

Domestic Refining of Crude Oil in Nigeria:

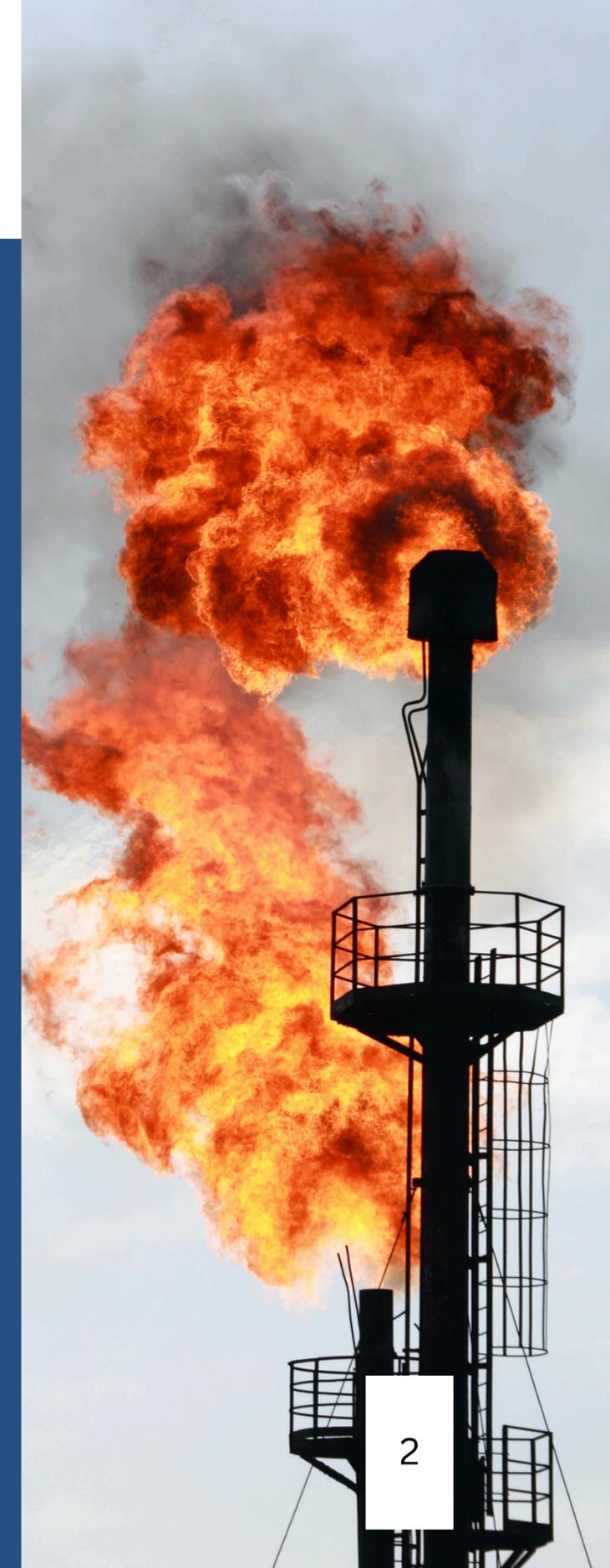
Macroeconomics & Trade-offs

Introduction

Nigeria's oil and gas sector operational landscape has undergone a significant transformation, primarily driven by sweeping reforms. These reforms reached a monumental milestone with the enactment of the Petroleum Industry Act (PIA) in 2021, heralding the onset of a transformative era. Central to these changes are pivotal measures such as the restructuring of the Nigerian National Petroleum Corporation (NNPC) into a Public Limited Liability Company (PLC), the deregulation of the downstream sector, and the imminent operationalisation of two out of five large-scale refineries in the country. The anticipated outcomes of these evolving events include a resilient oil and gas sector that supports Nigeria's economic growth and enhances consumer welfare as prices of refined petroleum products reduce significantly.

However, global experience and industry insights are lining towards a position that the presence of functional refineries in Nigeria's oil and gas sector does not automatically translate into optimal business and economic outcomes for all stakeholders, including the government, businesses, and households. Citing global trends where countries with abundant petroleum resources and refineries do not significantly differ in pricing from those without such facilities, this confirmed that the availability of operating local refineries is insufficient for having low-priced petroleum products in Nigeria.

This situation has also triggered similar sentiments in the public sector and among local energy experts that simply having a few refineries does not necessarily lead to lower prices for refined petroleum products in Nigeria. This assertion stems from structural and policy challenges within the Nigerian oil & gas sector, such as widespread oil theft, deteriorating pipeline infrastructure, inadequate logistical systems, and the lack of supporting value-added activities for crude oil refining.



Though this assertion challenges common beliefs among Nigerians that the opposite of the picture above should be, it sparked concerns among stakeholders. Many wondered how the transition from no working refineries to two could have such limited effects on fuel prices and the economic growth process, given the importance of the oil and gas sector. Thus, it's crucial to understand (1) the economics of local crude oil refining and (2) build scenarios on why the situation persists and the counterfactual.

The intriguing questions are:

Why does the price of refined petroleum stay the same when costs from the current imported-driven price structure are adjusted?

At what price can it ensure lower gate prices for refined petroleum products domestically?

Can Nigeria consistently supply enough crude oil to its local refineries?

How inadequate is Nigeria's logistic system that moving feedstock to or refined products from the refinery costs as much as importing them?

This report explores the economics of local refining in Nigeria, examining its implications for the sector's performance, macroeconomic indicators, and refined petroleum prices within the country. By analysing current conditions in the oil & gas sector and emerging value chains, various scenarios, key drivers influencing anticipated outcomes and clarity on potential economic trade-offs.



