

Improving the Situation with NNPC's Refineries, Petrochemical Plants, Pipelines and Depots: Governance

NSChE Fellows Refining and Petrochemicals Technical Committee

Table of Contents

1. Executive Summary	1
2. Current State and Challenges faced by NNPC Refineries, Petrochemical Plants, Pipelines, and Depots	3
3. What work scope is needed to get the facilities operational	5
3.1 Refineries and Petrochemical Plants	5
3.2 Crude Supply and Product Distribution Pipelines and Depots	7
4. Governance Options and Key Recommendations	9
4.1 Specific Recommendations for Refineries and Petrochemical Plants	13
4.2 Specific Recommendations for Pipelines and Depots	14
5. Role of Regulators	15
5.1 Nigerian Midstream and Downstream Petroleum Regulatory Authority	15
5.2 Nigerian Upstream Petroleum Regulatory Commission	16
6. Conclusions and Recommendations	18
7. Appendix: Euro 5 Fuel Quality Specifications	21
Committee Membership and NSChE Leadership	25

March 2026

Improving the Situation with NNPC's Refineries, Petrochemical Plants, Pipelines and Depots: Governance

1. Executive Summary

The Nigerian Society of Chemical Engineers (NSChE) has constituted a team of Fellows to develop practical, implementable strategies for strengthening the downstream and midstream sectors of Nigeria's Oil and Petrochemical industry. This report is the first in a series by the NSChE Refining & Petrochemicals Technical Committee. The report was subsequently deliberated upon and adopted by the Fellows of the NSChE. The report considers alternative governance models and proposes a recommended governance structure to reposition Nigeria's ailing NNPC refineries and their associated petrochemical plants, and its crude supply and product distribution pipeline systems and depots.

The state of the nation's owned 445,000 bpsd refineries and petrochemical plants (i.e. refinery complexes) is very precarious and worrying, especially from the governance structure and on account of huge expenditures over the past 20 years, whilst delivering minimal products. Sadly, it is the same situation with the over 5,000km of Crude Oil & Petroleum Product pipelines and 21 Depots, along with the Refinery complexes, which are strategically located all over the country. Investigations to-date still show they are credible investments with premium potential, given a right Governance and Professional Management structure.

After careful technical and commercial considerations of these assets' virtues and a review of alternative resuscitation options, we recommend, **with no extra capital contribution** by the Federal Government beyond these assets, the following:

1. An immediate change from current 100% Ownership and Management structure by Government (with attendant heavy political interferences) to a proven Public and Private Partnership (PPP) model, with Government represented by NNPC taking minority share equity.
 - a. The basis of the tenders should include provisions under the Petroleum Industry Act (PIA) and the Federal Competition and Consumer Protection Act (FCCPC

- Act) to mitigate against industry over-concentration, collusion, and other anti-competition practices.
- b. The agreements should also include binding legal protections and penalties to ensure the primary performance objectives of the partnership are met, such as the facilities being continually and profitably operated as intended.
2. The bids for the new PPP Company (or Companies) for the Refinery complexes shall be competitively tendered, to secure credible local and international partners. The work scope will upgrade the assets to the current state-of-the-art technology in the industry, produce products that meet current local or better-quality specifications and improve competitiveness, largely within the first three (3) years.
 3. A new PPP Company for the Products evacuation facilities and Depots be formed with compulsory Ownership by Equity contribution of all the Licensed Petroleum Products Marketing Companies in Nigeria including NNPC Retail holding a negotiated minority equity.
 4. Government to enhance local Security to encourage increased production of Crude Oil and Natural Gas to meet both Domestic and Exporting excess obligations.
 5. Government should by all means possible enable high and Independent reliable performance of both the Nigerian Upstream Petroleum Regulatory Commission (NUPRC) and the Nigerian Midstream and Downstream Petroleum Regulatory Authority (NMDPRA) as key regulators in this industry.
 6. NNPC should consider engaging professional skills and services, such as offered by NSChE to provide input in developing the tender documents and assist during the transition to the new companies.

