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Unlocking Non-Associated Gas Reservoirs to Power Future Energy Demands in Nigeria

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Abstract: Nigeria faces a significant energy crisis characterized by a substantial gap between energy supply and demand, driven by rapid population growth, urbanization, and industrial expansion. With a projected electricity demand exceeding 50,000 MW by 2030, the country must explore underutilized resources to meet its energy needs. Non-Associated Gas (NAG) reservoirs present a viable solution, offering a cleaner and more stable fuel source than traditional fossil fuels. This paper examines the historical context of Nigeria's gas policies, highlighting key legislation such as the Petroleum Act, the Associated Gas Re-Injection Act, and the recent Petroleum Industry Act (PIA) of 2021. It discusses the challenges faced in gas utilization, including infrastructure deficits and investment barriers, while emphasizing the economic, environmental, and social benefits of developing NAG. The study also outlines recommendations for stakeholders to enhance investment in NAG infrastructure and create a favourable regulatory environment. By leveraging NAG, Nigeria can not only address its immediate energy crisis but also promote sustainable economic growth and improve energy security for its citizens.

Key Words: Non-associated, Reservoir, Energy, Domestic-Gas, Reserves, Policy, Deep-water.

I. Introduction

Energy is a building block for social and economic growth, and likewise the development of a nation hedges around it (Oyedepo, 2012). Approximately 600 million people in Africa lack access to electricity, with three out of five individuals in Sub-Saharan Africa facing this challenge. Despite the continent's rich energy resources like solar, biomass, natural gas, oil, coal, and Uranium, Africa has not yet achieved energy independence (Williams et al., 2019). Nigeria is one of the fastest-growing nations globally, with an estimated population of 220 million and a growth rate of 2.6% per year. (Okakwu et al., 2019) Energy consumption has been established to be a major determinant of economic growth according to the endogenous growth theory (Okoye et al., 2021). Nigeria an oil-rich country, has been experiencing an energy crisis for a long time due to insufficient electricity generation, 85 million Nigerians don't have access to grid electricity which represents 43% per cent of the country's population and makes Nigeria the country with the largest energy access deficit in the world (World Bank Group, 2021).

Nigeria has been able to achieve a power mix in recent times, initially dominated by hydro, gradually diversifying as solar PV and natural gas increasingly make headways into the power system. 70% of power generation in Nigeria comes from Gas. Natural Gas will be a jewel for the Nigerian energy sector in years to come. Power generation and domestic fuel have been identified as major drivers in the domestic demand for Natural gas as it is believed that sufficient and stable power will revive other sectors (Oluogun et al., 2021). Gas produced in Nigeria is either exported or used domestically for power generation, as feedstock for gas-based industries (such as petrochemicals and fertilizer production), industrial heating, and as fuel for natural gas vehicles. Liquefied Petroleum Gas (LPG) derived from gas processing is also used for cooking and power generation. (Emeke, 2022).

Nigeria's gas reserve is estimated to hold a total of (209.26 TCF), with (102.59TCF) being associated gas (AG) and (106.67TCF) as non-associated gas (NAG), thereby topping the chart of gas reserve holders in Africa and position 10 in the world (NUPRC, 2024). It holds more non associated gas in its reserve. In 2023, A total of 2.503 TCF of associated and non-associated gas was produced with an estimated daily average production of 6.857 BCF/D and with the daily average of associated and non-associated gas at 4.213BCF/D and 2.644BCF/D representing 61.4% and 38.6% respectively. (NUPRC, 2024). This fact shows that despite having a larger estimated NA gas reserve, the total quantity produced in 2023 as compared to Associated gas falls short by 22.8%, and this displays a significant underutilization of the non-associated gas reserve.

Non-associated gas reserves are primarily developed to produce natural gas, and there may or may not be condensate production with the gas, while associated gas is not primarily developed for gas production. Despite Nigeria holding a larger share of AG in terms of production, the economic drivers for monetizing gas from these two basic sources are quite different and likely to lead to different gas Utilization routes (PetroWiki, 2015). The Large AG relative to Non-associated Gas is attributed to the activities of the multinational oil companies, whose primary goal is oil exploration and production (PWC 2020).

From Africa's Energy Outlook, it is stated that in Nigeria, the Demand for natural gas in 2023 reached around 18.7 billion standard cubic meters and has been estimated to reach around 30 billion standard cubic meters by 2040 (Africa Energy Outlook 2019 Analysis - IEA, 2019). According to IEA, chemicals production will triple by 2040 with new gas-based methanol and

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ammonia plants, and the number of vehicles could grow from 14 to 37 million, despite the progress on access to clean cooking services, almost three-quarters of the population might still lack access in 2030 but universal access can be achieved through greater household access to gas networks and LPG in the main cities, and to improved cookstoves in rural areas. There is a huge gap between current energy production and future energy demands and it is glaring that the development of non-associated gas reserves plays a pivotal role in filling this gap, availability of associated gas is largely dependent on the continuous exploration and production of oil.

In this context, Non-Associated Gas (NAG) emerges as a vital resource for meeting future energy needs. The Nigerian government has recognized this potential by declaring 2021 to 2030 as the "Decade of Gas Development." This initiative aims to strategically exploit the country's vast natural gas resources and integrate them into various sectors such as power generation, agriculture, and transportation.