Box 01

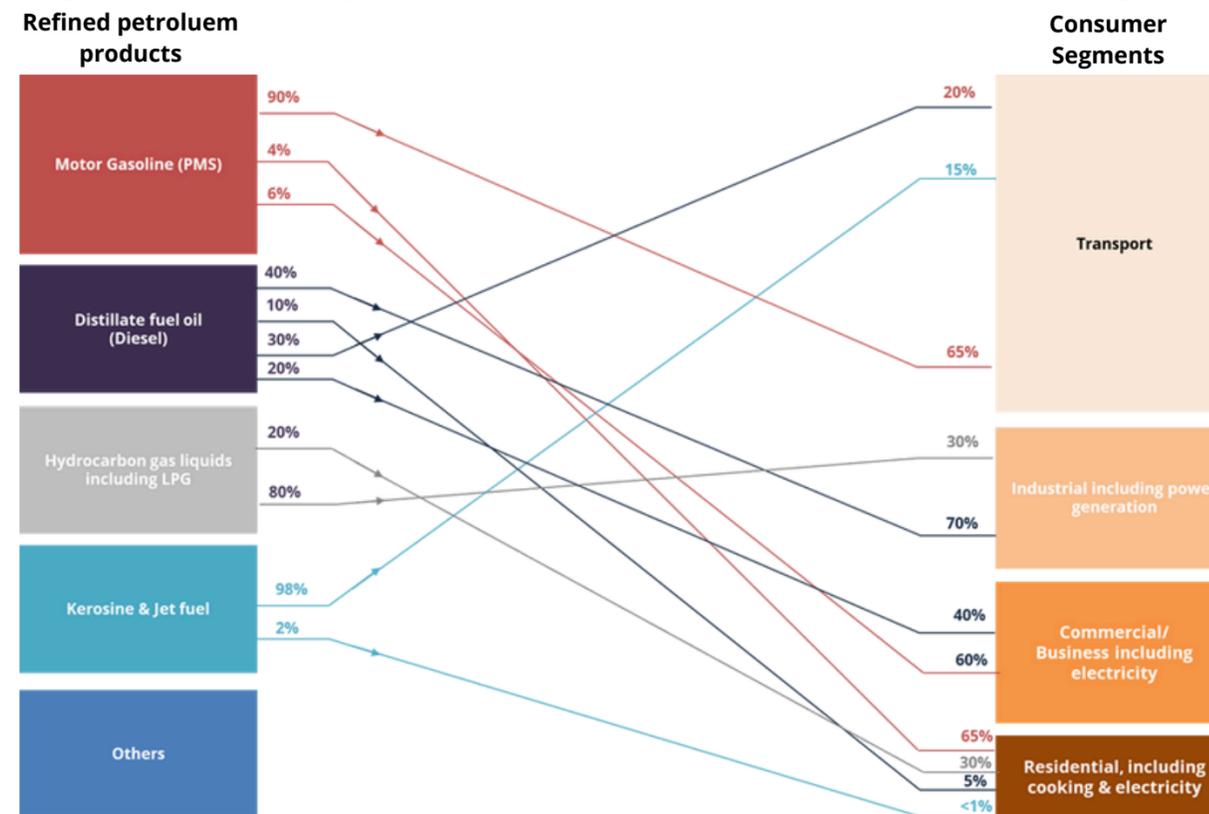
Why Nigerians Care About Price of Refined Petroleum Products

In Nigeria, refined petroleum products hold substantial importance across various dimensions of the daily life of Nigerians and the wider economy. This significance arises from the country's longstanding energy challenges, leading to the widespread utilisation of these products to meet household needs, power commercial enterprises, and support industrial activities. As illustrated in Figure 1, petroleum products, notably petrol (gasoline), diesel, and kerosene, play indispensable roles in transportation, electricity generation, cooking, and various industries. Consequently, the accessibility and affordability (pricing) of these products carry significant macroeconomic implications for the nation.

The typical economic scenario in Nigeria regarding petroleum product pricing is that any increase in their prices usually triggers inflationary pressures. For example, due to the inelastic nature of demand for transportation, 100% of fuel price increases are passed to end users, households and businesses. Causing transportation costs rise and making prices of goods and services across the economy to elevate.

Businesses in Nigeria rely on gasoline and diesel to generate electricity for commercial purposes. Hence, the price of these petroleum products directly impacts economic operations and business strategies, shaping their growth, employment and output levels.

Figure 1: Consumption Pattern of Petroleum Products in Nigeria



Data: NNPC, NBS; IEA;

Calculations & Chart: NESG Research

Industrial activities rely on gas and diesel to power plants, essential for production processes. Fluctuations in fuel prices can disrupt economic activities, affecting sectors like agriculture, manufacturing, and commerce, hindering overall economic growth.

Many Nigerians rely on petrol for vehicles and generators due to inadequate public transport and unreliable electricity. Petroleum price changes directly affect household budgets, with lower-income families disproportionately affected. Higher fuel costs worsen poverty levels by increasing basic expenses and reducing disposable income.

Nigeria's Oil & Gas Industry Value Chain



Nigeria's Economy and Oil & Gas Industry

The overarching narrative of Nigeria's economic trajectory has been heavily influenced by the dominance of the oil and gas industry, coupled with its growth-dampening performance since 2019. This phenomenon has consequently marginalised the industrial sector's role within Nigeria's recent economic narrative.

During the timeframe delineated in Figure 2, Nigeria's economic growth trajectory closely mirrors the oil sector's performance. The continued prominence of the oil sector as a primary driver of economic growth is undeniable. However, this reliance amplifies the nation's susceptibility to external shocks and fluctuations in the global oil market. The abrupt downturn in global oil prices in 2020, precipitated by the COVID-19 pandemic, resulted in negative growth within the oil sector and dragged the Nigerian economy into a recession. The sluggish recovery and tepid economic growth observed in the post-COVID-19 era can be predominantly attributed to the lacklustre performance of the oil sector.

