

HARNESSING NIGERIA'S OIL AND GAS INDUSTRY AS AN ENERGY VALUE CHAIN AND INTEGRATION INTO GLOBAL MARKETS

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1.0 Introduction

Crude oil was discovered in Nigeria's Niger Delta in 1956, in a development that was set to transform the nation's economy. Nigeria began the exportation of crude oil in 1958, with 5,000 barrels. However, upon the nation's political independence in 1960, policymakers deregulated the industry, allowing other multinational petroleum companies, alongside Shell Petroleum, which had enjoyed exclusive rights to oil exploration, to participate extensively in the industry's activities. Consequently, such multinational petroleum companies as Exxon, Mobil, Chevron, Texaco, Total, and Agip, embarked upon oil exploration across the Niger Delta. Nigeria's crude oil reserves ranks among the highest in the world, with 37 billion barrels. Although, Nigeria is acknowledged for its crude oil exports, its natural gas reserves are even larger, estimated at 206.5 Trillion Cubic Feet (Tcf). The petroleum sector drives the Nigerian economy, accounting for about 20% of the nation's annual Gross Domestic Product (GDP) in recent times. It also accounts for the bulk of government's revenue and generates more than 90% of the nation's annual foreign exchange earnings. Nigeria's oil and gas industry is part of the global energy value chain in the Atlantic Basin, delivering products worldwide, and integrating the nation's economy into global markets. Nigeria is the eleventh largest oil producer worldwide (Statista, 2023).

2.0 Production of Oil and Gas in Nigeria

Nigeria's oil industry is broadly divided into: upstream and downstream sector, as well as services. The upstream features exploration and production of crude oil and gas. The nation's crude oil is largely produced from three different basins; the onshore Anambra, the offshore Benin/Dahomey (deep-water and ultra-deepwater) and the Niger Delta (shallow and deep offshore basins (KPMG, 2014). Participation in Nigeria's upstream sector is characterized by an array of major arrangements, including joint venture (JV), production sharing contracts (PSCs), service contracts

(SC), and marginal field concession (MFC). In every case, the Nigeria government engages both domestic and foreign partners through the National Petroleum Corporation (NNPC) in exploration and oil production, with an average equity holding of about 60%, while the partners hold the balance. Table 1 shows selected crude oil grades in Nigeria, which is endowed with relatively high quality crude oil, popular in the global market as ‘light’, ‘sweet’ crude, characterized by a gravity ranging between 21⁰API and 47⁰API (API: American Petroleum Institute Gravity is measure of density and sulphur content in crude oil). Nigeria’s crude oil has a low sulphur content, which is considered an impurity, that must be removed in processing crude oil into petroleum products (usually, the higher the gravity, the lower the sulphur content). Unlike crude oil from the Middle East region, which is heavy in sulphur and requires more resources to remove, Nigeria’s crude oil needs relatively little efforts to remove the sulphur content. In fact, its condensate requires virtually no efforts to purify into petroleum liquids. Table 1 shows selected crude oil grades and sulphur content in Nigeria.

Table 1. Selected crude oil grades produced and Sulphur content in Nigeria

Crude oil grade	API gravity number (degrees)	Sulfur content (percentage)
Agbami	47.2	0.05%
Akpo	45.8	0.07%
Amenam	37.0	0.17%
Bonga	29.1	0.29%
Bonny Light	34.5	0.14%
Brass River	36.5	0.13%
Erha	33.7	0.18%
Escravos	34.0	0.15%
Forcados	30.0	0.15%
Qua Iboe	36.6	1.60%
Usan	30.6	0.23%

Source: EIA, 2023

Crude oil of high-quality grades are extracted from wells on land, mainly in the Niger Delta and offshore in the Gulf of Guinea. While Nigeria was Africa’s leading oil producer until recently, the nation’s oil and gas industry is characterized by sporadic supply disruptions, which have severely

affected production and resulting in unplanned outages in recent years. Since 2020, unplanned disruptions, as well as less investment in upstream development, led to a significant drop in oil production in 2022, with production declining below an average of one million barrels of crude oil per day (b/d). The violence that surround disruptions often force affected oil companies to declare a *force majeure* on oil shipments (a legal clause that releases stakeholders from contractual obligations arising from circumstances beyond their control). Therefore, crude oil and lease condensate exports from Nigeria declined to an average of about 1.9 million b/d between 2013 and 2022 over production levels in the previous decade. However, production levels have spiked to about 1.5 million b/d in February, 2024 (CEIC, 2024). This is still a sharp drop from an all-time high of about 2.5 million b/d recorded in 2005. The offshore platform currently generates significant quantity of crude oil, which is free from disruptions and transported by pipelines or tanker ships to refineries, where it can be processed into petroleum products and derivatives. Table 2 profiles the Nigerian oil and gas industry in 2022.