The development of NAG not only promises to alleviate current energy shortages but also offers a cleaner alternative to traditional fossil fuels. As Nigeria pursues its goal of achieving net-zero carbon emissions by 2060, natural gas is positioned as a transitional fuel that can support economic growth while reducing greenhouse gas emissions. Furthermore, ongoing divestments by international oil companies present opportunities for local entities and investors to capitalize on underdeveloped NAG reserves.

This paper aims to highlight the size of the energy demands in Nigeria and how investments in NAG reserves are critical in unlocking it and ensuring energy security in Nigeria, by quantifying the current and projected energy demands, assessing the potential of NAG reservoirs in meeting these demands, and identifying the investments required to unlock these resources.

II. Literature Review

Global Energy Demand Trend.

The ongoing spike in the global energy demand is projected to continue until 2040 (Energy - ISS African Futures, 2024). It is estimated that 2 out of 10 (approximately 760 million) people in the world still live without access to electricity, while 2.6 billion people engage in polluted and harmful means of cooking which are damaging to health (Panos et al., 2016).

The correlation that exists between HDI (Human Development Index) and per capita energy consumption serves as a powerful and reliable indicator that sufficient energy can spur rapid development in nations at low-income levels. It was pointed out that a whopping 8.62 barrels of oil equivalent (BOE, amounting to 100 gigajoules) per person will allow for this rapid development and only six African countries (Libya, Mauritius, South Africa, Seychelles, Botswana, and Namibia) have per-capital demands above the threshold of 8.62BOE in 2022 (Energy - ISS African Futures, 2024), thus, Nigeria inadequacy in meeting her energy demand with oil given the population growth.

Globally, in a bid to resolve the ever-growing energy demand, which is estimated to be 17,487 Mtoe by 2040, Ahmad & Zhang, 2020, concluded that the global demand for gas will increase by more than 50% in 2040, while the demand oil and coal may only increase by 15%, to strengthens the view that non-associated gas investments have to be explored particularly in Nigeria, given that continued and sustainable investments in oil exploration are not guaranteed, particularly by the IOCs and NOCs who would be looking to further strengthen their company's profile and gradually drifting from exploration of crude oil for climate change, and among other reasons. Above all, Nigeria is on course to becoming a gas economy.

Nigeria Energy Landscape

Nigeria recently experienced intense divestment in its oil and gas sector, which led to a significant decrease in oil production output (Ekong, 2023), since the all-time low in September 2022 with the lowest production volume of 0.94mbdp. There has been a significant improvement with production reaching a two-year high of 1.43mbpd in January 2024 (Proshare, 2024), irrespective of the recent setbacks in production volume which were attributed to Issues on the Trans Niger Pipeline and maintenance activities by oil as well as the Niger delta youth restiveness (Chukwu, 2023).

Currently, there are five (5) International Oil Companies (IOC) present in Nigeria, Chevron, Eni, ExxonMobil, Shell, and TotalEnergies. These IOCs are responsible for 45% and 40% of oil production and gas production respectively (Adekoya 2022). In 2023, 43 companies produced associated gas, which is 61.4% of the entire gas production for the year, 15 companies produced NAG with a share of 38.6% out of the 47 companies reported in the annual gas production from the regulators. The top 5 NAG producers include Shell, Chevron, TEPNG (TotalEnergies E&P Nigeria Limited), NEPL, NAOC, and Seplat, with NEPL and Seplat as the only indigenous companies among the top 6 (NUPRC, 2023), following its recent ANOH plant which was set to be delivered in Q1 2024 but is being revised due to a delay in the Nigerian Gas Infrastructure Company (NGIC) OB3 pipeline construction delay which has been attributed to poor weather and Insecurity. This particular project is expected to have 58% of its gas supply from Non-Associated Gas reserves driven by onshore developments like ANOH and Ubete, and other offshore developments.

This further shows that improvement, especially in the production of Non-Associated Gas (NAG) reserves is crucial, considering the large NAG reserve in Nigeria. Indigenous companies are encouraged to spring up to attain a cumulative production value that exceeds that of the IOCs. Seplat has shown significant progress in the gas business recently and it is expected to meet the demand

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from NLNG Train 7 & Nigeria/Morocco Gas pipeline (Anyaogu, 2023). It is believed that through major projects like the NLNG Train 7 and the NLNG Train 8, AKK pipeline between 2020 and 2030, a growth rate of 16.6 % annually is expected to compound the annual growth rate of gas demands. It is a new dawn in the Nigerian gas business and there is room for everyone to be a part of it. Using gas to power the transport sector also opens another window to expand the domestic gas demand envelope (Emeke,2024)

Nigeria Gas Policy Landscape

The Petroleum Act (PA) which was the principal legislation enacted in 1967 was believed to hold no room for gas, as gas was considered to be a mere byproduct of Crude oil (Dike & Osinachi-Nwandem, 2023). The first major gas legislation the Associated Gas Re-Injection Act (AGRA) in 1979, was aimed at controlling gas flaring. However, this law was not as efficient as expected due to the inability of NNPC to meet the cash obligation for building re-injection plants since NNPC was a joint operator with these companies under the JV partnership arrangement (Dike & Osinachi-Nwandem, 2023).