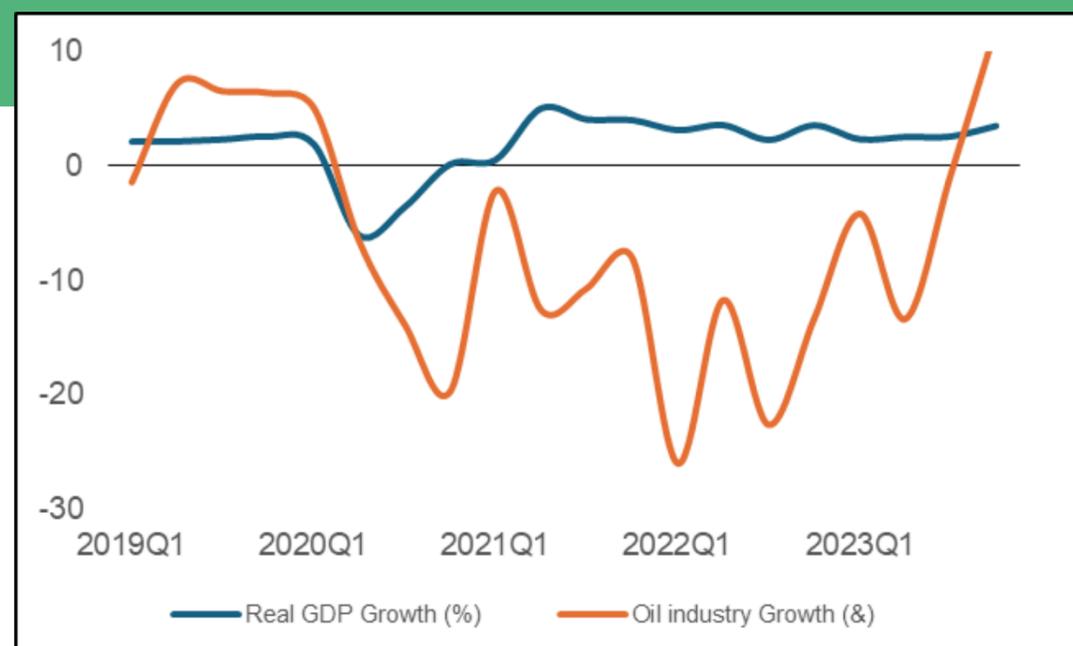
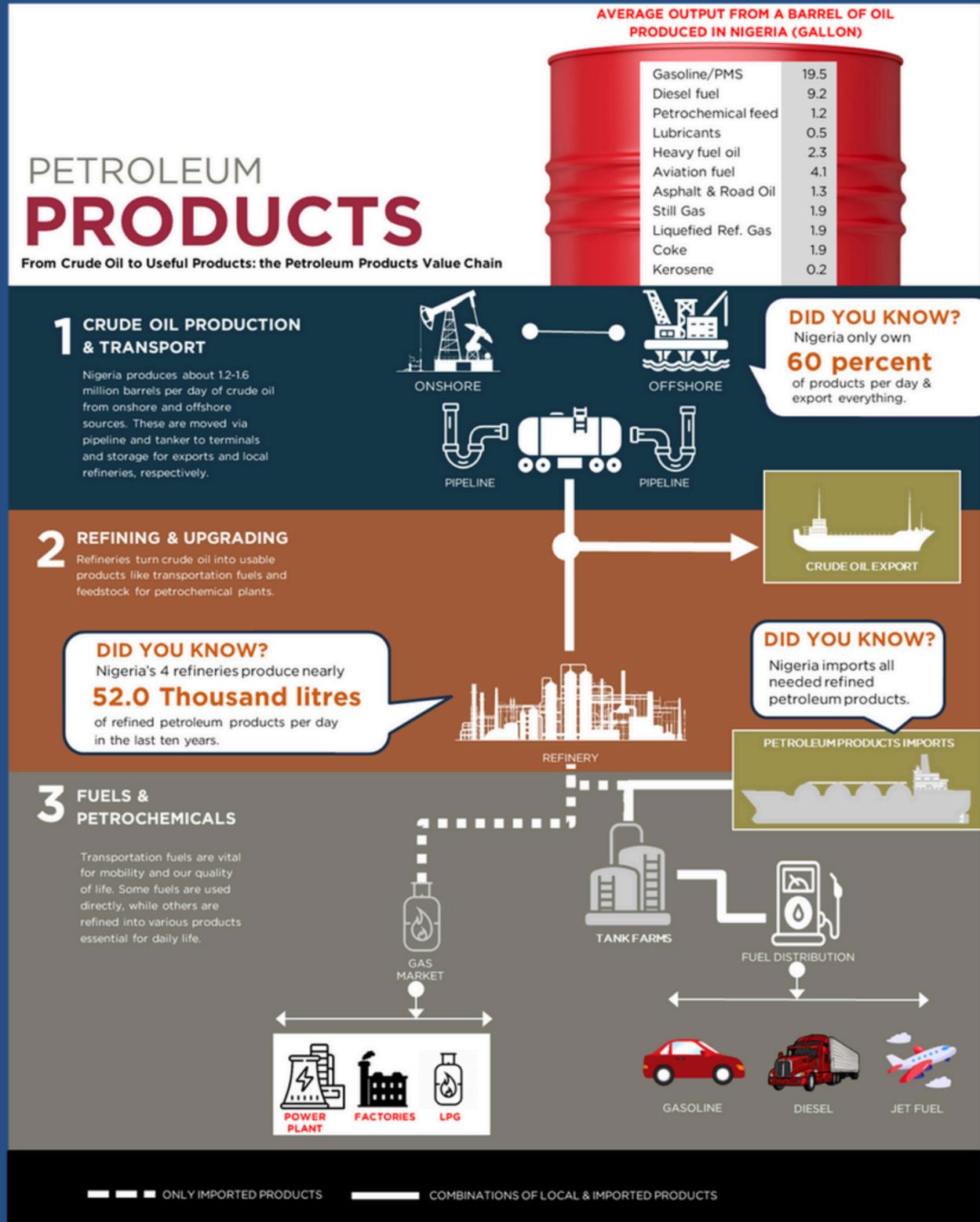


Figure 2: Co-movement of Oil Sector & Nigeria's GDP Performance

Nigeria's oil industry encompasses active onshore and offshore oil exploration, alongside a relatively inactive midstream sector and a downstream segment heavily reliant on imports. This prevailing condition within the sector has had ripple effects on the country's industrial development, particularly within the manufacturing sector. The heavy dependence on imported raw materials and inputs, which could have been derived from by-products of crude oil exploration and processing, has constrained productivity.

Data: NBS, Chart: NESG Research

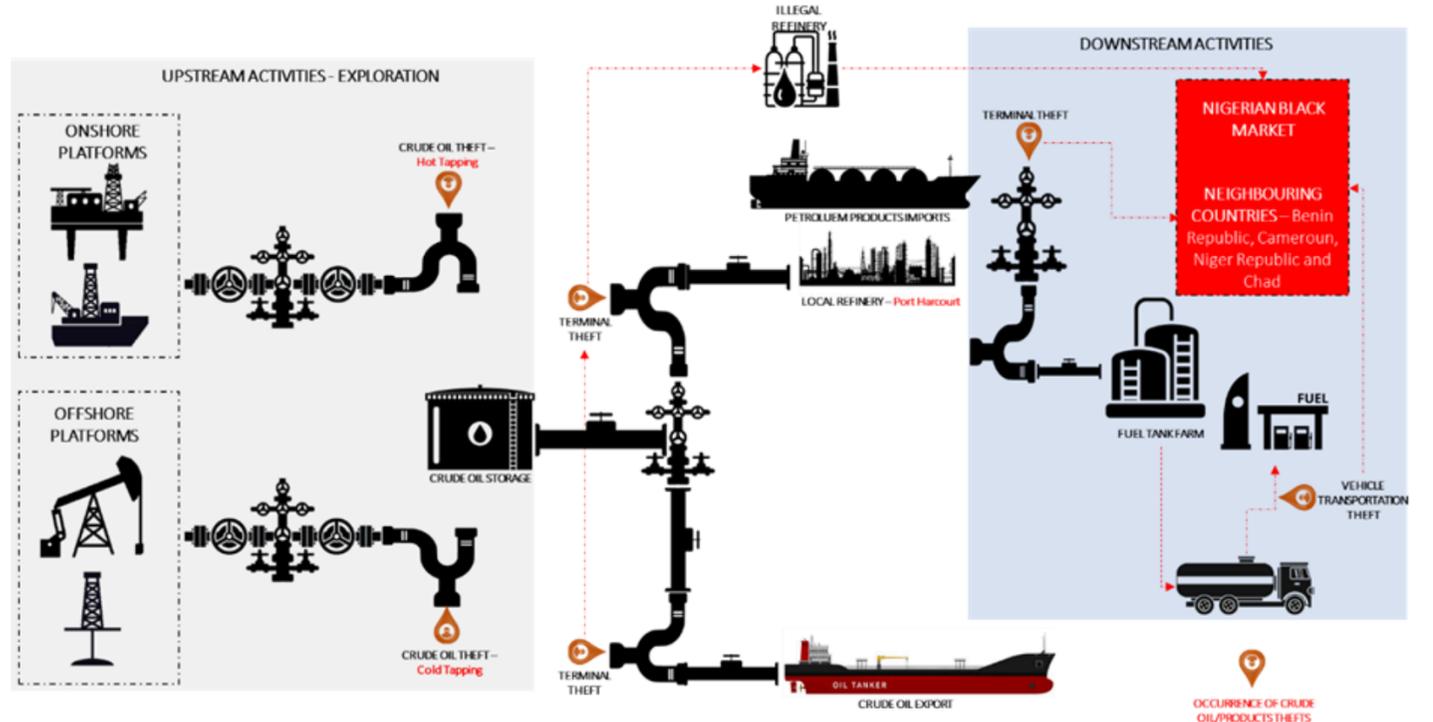
Figure 3: Current Value Chain of Nigeria's Oil & Gas Industry