Table 2: Key Data on Nigeria’s Oil and Gas Industry, 2022

Value of petroleum exports (million \$)	53,457
Proven crude oil reserves (million barrels)	36,967
Proven natural gas reserves (billion cu. m.)	5,913
Crude oil production (1,000 b/d)	1,138
Marketed production of natural gas (million cu. m.)	44,307
Refinery capacity (1,000 b/cd)	486
Output of petroleum products (1,000 b/d)	6
Oil demand (1,000 b/d)	518
Crude oil exports (1,000 b/d)	1,388
Exports of petroleum products (1,000 b/d)	--
Natural gas exports (million cu. m.)	32,190

- b/d (barrels of crude oil production allocated by OPEC per day)
- cu. m. (cubic metres)
- b/cd (barrels of crude oil processed by refinery per calendar day)

Source: Adapted from OPEC Annual Statistical Bulletin, 2022¹

The downstream sector comprises the refineries, distribution and marketing of petroleum products and derivatives to the domestic market. Nigeria has four major refineries that drive operations in the downstream sector. Although the nation's refinery nameplate, or installed capacity prior to initial commencement of operations, can meet all its domestic demand; it relies mostly on imported products and derivatives because of the dysfunctional state of most of the refineries. Consequently, the government plans to construct smaller modular refineries to foster adequacy of products for the domestic market. Table 3 reveals the profile of Nigeria's major refineries.

Table 3: Major refineries in Nigeria

Refinery	Location	Notes	Nameplate Capacity (barrels per day)
Kaduna refinery	Kaduna state	crude sourced from Escravos and Forcados terminals	110,000
Port Harcourt refinery I and refinery II	Rivers state	crude sourced from Escravos terminal	210,000
Warri refinery	Delta state	crude sourced from Bonny terminal	125,000
Dangote refinery	Lagos state	Commissioned: May, 2023	650,000
Total			1,095,000

Source: Adapted from EIA, 2023

Nigeria's latest refinery, owned by the Dangote Group and commissioned in May, came on stream in October, 2023. It has an operational capacity of 650,000 barrels per day (b/d), which would allow Nigeria to reduce its reliance on the imports of petroleum products (EIA, 2023). The refineries are connected to pipelines, which deliver petroleum products to depots spread across the nation. Subsequently, petroleum tankers transport the products for delivery to filling stations around the nation to meet consumers' demand.

The oil service sector is the third segment of Nigeria's petroleum industry. The sector features an array of services aimed at sustaining operations in the industry. These include:

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- i. Exploration support services, which engage in seismic data acquisition, processing and interpretation, logging, fishing and cementing.
- ii. Drilling services, which engage in welding services, well drilling, cementing, logging and fishing.
- iii. Production support services which engage in wireline services, work over services, production testing services, as well as construction of oil and gas facilities.
- iv. Downstream services, which engage in wireline services, refinery maintenance, pipeline/depots construction, petroleum products, haulage, and petroleum product marketing.
- v. Others, which include Banking Services, Catering Services, as well as Communication Services.

The Nigeria natural gas reserves ranks eleventh in the world and the sixth largest exporter of Liquefied Natural Gas (LNG) in 2020. In the late twentieth century, policy makers decided to monetize the nation's gas reserves (Savannah Energy, 2024). Until then, most of Nigeria's natural gas resources were flared, with serious consequences for global warming. Dry natural gas production in Nigeria averaged about 1.5 trillion cubic feet (TCF) between 2012 and 2021, while its consumption averaged 649 billion cubic feet (Bcf) over the same period.