In 1992, the Associated Gas Framework Agreement was enacted aimed at introducing fiscal incentives for the utilization of natural gas, and subsequently incorporated into the Petroleum Profit Tax Act of 2004 (PPTA). In 2008, the National Domestic Gas Supply and Pricing Regulation was enacted which divided the domestic gas market into 3 groups, namely; gas-to-power, gas-as-feedstock, and gas-as-alternative fuel with their respective pricing regimes, this was aimed at increasing the use of Nigeria's energy mix (PWC 2020).

The Nigeria Gas Master Plan implemented in 2008 aimed at making Nigeria a major player in the international gas market, through the export of LNG, as well as establishing a solid framework of gas infrastructure expansion within the domestic market, which is yet to deliver on all its targets. According to the Ex-NNPC Group Executive Director, Dr. David Ige, Nigeria has not grown gas for the last seven years, except for the domestic market which has grown only about 3% which is also surrounded by infrastructure challenges such as pipelines which generally points to low level of investments in the field. Despite the PIA, reserve accessibility is an issue that must be resolved, most of these gas reserves are stranded, taking cues from the United State where reserve accessibility is never an issue is a way to start. Also, Infrastructure investment must consider market benefits, as these benefits will drive its viability (Thisdaylive, 2024).

The emergence of the PIA enacted in 2021 under the National Gas Policy of 2017 made provision for gas as a major source of energy, encouraging gas utilization and boosting the confidence of investors. The value attached to gas was further boosted by the declaration of 2020-2030 as the 'Decade of Gas' in Nigeria. This is a result of Nigeria's commitment to the United Nations Convention Framework on Climate Change (UNCFCC) 2015 in a bid to ensure energy security and sustainability. One take away from this policy is the urgency to expand access to clean household cooking energy source in Nigeria as a way of reducing the emission levels from traditional sources (Emeke, 2023).

The impact of the PIA is already becoming evident, as at the end of 2023, reports showed that out of the forty-three (43) FDP (Field Development Plan) applications processed in 2023, Thirty-one (31) FDP was approved, which is about 55% increase in FDP approvals relative to the year 2022. Also, seven (7) gas well proposals were received of which five (5) were approved with three (3) belonging to Shell and the remaining two awarded to NAOC and Seplat respectively. These wells are expected to produce a daily average of 280.15MMscf/d and have a total estimated volume of 730.52 Bscf of gas (NUPRC 2023).

In addition to the policies in Nigeria, President Bola Ahmed Tinubu signed three Executive Orders on February 28, 2024. This action is part of the Nigerian government's effort to enhance the investment environment in NAG and improve its overall standing (KPMG 2024).

1. Oil and Gas Companies (Tax Incentives, Exemptions, Remissions, etc.) Order, 2024
2. Presidential Directive on Local Content Compliance Requirements, 2024
3. Presidential Directive on Reducing Costs in the Petroleum Sector.

Despite the Presidential Executive Order (PEO) seeming to receive public affirmation, it is not without certain criticism. According to Prof Iledare, there were certain misalignments in the PIA, which perhaps led to the agitation for the PEO 2024 for NAG, such misalignment as the loophole created by the differentiation of natural gas royalty by market, i.e. domestic or international, the special treatment of the deep offshore terrain concerning the oil royalty scheme based on two tranches rather than three, and the truncation of the dual tax system called Nigeria Hydrocarbon Tax (NHT) which was designed to protect the company income tax act(CITA) However, he believes that targeting NAG with PEO 2024 instead of amending the PIA 2021 is, perhaps, ill-advised judging from the state of the economy of the Federation.(https://www.thevaluechainng.com)

Gas Utilization in Nigeria

Nigeria currently ranks as the most populous country in Africa and sixth in the world, with an approximate population of over 230 million (Worldometer, 2024). This further establishes the fact that the domestic gas market is readily available. In 2023, 2.503 TCF of gas was produced, and about 2.316 TCF (92.54%) was utilized, with the highest percentage going to export sales (36.5%), followed by domestic sales (28.8%), gas re-injection (23.6%), fuel gas (6.2%) and gas lift (4.9%) (NUPRC 2023).

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Table 1.1 Gas Utilization Profile for the year 2023 (Source: NUPRC, 2023).

Gas Utilization Category	Volume (MMScf)	% Utilization
Fuel Gas	143,604.09	6.2%
Gas Lift	113,589.66	4.9%
Gas Re-Injection	545,995.89	23.6%
Domestic Sales	666,384.76	28.8%
Export Sales	846,471.85	36.5%
Total	2,316,046.25	92.54%

According to the National Domestic Gas Supply and Pricing Regulations (2008), the domestic gas market was divided into three divisions from a gas pricing strategy perspective. The National Domestic Gas Supply and Pricing Regulations categorize the domestic gas market into three sectors. The Strategy Domestic Sector which focuses on sectors that have a significant direct multiplier effect on the economy, i.e. Gas-to-Power, aiming for low-cost gas access to drive economic growth, although power generation remains constrained by supply and infrastructure challenges, with a peak generation of 5313 MW compared to a demand of 19,798 MW (Agusto & Co Store, 2023). The Strategic Industrial Sector targets industries that utilize gas as a feedstock, promoting local production and exports while fostering job creation and competitiveness in the global market. Finally, the Commercial Sectors use gas as an alternative fuel, offering a direct revenue stream due to their capacity to absorb higher prices compared to competing fuels like LPFO. Together, these sectors highlight the diverse roles of gas in enhancing Nigeria's economy.