Box 02

Prevalence of Crude Oil Theft in Nigeria

The rampant theft of crude oil and petroleum products in Nigeria signals a bleak future for a nation heavily dependent on oil exports, which account for 80 percent of government revenue and 85 percent of exports and foreign exchange earnings. According to the Nigerian Upstream Petroleum Regulatory Commission (NUPRC), Nigeria lost about 400,000 barrels of crude oil daily in the first two months of 2022.



The figure above illustrates the occurrence of oil theft within Nigeria's oil and gas value chain. According to this depiction, three (3) types of oil thefts are observed within both crude oil production and refined product distribution channels in Nigeria. Two (2) methods are prominent in the crude oil section: hot tapping and cold tapping. These forms of oil theft occur along the pipeline channels and terminal stations designated for export or transportation to refineries.

There are limited benefits in maintaining the status quo

Considering the suboptimal state of Nigeria's oil and gas industry's value chain, the reactivation of the midstream segment, prompted by initiating activities by the Dangote refinery and other projects, may not yield the immediate benefits energy analysts and citizens anticipate. While the reactivation of the midstream segment is undoubtedly essential for the Nigerian economy to capitalise on the advantages of being an oil-producing nation, it alone may not suffice to deliver short-term benefits. Previous studies indicate that certain conditions must be met to ensure that the commencement of these refineries leads to significant economic growth, job creation, reduced imports, and other anticipated economic and business advantages.

These conditions encompass factors such as regulatory reforms, infrastructure development, investment in human capital, technological advancement, and market liberalisation. Without addressing these underlying challenges and implementing necessary reforms, the reactivation of the midstream segment may fall short of its potential to drive transformative change in Nigeria's oil and gas industry and foster sustainable economic development. These conditions are discussed in subsequent sections of this report.



Domestic Refining of Crude Oil In Nigeria: What It Means For The Economy



Like experiences in other advanced and emerging economies, the operationalisation of an oil refining complex should not merely focus on diversifying Nigeria's oil and gas sector. The country must also prepare to leverage the revolutionary potential and economic structural disruptions accompanying such endeavours. Nevertheless, the government, businesses, and citizens must seize this pivotal opportunity presented by current developments in the oil and gas sector to achieve the following.

- Diversifying the oil and gas sector,
- Developing the manufacturing sector,
- Activating the country's industrialisation path,
- Strengthening the economic growth process, and
- Enhancing the overall welfare of the country's populace.

Efforts toward steering the refining sub-sector towards pro-economic growth and welfare enhancement necessitate a profound comprehension of the unintended consequences associated with the disruptive nature of domestic crude oil refining. Failure to position Nigeria to capitalise on these opportunities by sticking to the status quo as outlined in Figure 3), the country would risk allowing other emerging economies to exploit them to fuel their economic growth process. A pertinent example is the recent export of Naphtha by the Dangote Refinery to industrial complexes in Asia[2], with Nigeria as a principal destination for goods produced using inputs sourced from the country.

Emerging Oil & Gas Value Chain: Exploring the Theory of Change

Notably, the start of activities by local refineries is expected to drastically change the current and less-optimised value chain of Nigeria's oil & gas industry. Many new economic activities would emerge across the sub-industries that would require concerted efforts from the government - through policy and infrastructure development, and the private sector - through investments and product development to make the best of the new state of the industry.

The comparison of Figures 3 and 4 highlights this theory of change that would unintentionally spring up because of the functional local refineries in Nigeria.

[2]<https://www.qcintel.com/article/naphtha-cracks-slide-as-dangote-adds-to-returning-middle-east-russia-supply-21609.html>



A. Upstream Sector

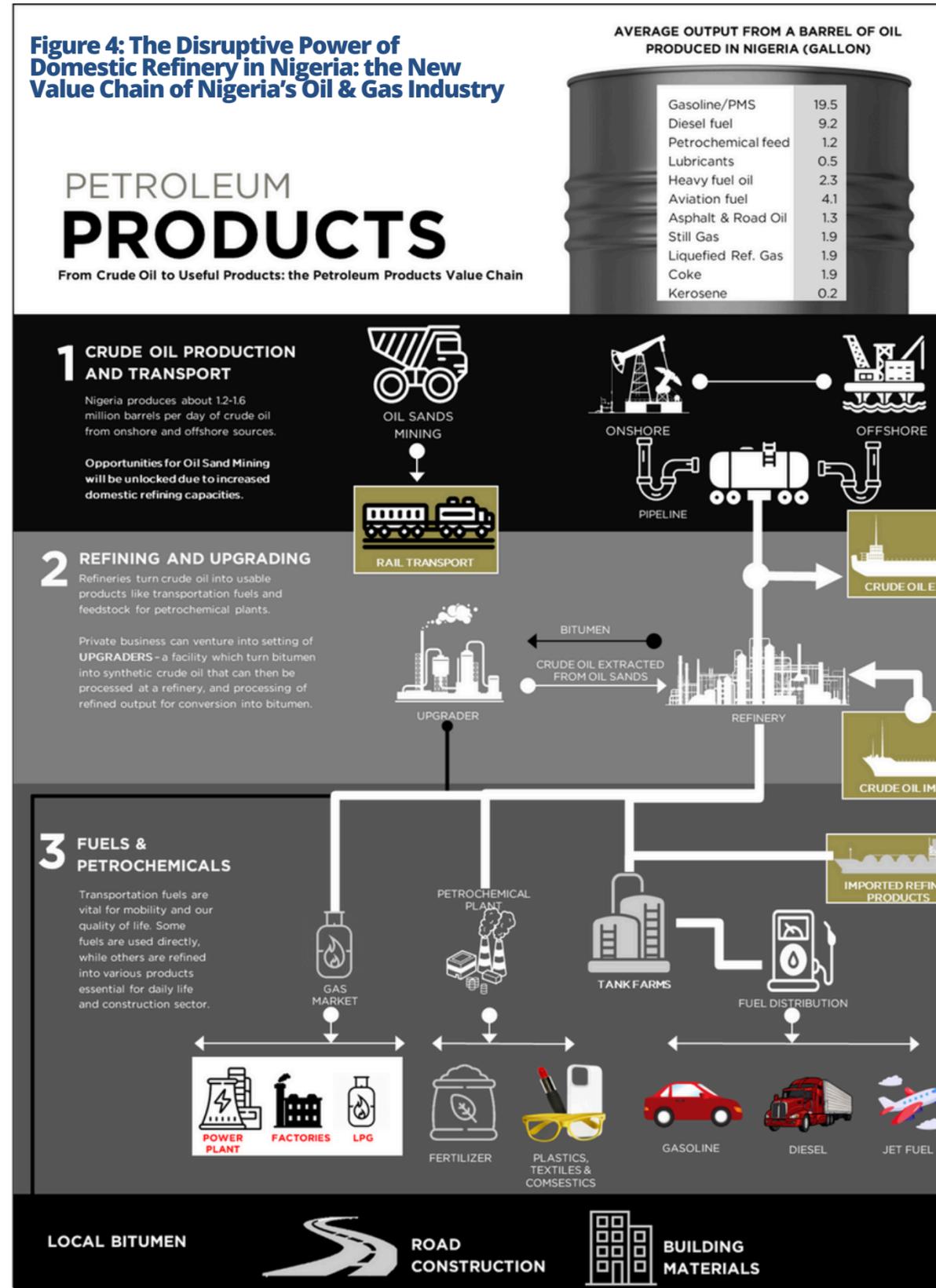
1. Onshore and Offshore Crude oil Exploration

