposed + construction (USD billion)</b>
Cameroon	0.5		0.5
Equatorial Guinea	4.5		4.5
Gabon	1.0		1.0
Mauritania	10.2	1.2	11.4
Mozambique	51.0		51.0
Nigeria	11.4	6.8	18.2
Senegal	6.8		6.8
Tanzania	42.0		42.0
<b>Total</b>	<b>127.4</b>	<b>8</b>	<b>135.4</b>

Source: Developed with data from Global Energy Monitor, 2023.





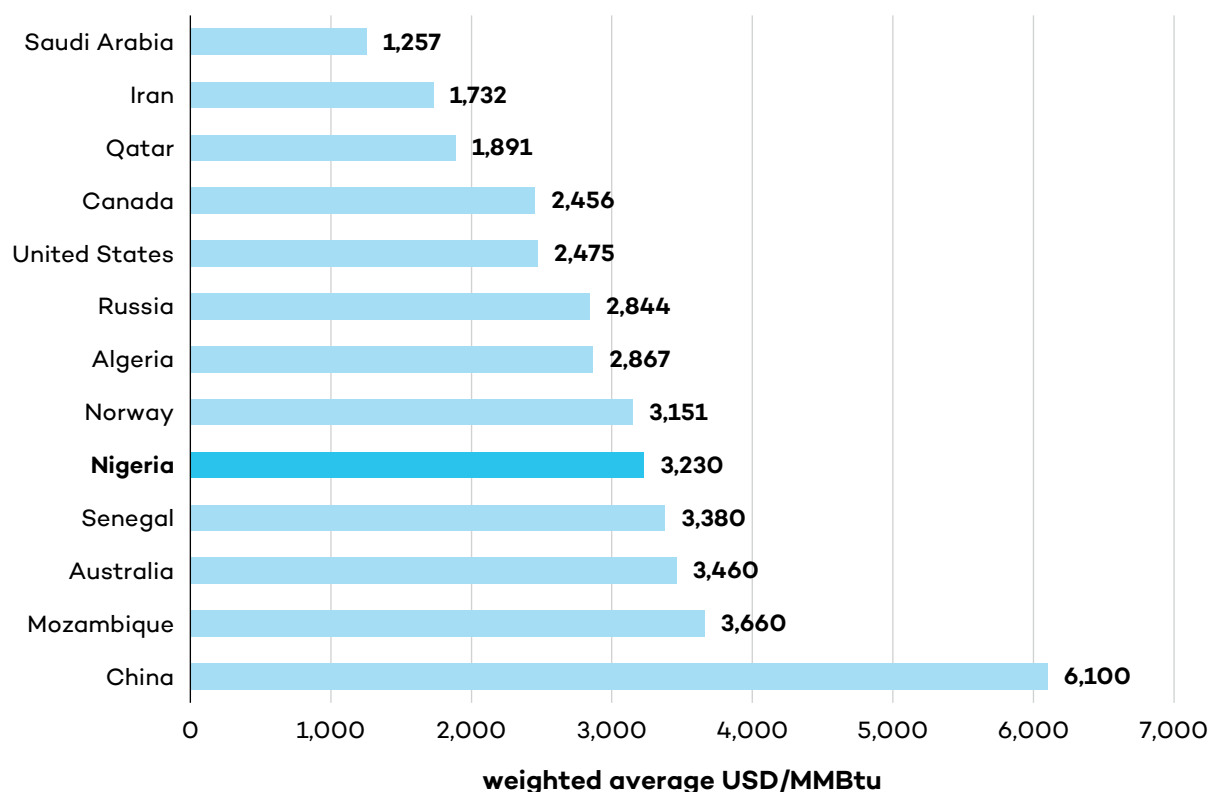
## 4.0 The Risks of Scaling Up LNG Production

Nigeria stands at a critical juncture, compelled to diversify its economy amid declining oil revenues. Replacement of oil revenues with LNG export revenues may seem like a plausible economic pathway. However, this approach is not without risk. In this section, we discuss three key risks facing Nigeria as it looks to expand LNG exports.

### 4.1 Risk 1: Nigerian LNG exports may struggle to compete on the global market after 2030

Gas projects cost more to produce in Nigeria than in key competitor countries.

Figure 5. Global LNG breakeven analysis



Source: Authors' own, developed with data from Rystad Data, n.d.



The authors calculated the weighted average breakeven gas price<sup>8</sup> to determine the relative costs needed for projects to be economically viable. The breakeven gas price (Figure 5) is a useful indicator for assessing aggregated operational costs and the relative competitiveness of gas production. Higher breakeven gas prices imply increased vulnerability to stranded asset risks, as most national production would become commercially unviable if global gas prices drop below their domestic breakeven prices. Relatively high breakeven gas prices signal higher production costs and lower profit margins for domestic gas producers, which could impact investment decisions and market competitiveness. It should be noted that the breakeven costs are not directly comparable to the average global LNG prices presented in Section 3.3 due to the absence of freight costs and methodological differences in the calculations.