The National Domestic Gas Supply and Pricing Regulations of 2008 have been bolstered by the introduction of the Gas Pricing, Domestic Demand and Delivery Regulations, as authorized by Section 33 of the Petroleum Industry Act, 2021. These new regulations aim to establish a framework for regulating marketable natural gas prices specifically for strategic sectors outlined in the Act. Additionally, they seek to identify unregulated markets and provide necessary provisions for those sectors. This framework is designed to enhance market efficiency and ensure fair pricing within the domestic gas sector. ("Gas Pricing, Domestic Demand and Delivery Regulations," 2021)

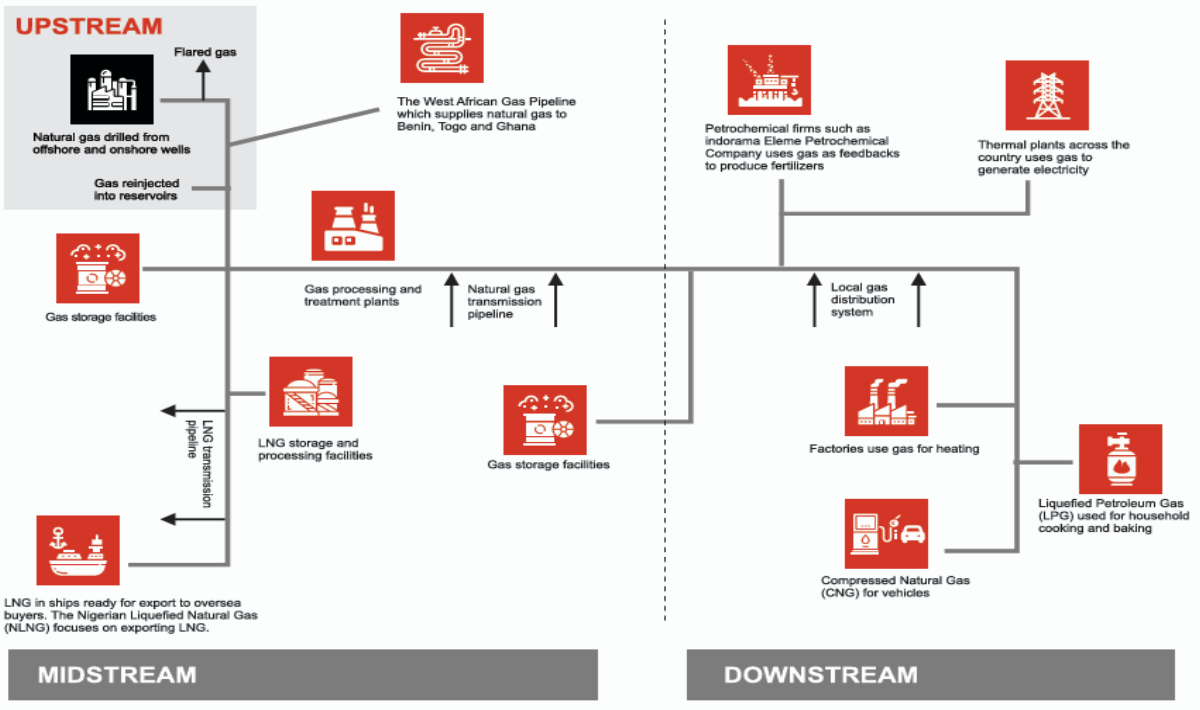


Figure 1: Nigeria Gas Value Chain (Source: PWC Analysis, 2020)

III. Methodology

This study used a mixed-methods approach to quantify Nigeria's existing and forecast energy demands. This technique combined qualitative and quantitative data, allowing for a thorough examination of the several elements shaping Nigeria's energy landscape. To lay a solid foundation, secondary data were gathered from current literature, reports, and studies, with a focus on Okunbanjo et

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al. (2020), Oyedepo (2012), and Sambo et al. (2008). This broad literature analysis contributed to a better understanding of current energy demand estimates and the contextual elements that influence these demands.

Building on the foundational data, the study used models created by the Energy Commission of Nigeria (ECN), notably the Model for the Analysis of Energy Demand (MAED). This model was used to generate forecasts of future electricity demand under various economic conditions. The study used a scenario analysis methodology to examine four different economic growth scenarios: Reference, High Growth, Optimistic 1, and Optimistic 2. The study efficiently summarized energy demand estimates using descriptive statistics, allowing for a more precise assessment of projected power consumption trends.

The methodology used probabilistic growth modelling to analyse the prospective contributions of Nigeria's Non-Associated Gas (NAG) reserves to fulfilling future energy demands. This entailed using a triangular distribution model to estimate the expansion of NAG reserves, drawing on information from papers by Omotosho and Akinpelu (2017) and other government sources. Monte Carlo simulations were also used to offer a statistical study of NAG reserve growth, resulting in a range of estimations that account for data variability and uncertainties. This combined technique of probabilistic modelling and simulation improved forecast accuracy while also allowing for a more nuanced understanding of the reserves' possible impact on Nigeria's energy future.

IV. Results and Discussion

Quantifying the Current and Projected Energy Demands

Energy demand in Nigeria is an important component that shows the consumption of energy caused by human activity. Currently, yearly energy demand is anticipated to be 17,520 MW, with a peak generating capability of around 5,300 MW (Okunbanjo et al., 2020). This enormous disparity underlines the country's difficulty in satisfying its energy needs in the face of a constantly rising population and economy. The necessity for stable energy sources to enable development emphasizes the urgency of addressing this discrepancy.