The offshore and onshore crude oil exploration would remain the main source of feedstocks to the refineries and for export purposes as obtainable with the current value chain (see Figure 4). Notable changes to the operations of these economic activities would be the portion/volume of production allocated for domestic refining purposes.

2. Oil Sand Exploration

Aside from the conventional offshore and onshore oil exploration that dominated upstream activities in the last 6 decades of oil exploration in Nigeria, Oil Sand exploration is expected to be added to the industry segment.

Oil Sand represents a crucial energy source that necessitates thorough processing to convert it into upgraded crude oil suitable for refining into gasoline and other fuels. Extraction of crude oil from the oil sand processing would significantly increase local oil production and enhance the performance of the local refineries.

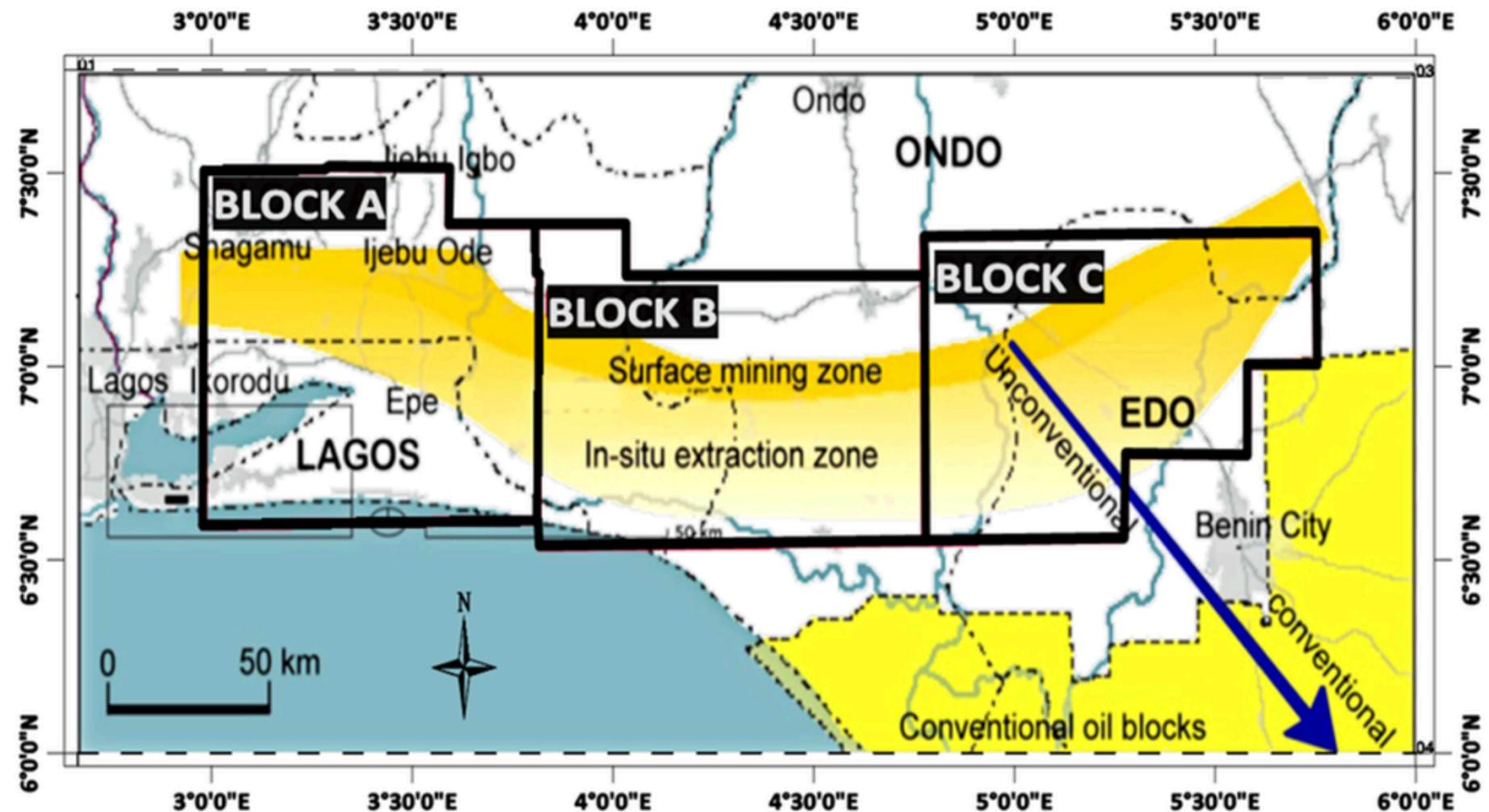


Box 03

Oil Sand Deposit in Nigeria

Oil sand, naturally occurring as bitumen, can be acquired through direct mining from its natural deposit sites or via fractional distillation of crude oil. In Nigeria, oil sand is predominantly and commercially found in South-west Nigeria, particularly in Ondo, Edo and Ogun States, covering a huge depository length.

Presently, oil sand isn't extracted directly or obtained from crude oil. However, this scenario is anticipated to undergo a transformation as the country progresses in alignment with the theory of change, aiming to optimise the evolving value chain within the oil and gas industry.



B. Midstream Sector

The structure of the midstream sector would change significantly from the current one and docile activity to three activities.