3.0 Nigeria's Petroleum Export Markets

Nigeria is a major player in the global energy chain, with major exports of oil and gas products. Crude oil and lease condensate exports from Nigeria averaged about 1.9 million b/d between 2013 and 2022; however, exports of the products declined significantly over the past decade, fuelled by crude oil theft, inefficiency and corruption in the industry. In 2022, these exports averaged about 776,000 b/d lower than the 10-year high of 2.1 million b/d. Available data from OEC (2024) reveal that in 2022, Nigeria exported crude petroleum, with a total value of US\$52.1 billion. The main destination for Nigeria's crude oil were India (US\$7.35 billion), Spain

(US\$6.72 billion), France (US\$4.18billion), the United States (US\$4.02 billion) and Netherlands (US\$3.8 billion).

Nigeria exports natural gas by pipeline and as LNG, exporting an average of about 900bcf between 2012 and 2021. In the former, the West African Gas Pipeline is a 678-kilometer gas pipeline that transports natural gas from Nigeria's Niger Delta to consumers in Benin, Togo and Ghana. The transboundary, offshore pipeline carries 11.3 billion cubic meters of natural gas per day (11.3BCMPD), supporting energy consumers in West Africa (WAGPA, 2024), and illustrated in figure 1.

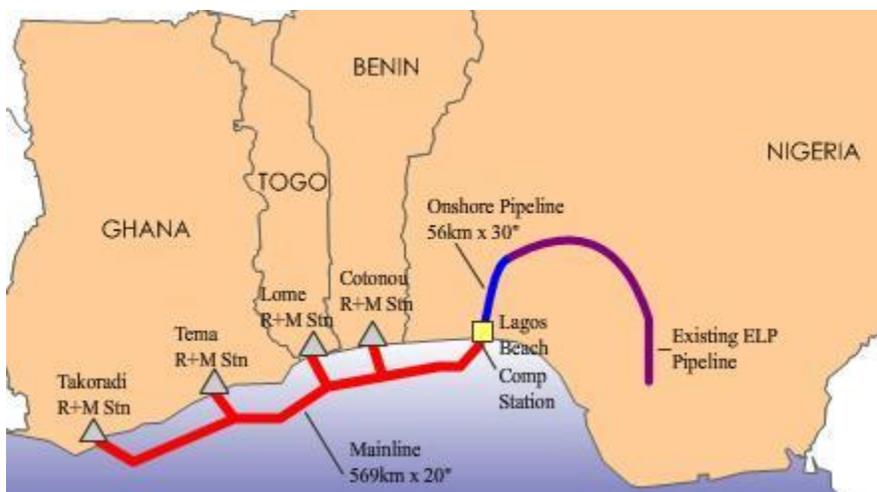


Figure 1: The West African Gas Pipeline (WAGP) Project

Source: WAGPA, 2024

In the latter, Nigeria exports most of its natural gas and LNG. The LNG is produced in Bony Island from Nigeria Liquefied Natural Gas liquefaction plant (Igbatayo, 2005). The Nigeria LNG terminal began operations in 1999 and comprises six liquefaction trains, with a total capacity of 1.1 Tcf per year. Construction of a seventh train commenced in June 2021 and is scheduled to be streamed by 2026. Available data reveal that Nigeria exported 824 Bcf of natural gas in 2021, most of which was destined for Europe and Asia. France and Spain accounted for the bulk of the exports, receiving 123 and 152 Bcf of LNG from Nigeria, respectively (EIA, 2023). In 2022, Nigeria exported US\$9.04billion in Petroleum gas, making it the 19th largest exporter of petroleum gas in the world. Data from OEC reveal that the main destination of petroleum gas exports from Nigeria

in 2022 are Spain (US\$2.54 billion), Japan (US\$936million), Portugal (US\$814 million), France (US\$598million), and South Korea (US\$558million) (OEC, 2024a).

4.0 Conclusion

Nigeria is a major player in the global oil and gas industry. The sector largely accounts for the bulk of the nation's crude oil exports, which represents about 20% of annual GDP and more than 90% of the nation's annual foreign exchange earnings. Nigeria's petroleum and gas exports target global consumers, in Europe, the United States and Asia. The nation has emerged as a major player in the global energy chain, in a development that has transformed its economy. In order to reinforce Nigeria's status as a major player in the global energy value chain, policy makers subscribed to membership of the international body, Extractive Industries Transparency Initiative (EITI), in 2003, by launching the Nigeria Extractive Industry Transparency Initiative (NIETI). The effort was aimed at fostering transparency, accountability and zero tolerance against corruption in the petroleum industry. While challenges remain, NEITI has risen to sanitize the petroleum industry.

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