Nigeria's current energy landscape is defined by a population that is expected to expand from 115 million in 2000 to 281 million by 2030, representing an average annual growth rate of 2.86% (Oyedepo, 2012). This demographic transition is a primary driver of energy consumption, according to research conducted by Sambo et al. (2008), who note that, while population growth is important, economic activity and structure are the most important variables. As the economy grows, population growth and economic development will have a greater influence on energy consumption patterns, demanding strategic planning to bridge the growing demand generation gap.

Electricity is the most frequently used and desirable energy source worldwide (K.A. Khan et al., 2018). It is a fundamental prerequisite for economic development, national development, achieving the Sustainable Development Goals (SDGs), and maintaining a sufficient level of living. To more properly evaluate Nigeria's future energy demands, models established by the Energy Commission of Nigeria (ECN) were used, which were based on power consumption, notably the Model for the Analysis of Energy Consumption (MAED). The investigation looked at four economic scenarios:

1. Reference Scenario: 7% GDP growth
2. High Growth Scenario: 10% GDP growth
3. Optimistic Scenario 1: 11.5% GDP growth
4. Optimistic Scenario 2: 13% GDP growth

Table 1.1 Electricity Demand Projections Per Scenario (MW) (Source: Sambo et al. 2009)

Electricity Demand Projections Per Scenario (MW)					
Scenario (GDP Growth %)	2,010	2015	2020	2025	2030
Reference (7%)	15,730	28,360	50,820	77,450	119,200
High Growth (10%)	15,920	30,210	58,180	107,220	192,000
Optimistic 1 (11.5%)	16,000	31,240	70,760	137,370	250,000
Optimistic 2 (13%)	33,250	64,200	107,600	172,900	297,900

The predictions show a significant growth in electricity demand. For example, the reference scenario estimates power demand at 50,820 MW in 2020, whereas the optimistic scenario with a 13% GDP growth might reach 107,600 MW in the same year, more than 50% higher than the reference scenario. This association between economic growth and energy consumption emphasizes the importance of Nigeria fully utilizing its energy producing capability to support both economic development and rising electricity demand.

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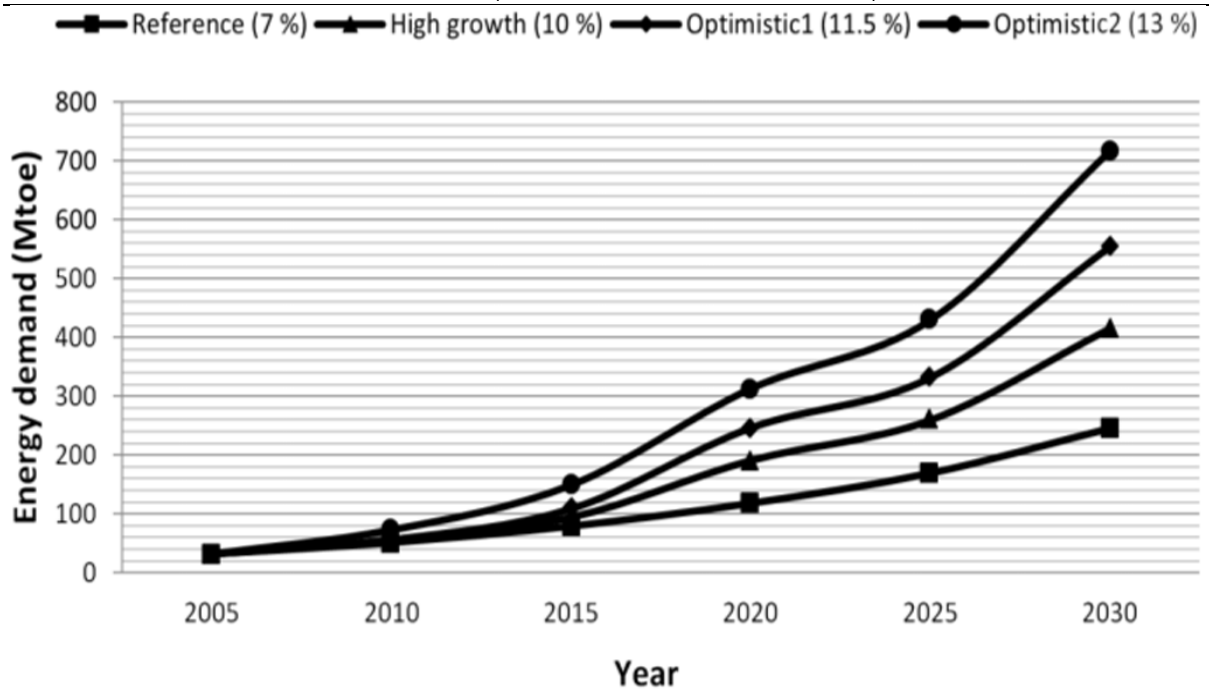


Figure 2.1 The energy demand projections for the four economic growth scenarios. (Akorede et al., 2016)

Assessment of the Potential of NAG Reservoirs in Meeting These Demands

According to a paper by Omotosho and Akinpelu (2017) from the University of Ibadan, Nigeria's total gas reserves are estimated to be at 186 trillion cubic feet. Approximately 54%, or roughly 100 Tcf, are available for short- to medium-term use. The remaining reserves are constrained by infrastructure limits and legal barriers, such as OPEC output quotas. Significantly, Nigeria's non-associated gas (NAG) deposits, primarily in the Niger Delta, constitute an underutilized resource that, if properly harnessed, could significantly meet the country's energy demands.