1. Crude Oil Refining Activity

Crude oil refineries are crucial components of domestic energy infrastructure, driving economic growth by converting crude oil into essential petroleum products like gasoline, diesel, jet fuel, and petrochemicals. These products are indispensable for transportation, manufacturing, and various industries, profoundly affecting energy prices, employment, trade balances, and overall economic competitiveness. Besides the refineries listed below, approximately 20 more are currently under construction, undergoing mechanical turnarounds, or in the conceptualisation stages.

2. Upgrader/Processing of Oil Sand

In Nigeria, there are currently no upgraders or oil sand processing facilities. This presents a greenfield investment opportunity for large bitumen-purchasing oil and gas, construction, and allied industrial companies in the country. Additionally, apart from heavy oil as a by-product, the local demand for bitumen-asphalt in Nigeria and export prospects to neighbouring countries like Egypt and Ethiopia make this sector an attractive investment for both the government and private enterprises.

Dangote Refinery	The Dangote Refinery has a daily refining capacity of 650,000 barrels, it's the world's largest single-train refinery.	Active
Port-Harcourt Refinery	The Port-Harcourt Refinery comprises two refining units with a combined capacity of 210,000 barrels per day.	Undergoing mechanical turn-around
Waltersmith Refinery	The refinery has an operational unit with a modular capacity of 5,000 bpd (790 m3/d).	Operational
Edo Refinery (ERPC)	Edo Refinery is a 6,000 barrels per day modular refinery in Edo State. it's the first fully private independent refinery in Nigeria, operating in two trains of 1,000BPSD and 5,000BPSD.	Operational

3. Crude oil importation

Naturally, importing crude oil to meet refinery demand capacity is a crucial activity. The government's allocation of total crude oil production to local refineries, as discussed in section 1A, dictates the volume of crude oil the country imports. An example is the Dangote Refinery Complex importing crude oil from the United States[3].

[3]https://www.arise.tv/dangote-refinery-ramps-up-imported-crude-stock-second-shipment-leaves-us-for-nigeria/#google_vignette

C. Downstream Sector

The revolutionary impacts of resuscitation of the midstream segment of Nigeria's oil & gas industry will take in the downstream sector. It will profoundly affect prices, businesses, and households and provide raw materials for petrochemical and manufacturing industries.

1. Export of refined petroleum products:

In addition to its status as one of Africa's primary oil producers and exporters, Nigeria will solidify its position as a leading regional net exporter of refined petroleum products. This development will significantly shift the country's energy strategy and economic landscape.

This transformation opens up new opportunities for oil companies and logistics providers to streamline the transport and distribution of refined petroleum products.

2. Importation of refined petroleum products:

Although Nigeria has operational refineries, imported refined petroleum products may persist for strategic reasons or to meet specific product grade demands not adequately addressed by local refineries. This underscores market dynamics and the necessity for flexibility to cater to diverse consumer needs.

Strategic imports buffer stock or address refinery disruptions. Specialised products not efficiently produced locally may require imports. Goal: reduce import reliance, enhance self-sufficiency via local refineries, efficiency improvements, and productivity measures.

3. Emergence of petrochemical plants

The burgeoning growth of Nigeria's petroleum industry is poised to catalyse the emergence of numerous petrochemical companies, each strategically positioned to capitalise on the abundant availability of feedstocks within the country. Companies will leverage locally sourced feedstocks, including various fractions derived from crude oil refining processes, to produce a diverse range of essential products, thereby fostering industrial development and economic diversification. Key among these products is fertiliser, a vital input in agricultural production that holds immense potential for boosting food security and enhancing agricultural productivity in Nigeria and beyond.

Moreover, the production capabilities of these petrochemical companies extend beyond fertilisers to encompass a broad spectrum of other valuable items, as illustrated in Figure. These may include but are not limited to plastics, pharmaceuticals, synthetic fibres, and industrial chemicals. By diversifying their product portfolio, these companies not only cater to domestic demand but also position Nigeria as a competitive player in the global petrochemical market.

Macroeconomics of Domestic Oil Refining in Nigeria



The section presents the intriguing impacts of reactivation of the midstream segment of Nigeria's oil and gas industry on the economy and consumers, especially providing a detailed explanation of the posture of energy exports and government officials in the short and medium term.

Scenarios crafted to analyse this impact on the economy (Gross Domestic Product), sectoral impact analysis & effects on the final price of refined petroleum products in Nigeria. The main two scenarios are further disaggregated into three likely conditions dependent on the following actions.

Scenarios	Details	Key Drivers
Maintaining the Status Quo	This entails a situation in which the Nigerian oil & gas industry operates within the sub-optimal value chain identified in section 2.	<ul style="list-style-type: none">• Adequate crude oil supply (zero import).
Moving towards the theory of change	The reactivation of the refineries resulted in a significant change in the industry structure alongside improvement in activities and segments.	<ul style="list-style-type: none">• Crude oil pricing for local refineries.



Scenario A: Maintaining the Status Quo

Scenario A, the revival of crude oil refining activities in Nigeria, is not typically anticipated due to the prevailing reform stance of both the government and private sector. Consequently, less attention is given to this scenario. However, maintaining the status quo is akin to embracing uncertainty, obstructing potential economic growth opportunities associated with a robust mid-stream oil and gas industry. Moreover, this economic stance poses significant risks to the country's growth and development prospects, potentially validating the concerns outlined in the report's introduction.

In this scenario, crucial factors influencing outcomes, such as crude oil supply and feedstock pricing, are less predictable, as persistent value chain constraints continue to hamper overall sector productivity. As illustrated in Figure 3, while oil and gas industry productivity may increase, it does so at a slower pace and below the expected level to drive manufacturing and industrial growth and, consequently, the broader economy.

The absence of industries to utilise by-products from refining further diminishes anticipated socio-economic benefits, including job creation and infrastructure development. Refineries may focus solely on specific petroleum products, exporting other by-products to emerging markets whose finished goods are later imported into Nigeria.

In terms of economic performance, the country's growth trajectory will see limited gains. Lastly, the final prices of refined products may remain high due to limited local crude oil supply, crude oil imports at international market prices, and structural bottlenecks in the industry.

ECONOMIC IMPACTS - INDUSTRY LEVEL

Oil & Gas Industry

SA Slow-Paced Growth

Trend Growth 

Manufacturing sector

SA Recovery

- Reduced import reliance
- Lower FX volatility
- Low Investment
- Structural challenges

Broad Industrial sector

SA Soft Improvement

Emerging economic opportunities, especially from the private sector

ECONOMIC IMPACTS - ECONOMY

Forward Linkages with other sectors

SA Limited contribution

Broken connections 

Economic growth (GDP)

SA Weak Contribution



Employment Generation

SA Strong Improvement

Enhanced performance in key sectors will boost demand for specific jobs.

Scenario B: Embracing the New Era

This scenario, characterised by the rapid oil and gas industry's expansion, enhanced private sector cooperation, and more liberal economic policies, creates robust long-term incentives, attracting substantial local and foreign investments and fostering an innovation ecosystem in Nigeria. The government's renewed commitment to accelerating the industry's growth and addressing regulatory constraints will spur active private sector participation in new activities highlighted in Section 4. These new activity points will result in improved performance in the upstream activities and higher crude oil production. Thus, increasing the sector's contribution to the country's annual GDP.