Recommendations to address technical and other challenges, and suggestions on how NSChE can collaborate with and support NNPC and other stakeholders to strengthen the industry will be the subject of subsequent reports.

2. Current State and Challenges faced by NNPC Refineries, Petrochemical Plants, Pipelines and Depots

The NNPC (NNPCL) owns and has operated four major refinery complexes as follows:

- Old Port Harcourt Refinery; capacity 60,000 bpsd, commissioned in 1965
- Warri Refining and Petrochemical Company; capacity 125,000 bpsd, commissioned in 1978.
- Kaduna Refining and Petrochemical Company; capacity 110,000 bpsd, commissioned in 1980.
- New Port Harcourt Refinery; capacity 150,000 bpsd, commissioned in 1989.

NNPC (NNPCL) also owns and through its Pipelines and Products Marketing Company (PPMC) managed the facilities and infrastructure for the supply and distribution of crude oil and refined petroleum products (PMS/DPK/AGO, commonly referred to as petrol, kerosine, and diesel, respectively). These consist of¹

- 5 Terminals.
- 21 Petroleum Depots.
- 750 km of Crude Oil Pipelines.
- 4,400 km of Products Pipeline Networks.

The crude oil lines are linked to the export terminals of the major Oil Producing Companies which provide the main feedstock for the Refinery complexes. Likewise, the refinery complexes were designed to have products evacuated mainly by pipeline. Lifting of products from depots immediately contiguous to the refinery complexes was intended mainly to supply the towns and cities nearby. Depots further from the refinery complexes were intended to supply nearby towns and cities, with tankers intended to transport products for the “last mile” to the fuel stations.

The refinery complexes, pipelines and depots were all successfully commissioned by NNPC and ran at similar refinery capacity utilization (i.e. $\geq 90\%$) as existed elsewhere in the world. Then NNPC was run by professionals who were allowed to operate under good governance by a professional Board appointed by Government. The corporation was

¹ These numbers should be updated/corrected by NNPC.

allowed autonomy to run its affairs, maintain assets and run the government investments to a large degree without political interference, except to obtain approvals as needed from time to time from the Minister of Petroleum.

The decline in the performance of the refinery complexes, pipelines and depots started in the late 1980s/ early 1990s as NNPC lost its autonomy and became increasingly subjected to interference and directives by government and politicians.

Currently all four (4) refinery complexes and most of the associated pipelines and depots are not in operation, and the assets have experienced degradation and various levels of obsolescence. The refinery complexes had degraded units, obsolete FCCUs and hydrotreaters, significant corrosion and equipment failures, suffered from decades of poor maintenance, and lacked adequate instrumentation and automation systems. The refinery complexes will not produce products to meet regional and international product specifications, which have evolved since.

Several factors have been cited as reasons for the decline in performance. Some of the major ones are summarized here:

- **Poor governance:** The refinery complexes are 100% owned by the Government and have no independent control of or access to their funds. All requests for funds to carry out maintenance are subject to multilayer bureaucratic processes.
- **Turnaround Maintenance (TAM) :** No turnaround maintenance was carried out in any of these refineries between 2008 and 2018. This should be viewed against the established worldwide best practice (at the time) that TAM should be conducted by refineries every two or maximum 3 years. Recent turnaround maintenance activities carried out after 2021 (plans for which were announced in 2018), have not been effective.
- **Pipeline Vandalism:** Pipelines supplying crude oil to the refinery complexes, and those evacuating products from them were routinely vandalized, primarily from the agitation from militancy in the Niger Delta region, and outright theft of crude oil and petroleum products. The refineries cannot be run reliably with interruptions of crude supply, and products pipelines. Other consequences of the vandalism were environmental degradation and attendant loss of revenue,

- **Price Subsidy and Regulation:** Prior to recent price subsidy removal in May 2023, and the price deregulation from June 2023 via the PIA, the price of Premium Motor Spirit (PMS) was regulated by Government. This made the economics of refining unprofitable with many other negative effects.
- **Other Technical Challenges:** Asset degradation, inadequate routine maintenance, lack of compliance with regulations, obsolescence, process performance, staffing problems, among other challenges.