Projected Expansion of NAG Reserves

Omotosho and Akinpelu's (2017) analysis predict significant development potential for Nigeria's NAG reserves, which are currently estimated at 18.8 Tcf. Using a probabilistic growth model based on triangular distribution, the study predicts that NAG reserves will increase significantly by 2050. The model includes minimal, most likely, and optimistic growth rates of 2.5%, 5%, and 7.5%, respectively, in line with Nigeria's Gas Master Plan development targets. Monte Carlo simulations of these growth rates show that NAG reserves might increase by a further 78.39 to 89.80 Tcf with a 90% confidence interval, depending on supported infrastructure and economic incentives.

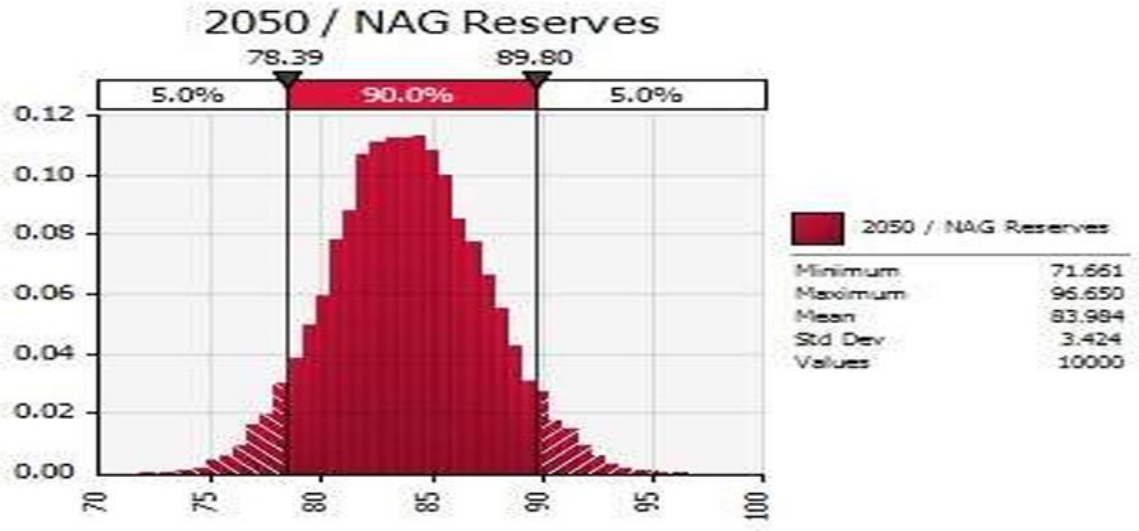


Figure 2.2 Monte Carlo Simulation Results for NAG Reserves Growth in 2050

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Meeting Nigeria's Future Energy Demand with NAG Reserves

By combining deterministic AG models and probabilistic NAG projections, the study predicts that total gas reserves would reach roughly 267 Tcf by 2030 and potentially 278 Tcf by 2050. This expanded reserve base is consistent with Nigeria's ambitions for gas-to-power projects, which include unlocking 3.1 billion cubic feet per day of gas to attract $14 billion in foreign direct investment, creating over 2 million jobs, and increasing federal government revenue by $12 billion (Agbonifo, 2015), as well as other industrial and residential gas utilisation plans.
However, getting into these assets requires significant infrastructure construction, such as pipelines, gas processing facilities, and export terminals, as well as a transformation in the regulatory and economic landscape to promote long-term investment in NAG fields. The Nigeria Gas company (NGC) is poised to increase the efficiency of gas distribution along its grid with the plan to install additional compression stations. More importantly, is the ongoing Ajaokuta-kaduna- Kano gas pipeline (AKK) nearing completion meant to unlock the gas demand envelope in the Northan part of Nigeria. This gas backbone infrastructure will stimulate economic growth along with improving gas export to the west African industrial hub.

Identifying the Investments Required to Unlock These Resources

To unlock Nigeria's gas resources and use them for energy development, the Nigerian government has implemented strategic investments and reforms via executive orders signed by the President on July 6, 2023. These initiatives are intended to improve the investment climate, attract both domestic and international investors, and ensure effective gas utilization to meet Nigeria's energy requirements. The primary investments needed to achieve these objectives are as follows:

Tax Credits for Non-Associated Gas (NAG) Greenfield Developments

The Tax Incentives Order establishes tax benefits expressly for NAG greenfield investments in onshore and shallow water zones, with beginning production deadlines in 2029. This policy encourages enterprises to create new gas projects by providing gas tax credits. The credit is based on the field's hydrocarbon liquids (HCL) content and is determined at a rate of $1.00 per thousand cubic feet or 30% of the fiscal gas price (whichever is lower) if the HCL content is 30 barrels or less per million standard cubic feet. Fields having an HCL content of up to 100 barrels per million cubic feet are eligible for a $0.50 per thousand cubic feet tax credit, which equals 30% of the fiscal gas price. These tax credits, which are valid for up to ten years, will be converted to tax allowances after the initial period, promoting long-term investments in gas extraction.