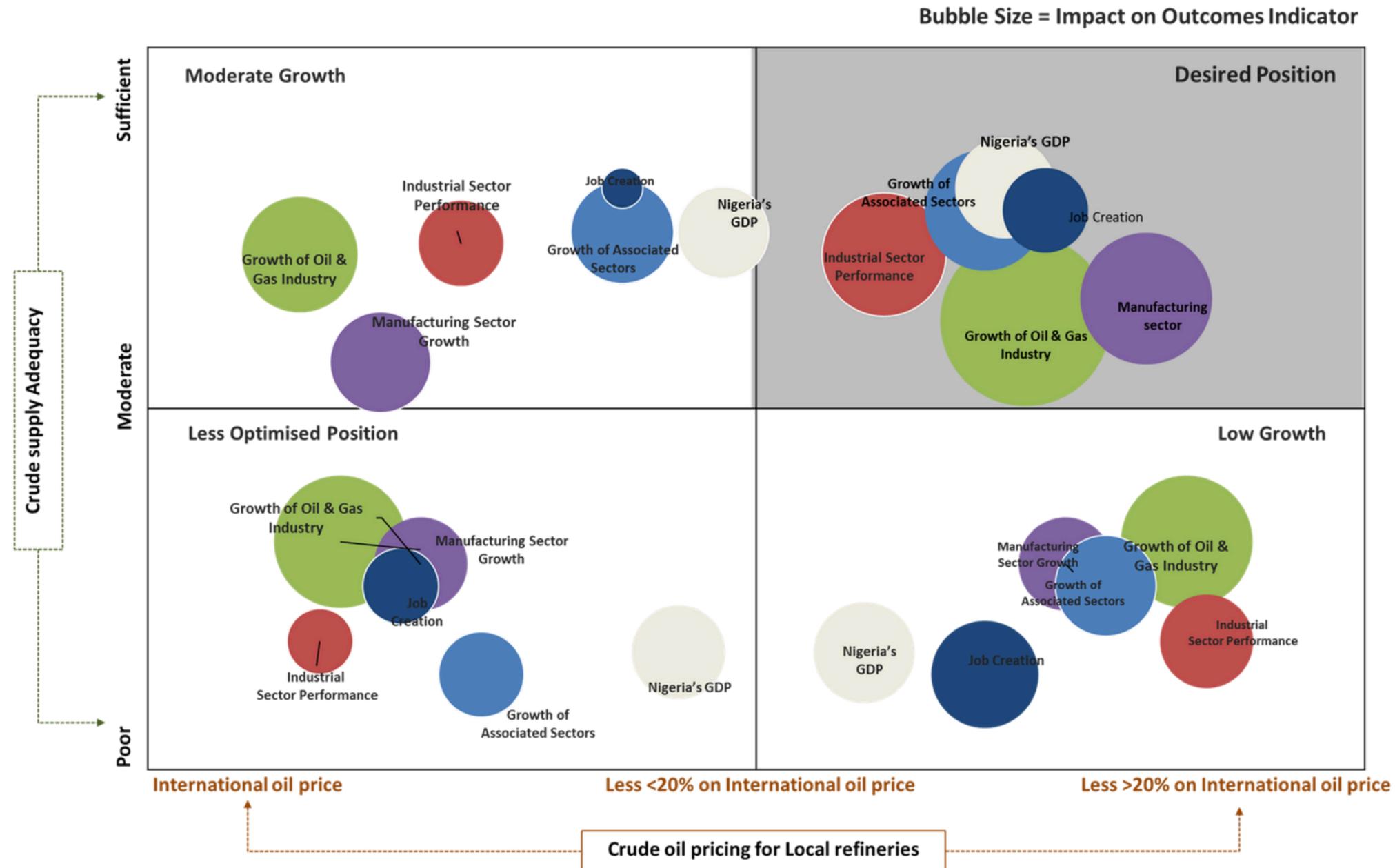
The realisation of this scenario hinges on the transcending posture of the government on the two crucial drivers highlighted above: **Adequate crude oil supply (zero import) and Crude oil pricing for local refineries.** At this stage, diverse interests of the government and private sector must align towards creating a robust industry supported by institutions and an environment conducive to equitable distribution of economic benefits in the form of profits and high investment returns for the private and jobs, economic opportunities, and support for industrial development for the Nigerian economy.

The eventual outcomes of the various sub-scenario/actions of the government and private sector with respect to the drivers are shown in Figure 5. From the analysis, the government and all stakeholders in the industry must work towards a regime that guarantees sufficient crude oil supply to local refineries in the country and at a premium of >20% of global oil prices.

Trade Off

This condition means that local refineries are prioritised over potential revenue from crude oil export and FX earnings for the government. In addition, low crude oil prices are also incentives to stabilise the refinery operations and guarantee low price of refined petroleum products.