### Increased competition could reduce demand for Nigerian LNG.

LNG exporters face exposure to global markets, even when offtake agreements are in place. Nigeria may have secured contracts to supply some European countries—it is currently exporting 60% of its LNG to Europe (Oladipo, 2023)—however, these contracts may not insulate Nigeria from a global downturn in demand, as offtakers may choose to accept penalties and break contracts if the commercial incentives are great enough. The new EU methane import performance standards may also impact export opportunities, depending on the emission levels from Nigeria’s upstream and LNG operations and actions taken to reduce them (Cahil & Post, 2024).

## 4.2 Risk 2: Investing in LNG may not generate expected revenues

Oil exports have provided a key source of government revenues. As oil exports decline, replacing oil revenues with LNG revenues is a key driver for the expansion of LNG capacity. This approach is fraught with risk.

### Time may be running out for profitable LNG investments.

Though there are high hopes of contractual commitments for Nigeria to supply LNG to Europe, this does not come without risks. The IEA has predicted a glut of gas when this infrastructure is up and running, likely in the next decade, as Europe seeks to diversify its energy mix and reduce overall gas demand (Sofiullahi, 2024). If gas projects are not profitable, then the government cannot collect revenues.

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<sup>8</sup> The domestic weighted average breakeven gas prices were calculated using Rystad Energy UCube data on asset-level breakeven gas prices over the operational life of the project, which were weighted based on their total forecasted production volumes. The sum product of each gas field’s breakeven price and their associated forecasted production volumes divided by the total forecast domestic gas production yields the weighted average of breakeven gas prices for a given country.



### Replacing oil revenues with gas revenues may not be possible.

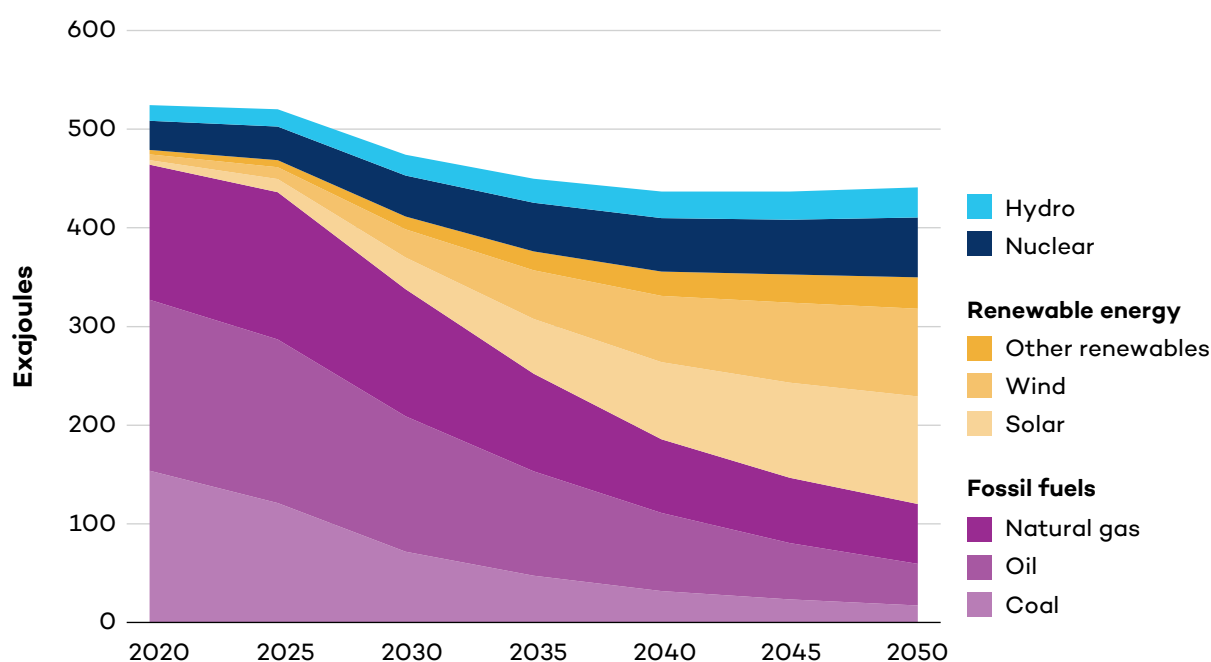
LNG projects may have a combination of long-term offtake agreements and short-term sales on spot markets. In both cases, prices are usually indexed to market prices. Proponents of LNG suggest that it can potentially replace the diminishing oil revenues, sidestepping the need for fundamental economic reforms. LNG revenues are currently around USD 74 billion per year and account for around 7% of total government revenues. To replace declining oil revenues, there would need to be continued strong international demand and high prices for LNG and continued sustained investment in LNG production and export capacity. Operations would need to be undisturbed by theft and social unrest. All of these conditions are uncertain.