Midstream Capital and Gas Utilization Investment Allowance

To encourage more investment in midstream gas projects, a gas utilization investment allowance is available for capital expenditure on new and continuing midstream oil and gas industry projects. Companies that invest in infrastructure, such as gas processing plants and transportation equipment, are entitled for a 25% allowance on real expenditures, which increases project affordability. This allowance is only applied once the Companies Income Tax Act's tax-free period expires, incentivizing prompt capital investment in Nigeria's midstream sector. The Federal Inland Revenue Service (FIRS) and the Nigerian Midstream and Downstream Petroleum Regulatory Authority (NMDPRA) are in charge of implementing this allowance and ensuring its appropriate implementation to increase gas availability for residential usage.

Incentives for Deepwater Oil and Gas Projects

Recognising the capital-intensive nature of deepwater oil and gas extraction, the presidential orders call for competitive fiscal incentives to make these projects financially viable. These incentives are designed to ensure that deepwater investments provide a positive internal rate of return (IRR), balancing investor profitability with Nigeria's strategic energy objectives. While these incentives are being finalized, the Ministry of Finance Incorporated and the Ministry of Petroleum Incorporated are directed to work with the Nigerian National Petroleum Corporation Limited (NNPC) to establish commercial support mechanisms for new and existing deepwater investments. This technique promotes exploration in Nigeria's deepwater areas, diversifying gas supply sources and meeting domestic and export gas demand.

Reduction of Contracting Costs and Timelines

Simplifying contractual procedures is crucial to reducing costs and expediting project timelines, according to the Presidential Directive on Contractual Reforms. The rule increases to $10 million the minimum amount required for approval of Production Sharing Contracts (PSCs) and Joint Operating Agreements (JOAs). By reducing approval-related delays, this modification enables quicker project development. Furthermore, it is the duty of Nigerian Upstream Investment Management Services Limited (NUIMS) and Nigerian National Petroleum Corporation Limited (NNPC) to ensure that contract approvals are issued promptly at every level, from prequalification to final clearance, within 15 days. This change brings Nigeria's contracting practices into compliance with international norms while lowering operating costs and expediting project timelines.

Local Content Compliance and Capacity Building

The Local Content Directive requires that all Nigerian Content Plans (NCPs) conform with the actual capacities of in-country enterprises, fostering genuine local content while maintaining investment feasibility. The Nigerian Content Development and Monitoring Board (NCDMB) would review enterprises' operational capacity for certain operations, ensuring that contractors meet

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local content standards. This order stimulates investment in local industries, promotes skill development, and decreases reliance on foreign services by establishing a strong domestic supply chain. Furthermore, by ensuring that local companies make genuine contributions to project outcomes, the government presents Nigeria as a more self-sufficient actor in the oil and gas industry, capable of financing large-scale gas development projects.

These executive orders provide a comprehensive strategy for establishing an investment-friendly climate and tackling financial and regulatory difficulties in Nigeria's oil and gas sector. Nigeria intends to harness its massive gas reserves and establish a sustainable energy future by focusing on tax incentives, contract efficiency, and local content development.

Economic Impact and Job Creation

According to estimations, domestic exploitation of Nigeria's recoverable proven gas reserves may generate a Gross Value Add (GVA) of around $18.3 billion annually, demonstrating the substantial economic impact of the country's gas potential (PWC, 2020). Numerous economic contributions, including direct, indirect, and induced value additions, are included in this statistic. The immediate advantages of gas production and consumption operations are reflected in the direct economic value addition, which comes to about $10.5 billion. The estimated US3.4 billion in indirect contributions come from the activities of the gas industry affecting other sectors, such as manufacturing and services. Additionally, a $4.4 billion induced value addition demonstrates the financial gains from spending money earned in the gas sector. This complex economic impact highlights how vital the gas industry may be to bolstering Nigeria's overall economy, particularly in a setting, where moving away from reliance on oil is becoming more and more significant.

Furthermore, a significant part of Nigeria's economic impact from gas is the creation of jobs. It is anticipated that optimizing domestic gas use will maintain around 6.5 million Full-Time Equivalent (FTE) jobs annually. In order to address Nigeria's high unemployment rates, especially among the youth, who comprise a significant fraction of the population, this job development is essential. In addition to auxiliary industries like manufacturing and services that support the gas value chain, the growth of the gas industry may directly lead to job opportunities in gas exploration, production, distribution, and consumption.