Figure 5: Modulating Roles of Impact Drivers on Outcomes of Scenario B



What May Happen to Local Price of Refined Petroleum Products



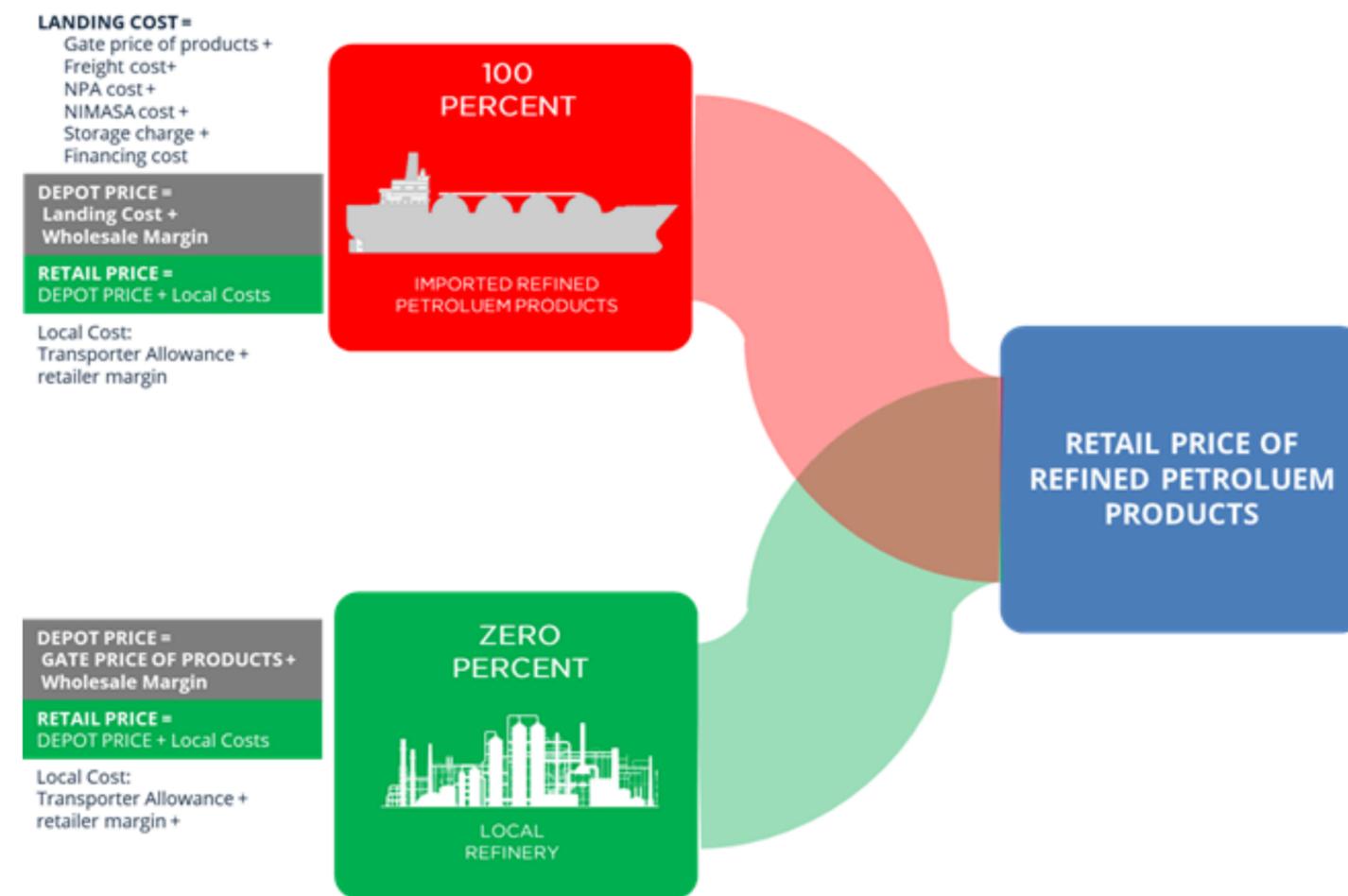
Building upon the preceding section that elucidates the impact of domestic refining on the broader economy, this section narrows the focus to address the fundamental questions regarding the local price of refined petroleum products. For most businesses and households, this discussion stands as the most crucial aspect and one of the central objectives of this report.

Traditionally, Nigeria has been a net importer of refined petroleum products, covering 100 percent of local consumption due to the prevailing circumstances in the oil and gas industry. Consequently, the current pricing structure of all petroleum products is entirely reliant on the cost prices highlighted in Figure 6 below.

The prevalent argument suggesting that establishing local refineries might not necessarily lead to a reduction in domestic prices of petroleum products is based on the functionality of the existing value chain in the oil and gas industry, which yields sub-optimal industrial performance.

Moreover, the impact drivers - namely, adequate crude oil supply and crude oil pricing for local refineries - will be assessed across two scenarios to forecast the probable situation concerning the prices of petroleum products in Nigeria. The Outcome Matrix, incorporating a combination of these feasible states of these drivers, would influence the extent of crude and refined petroleum product imports, as well as the gate prices of locally refined products, which ultimately determine the final retail prices for these products, as demonstrated in the Price structure of refined petroleum products.

Figure 6: Cost Structure of Petroleum Products in Nigeria



Scenario A - Maintaining Status Quo

As indicated in the Table below, the impact of local refineries on domestic prices of refined petroleum products is limited due to the optimal state of the industry's current value chain. Consequently, the local price of petroleum products would not significantly reduce in the immediate short-term, as highlighted in the A-E and the G-H cells of the outcome matrix presented below. Thus, the arguments suggesting that the availability of local refineries in Nigeria would not reduce the prices of fuel and other petroleum products are valid.

Reports on the pricing of refined products from the Dangote Refineries also support this stance, as the company relies heavily on imported crude oil to feed its operations, which explains the likely events in the Outcome Matrix below [4,5;6]. In this case, independent marketers may opt for importing as a more viable and competitive option. Consequently, the costs associated with imports would likely keep the prices of petroleum products high and susceptible to volatility in the international oil market.

Crude oil pricing for local refineries	Adequate crude oil supply		
	Poor	Moderate	Sufficient
Global oil price	A	B	C
Less 20% on Global oil price	D	E	F
>20% on Global oil price	G	H	I
Local Price Impact	Insignificant	Moderate	Significant

[4] https://leadership.ng/low-production-forces-dangote-to-source-crude-for-refinery-takeoff/#google_vignette

[5] <https://gazettengr.com/dangote-looks-towards-u-s-for-crude-oil-as-nigeria-fails-to-meet-supply-amid-oil-theft/>

[6] <https://www.reuters.com/markets/commodities/nigerias-oil-marketers-load-products-dangote-refinery-2024-04-02/>

Scenario B - Embracing the New Era

Aside from condition A, characterised by poor crude oil supply to local refineries and global oil price fluctuations resulting in negligible effects, all other conditions within the Outcome Matrix are expected to yield moderate to significant impacts on domestic prices of petroleum products (refer to Outcome Matrix Table below).

In this situation, the Oil & Gas industry is poised to operate at optimal levels, and the projected improvement in prices of refined petroleum products will primarily stem from favourable local and regional trade dynamics. On the regional front, Nigeria's strategic emphasis is on exporting refined petroleum products derived from crude oil to neighbouring countries, along with the concurrent development of associated sectors that rely on the by-products of refineries as intermediate inputs to compensate for revenue and FX losses for prioritising local refineries over export of crude oil.

Crude oil pricing for local refineries	Adequate crude oil supply		
	Poor	Moderate	Sufficient
Global oil price	A	B	C
Less 20% on Global oil price	D	E	F
>20% on Global oil price	G	H	I
Local Price Impact	Insignificant	Moderate	Significant

Call to Actions

This report serves as a clarion call to a wide array of stakeholders, encompassing government bodies, players within the oil and gas sector, affiliated industries, academic institutions, trade unions, and private sector entities. It underscores the crucial trade-off between perpetuating the status quo and embracing the dawn of a new era heralded by the commencement of domestic refining activities in Nigeria.

We firmly advocate for further high-level engagements, studies and in-depth analysis to delve into other pressing questions concerning local crude oil refining dynamics in Nigeria. This endeavour is pivotal in providing a comprehensive roadmap and policy suggestions that address the concerns and interests of government entities, businesses, and households alike.



About the NESG

The NESG is an independent, non-partisan, non-sectarian organisation committed to fostering open and continuous dialogue on Nigeria's economic development. The NESG strives to forge a mutual understanding between leaders of thought to explore, discover and support initiatives to improve Nigeria's economic policies, institutions and management.

Our views and positions on issues are disseminated through electronic and print media, seminars, public lectures, policy dialogues, workshops, specific high-level interactive public-private sessions and special presentations to the executive and legislative arms of government.

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