## 4.3 Risk 3: High likelihood that new LNG infrastructure may be stranded

### Additional investments in LNG face a real risk.

Natural gas, as a whole, accounted for 10.1% of the country’s energy mix and 52.8% of net exports in 2021 (IEA, 2024b), as gas is primarily a commodity for export. Global LNG prices are likely to remain above the cost of production; as a result, new LNG infrastructure investments are also unlikely to recover their capital, rendering them stranded assets. If assets are stranded, then the government will be forced to choose between writing off such investments or providing subsidies to keep projects operating. There is a risk of throwing good money after bad.

**Figure 6.** Total global energy supply in net-zero emissions scenario



Source: Developed with data from IEA, 2021.



As noted in Figure 6, due to the current global net-zero commitments, fossil fuels face projected reductions in demand. Europe's dash for gas demand is likely to drop further, considering that natural gas consumption in Europe fell by 7% in 2023, reaching its lowest level since 1995 (IEA, 2024a). Second, competition from other producers is likely to squeeze prices. Major LNG exporters such as Qatar, Australia, and the United States have been ramping up their gas capacity for export and making improvements on their LNG infrastructure and technology, rendering themselves more competitively placed against smaller players, like Nigeria (and other African countries, see Figure 5) (IEA & Korea Energy Economics Institute, 2019). Even if demand does not collapse, Nigeria could find itself priced out of the market by cheaper producers. And finally, the eventual transition to a low-carbon world could leave LNG assets stranded, mirroring challenges faced by other fossil fuel production infrastructure. For this reason, extending LNG infrastructure not only undermines global targets for net-zero emissions by 2050, but also suggests that green energy policies will not be implemented (IEA, 2023).



## 5.0 Conclusions

The impacts of LNG projects in Nigeria are multifaceted, requiring comprehensive assessment to determine their current and future justification. LNG may offer some benefits in limited circumstances where positive life-cycle emission reductions can be demonstrated—for example, when gas that would otherwise be flared is captured, liquefied, and used to displace higher-carbon-intensity fuels. However, it also poses cost and social challenges, including conflict and environmental issues. Nigeria’s heavy reliance on oil and gas revenues, combined with population growth, presents economic hurdles, necessitating diversification. Investing in LNG may further entrench fossil fuel dependency and risk stranded assets amid uncertain global demand and the ascent of renewables. Long-term analysis and addressing regulatory, environmental, and social concerns are essential for sustainable development. Nigeria must manage its gas ambitions realistically, align with transition plans, and prioritize community development in gas projects.





## 6.0 Recommendations

### Rethink Economic Dependencies

Nigeria is reliant on oil and gas revenues, but it faces economic challenges due to declining oil production and a rapidly growing population. Despite LNG contributing to revenue, Nigeria needs to pay immediate attention to addressing its economic model's challenges. The expansion of LNG projects in Nigeria requires careful long-term, scenario-based, and sound financial analysis. It is crucial to consider issues related to inequality, environmental sustainability, and economic dependence on fossil fuels.

### Assessing LNG Expansion Risks

While there are regulations in place to manage gas flaring, in the longer term, the continued extraction of fossil fuels contributes to higher carbon dioxide and methane emissions. Efforts should be intensified to manage such impacts while ramping up renewable energy alternatives. These efforts will introduce cleaner energy sources into its energy mix, capitalizing on potential economic opportunities that may arise and reducing emissions from gas and oil.

### Global Market Dynamics

Given the uncertainty in global LNG demand, Nigeria must reflect carefully before approving further LNG exploration tied with export markets and investigate the domestic use of LNG to boost its electrification efforts and job creation. Before embarking on state-supported LNG for export expansion, contingency planning needs to account for the possibility that demand may fall as new capacity comes online or is in commercial operation. Some of the global risks can be offset with local demand generation, but for export-led projects, there remains a substantial risk.

### Sector Diversification

Nigeria's attempt to replace dwindling oil revenues with LNG faces challenges amid global shifts toward clean energy. Expanding LNG projects poses risks of stranded assets and increased fossil fuel subsidies, hindering true economic diversification and sustainability. Nigeria should carefully navigate the expansion of LNG projects to balance its economic growth and development aspirations with global economic dynamics. This balance can be achieved by supporting new industries, enhanced taxation, diversified exports, and better-targeted public spending. Nigeria must reflect carefully before approving further LNG exploration tied with export markets and investigate the domestic use of LNG to boost its electrification efforts and employment creation.

### Energy Security

Nigeria still faces significant electricity access challenges that could be met by adding more sustainable and affordable sources of energy into its energy mix. Considering that there are already green energy plans underway, LNG expansion should not come at the expense of addressing inequality, energy access, and socio-economic challenges.



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