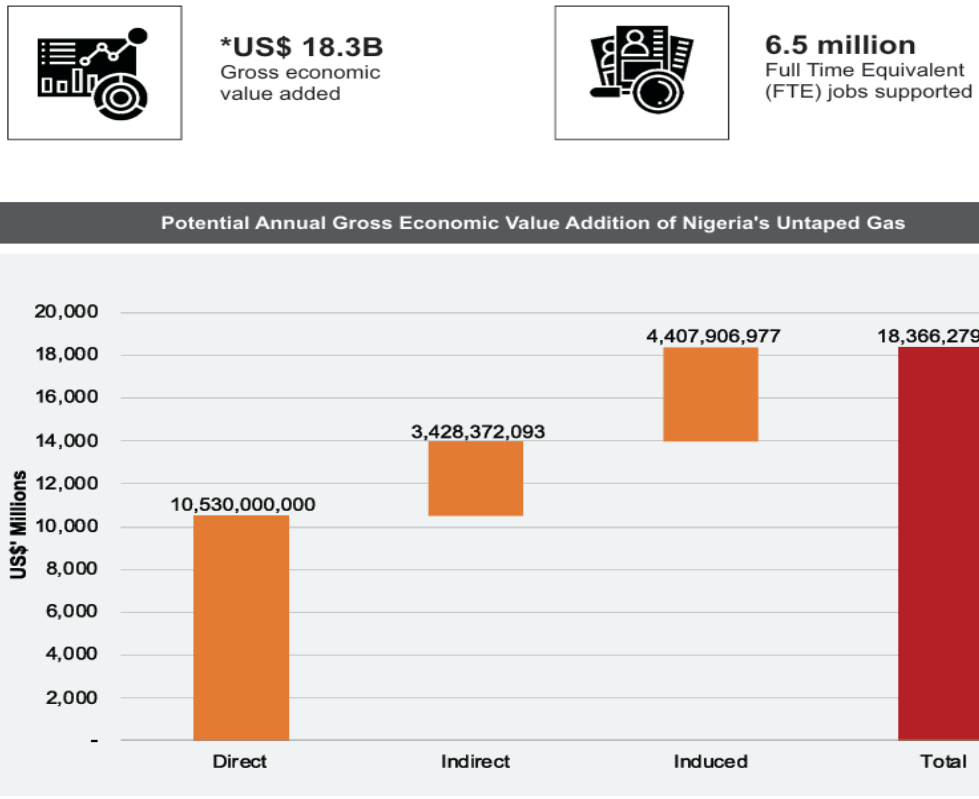


Figure 2.3 Economic Impact of Domestic Gas Utilization (Source: PWC Analysis, 2020)

Environmental advantage

Nigeria through her policy instrument is currently implementing her flare gas commercialization programs which has significantly reduced her flare gas exposure. With growing demand for domestic gas and ongoing infrastructural development, Gas flaring will be minimizing leaving us with a cleaner environment. Energy transition using natural gas as its major source of fuel compared to the traditional crude oil will be more friendly to the environment on the long run. The environment gains if Nigeria develops her massive gas resources rather than continuing with crude oil production.

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V. Conclusion and Recommendation

It will take a systematic strategy to meet Nigeria's growing energy needs, including a detailed analysis of current and projected requirements, the exploitation of non-associated gas (NAG) reserves, and the acquisition of focused investments to release these resources. Nigeria currently needs a larger and more reliable energy supply because its annual energy consumption of 17,520 MW is significantly more than its peak output capacity of 5,300 MW. As the nation's population and economic activities increase, this disparity is expected to widen. Depending on GDP growth, projections indicate that energy requirements will range from 119,200 MW to 297,900 MW by 2030. These projections emphasize how important it is to upgrade Nigeria's energy infrastructure and capacity to meet the country's rising demand.

Making full use of Nigeria's NAG reserves is essential to addressing this energy deficit. Omotosho and Akinpelu (2017) state that the nation's NAG reserves, currently estimated at 18.8 Tcf, have a great deal of room to increase and might reach 78.39 to 89.80 Tcf by 2050. When paired with infrastructure investments, this reserve expansion is highly compatible with Nigeria's objectives of boosting gas-to-power capacity, drawing in foreign direct investment, generating employment, and gradually shifting the country's economy away from its reliance on oil. By utilizing these reserves, Nigeria's energy landscape might be drastically changed. By 2030, total reserves could reach 267 Tcf, supporting both export and domestic markets.

Realising this potential takes a significant investment. The Nigerian government's recent executive directives and strategic objectives give a framework for creating a favourable investment climate. Tax credits for NAG greenfield developments, midstream capital investment allowances, deepwater project incentives, contracting changes, and local content standards are among the most important incentives. These policies aim to attract foreign direct investment, improve local capacity, and shorten project deadlines, all while creating a projected 6.5 million jobs and delivering $18.3 billion in Gross Value Add (GVA) from domestic gas utilisation (PWC 2020). Nigeria is well-positioned to change its energy industry by taking a comprehensive strategy to assess energy demand, developing NAG reserves sustainably, and promoting investment. This plan is critical for closing the energy demand-supply gap, promoting sustainable economic growth, and assuring the energy security required to power Nigeria's future.

A collaborative effort among stakeholders including the government, investors, and industry players is essential to realize this vision. Public-private partnerships (PPP) can facilitate the necessary investments in infrastructure such as gas processing plants, pipelines, and power generation facilities. Additionally, Foreign Direct Investments (FDI) can bring expertise and funding to accelerate the development of Nigeria's gas sector. This can be achieved by creating a conducive investment environment through pragmatic policies that prioritize the interests of all stakeholders, free from political power struggles. By ensuring that stakeholders' mutual interests align effectively over time, it is possible to avoid negative consequences or inefficiencies in the long run regarding the utilization of natural gas resources.

Therefore, unlocking Nigeria's NAG reservoirs offers a pathway to a more secure and sustainable energy future. All stakeholders must come together to create a favourable investment climate that encourages the exploration and utilization of these vital resources. By doing so, Nigeria can not only enhance its energy security but also drive economic growth and improve the quality of life for its citizens.

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