3. What work scope is needed to get the facilities operational

3.1 Refineries and Petrochemical Plants

As highlighted earlier, the NNPC refinery complexes have experienced degradation and different levels of obsolescence. Recently (2018 to 2024), Turnaround maintenance activities were carried out at the Port Harcourt, Kaduna, and Warri Refinery complexes. These Turnaround maintenance activities were not effective. While Turnaround maintenance is a necessary step towards returning the refineries to operation, the maintenance activities alone are not sufficient to allow the refineries to remain competitive.

All the refinery complexes must be upgraded by modernizing their facilities to allow them to meet stricter product quality and environmental standards, improve efficiency, increase capacity, and optionally, to enhance feedstock and product flexibility.

At a minimum, the Refinery complexes should be upgraded for the following reasons:

- **Economic & Strategic Goals:** Reducing import reliance, creating/preserving jobs, ensuring energy independence, and boosting local economies and for strategic and cultural reasons.

- **Product Quality & Environmental Compliance:** Upgrading to produce cleaner fuels and reduce emissions to meet local, regional, and international standards, i.e. Afri-6 Spec and/or the Euro 5 fuel quality specifications.²
- **Capacity Expansion:** Expanding the capacity of the refinery complex by debottlenecking existing units and/or building/co-locating new ones to process more crude oil, transforming the refineries into more competitive medium-large economical scale refineries to meet projected local demand.
- **Technology Integration:** Introducing new column tray and/or packing internals, and specialized catalysts, and advanced instrumentation, control systems, for better efficiency and reliability.
- **Logistics Capabilities:** Add New Deep-Sea Export / Import Capability for Products / Crude Oil respectively. This option should be explored for the Port Harcourt Refinery, given its vantage location to serve export markets.

Specifically, consideration should be given to expanding the capacity of the existing refinery complexes to the following:

	Current Capacity	Proposed Capacity Post Upgrade	Other
Kaduna Refinery and Petrochemicals	110,000 bpsd	250,000 bpsd	
Warri Refinery and Petrochemicals	125,000 bpsd	150,000 bpsd	
Combined Port Harcourt Refineries	210,000 bpsd	400,000 bpsd	Add New Deep Sea Export / Import Capability for Products / Crude Oil respectively.
Total	445,000	800,000	80% Cap. Incr.

² Note: The Afri-6 fuel quality specification is equivalent to Euro 5 fuel quality. The Afri-6 spec will become active in 2030. Euro 5 fuel quality specifications are detailed in the Appendix. Other industry standards such as AFQRJOS for Jet Fuel may also apply.

These capacity increases should allow Kaduna and Warri Refinery complexes to meet local and regional demand and position Port Harcourt Refinery to meet local and regional demand, as well as export refined products.

Optionally, the scope of the upgrades could also include the following:

- **Product Quality & Environmental Compliance:** Additional upgrades to produce cleaner fuels to meet more stringent global standards (e.g. Euro 6) to reduce CO₂ and NOx emissions. This option should be explored for the Port Harcourt Refinery, to restore her designed export capability to serve global markets.
- **Feedstock Flexibility:** Adding technology to process heavier, dirtier crudes (and partially refined feedstock such as naphtha or bitumen) into lighter, more valuable products, increasing feedstock options.
- **Product Flexibility:** Adding technology to adapt the refinery's output to changing market demands (e.g. more DPK vs. less PMS) or more fuels vs. petrochemicals Feedstock.

The exact scope of the upgrades and the refinery complex capacities should be determined via more detailed feasibility studies.

3.2 Crude Supply and Product Distribution Pipelines and Depots

As alluded to earlier, the NNPC crude supply and product distribution facilities have suffered significant degradation due to pipeline vandalism, aging and inadequately maintained infrastructure. Some of the pipeline segments have not been operated for significant periods without the attendant pipeline protection practices. Additionally, some of the depots require complete upgrading. Though there have been recent improvements via intensive efforts by the government, security forces, NNPC and through stakeholder engagement, there continues to be opportunities for improvement. These efforts need to be sustained.

There is need to evaluate the current state of the pipelines and depots, and launch a significant program for depot upgrades, pipeline replacement, upgrade, relocation from Right-of-Way (where necessary), installation of advanced pipeline monitoring and security surveillance systems. The pipelines should be treated as National Critical Infrastructure Assets. Vandalism of the pipelines should be treated as domestic terrorism, and culprits should be punished to the full extent of the law. Government and security forces need to continue to take the lead in joint Government-Industry efforts to secure the pipelines.

4 Governance Options and Key Recommendations

A major common factor cited for the decline in performance of the NNPC (NNPCL) refinery complexes was poor governance, as NNPC lost its autonomy starting from the late 1980s/early 1990s, courtesy of the governments at the time. Significant funds will be required to reinstate and upgrade the refineries, petrochemical plants, pipelines and depots to an operational state that allows them to remain competitive. The assets still hold significant value, and it remains a cheaper option to upgrade them rather than abandoning them and developing equivalent green field facilities.

Because governance is one of the key factors impacting performance, governance is addressed in this report. Other factors will be addressed in subsequent reports.

Three (3) categories of governance models may be considered for future operation of the assets:

1. **Maintain the Status Quo** with continued NNPCL (Majority) Ownership and Operation of the assets.
2. An **Operations and Maintenance (O&M) Concessioneing** model with NNPCL retaining ownership but hires a private operator to run the refinery complex under strict KPIs. Payment is performance-based.
3. Privatization: i.e. a **Public-Private Partnership (PPP)** where NNPCL retains minority shares and cedes operational control to private operators & investors.

This section evaluates the three options and recommends the Public-Private Partnership (**PPP**) model as the preferred approach.

Maintaining the Status Quo governance model with continued NNPCL (Majority) Ownership and Operation of the assets has not worked, mainly because of political interference from the Owner Government, and its several arms and agencies. After over 20 years of declining performance, NNPC declared all four (4) Refinery/Petrochemical plant complexes shutdown in 2020. The related pipelines have also been effectively shutdown. Since then a significant amount of funds was spent on and engaging renowned contractors on Turnaround Maintenance efforts (without upgrading) at the Port Harcourt, Warri and Kaduna Refinery complexes.

After several years of shifting deadlines, these efforts have resulted in minimal operational success, at best. A good example is when NNPC declared it achieved "mechanical completion" of phase one (60,000 bpd capacity) of the turnaround of the Port Harcourt Refinery in late 2024 after significant expenditure of US \$1.5B, and began "some" products loading. However, the refinery was shut down again for "planned maintenance" in May 2025. There were expectations to restore Warri and parts of Kaduna refineries to operation shortly following Port Harcourt startup, but these expectations have not been realized. There has been a resultant erosion of public confidence in the ability of a government owned entity to operate the refineries, and NNPC is reportedly considering other models.

Privatization of the NNPC refinery complexes has been considered in the past, with the most significant effort initiated in the mid 2000's and ultimately reversed primarily due to:

- a fear that selling refinery complexes would look like selling Nigeria's oil security,
- labour union resistance with the fear of job losses and benefits, and
- the political cost of fuel price deregulation, with the move towards market-based pricing, and removal of fuel subsidies.

Fuel subsidies were subsequently removed in 2023, and pricing of products is now market-based. While concerns related to oil security, and labour union resistance remain, the government-run refinery complexes have long been inefficient "deadweight" assets, consuming significant funds without delivering product – It is time to operate them under a different governance model.

Both **Operations & Maintenance (O&M) concessioning** and **Privatization (Public-Private Partnership)** models have been successfully implemented in many sectors worldwide - including refineries, petrochemicals, and LNG plants. Results include:

- Reduced political interference.
- Stronger profitability
- More efficient cost structures
- Higher mechanical availability and reduced downtime.
- Lower energy intensity

- Improved safety and environmental performance

India has some of the strongest examples of Government owned refineries run with Private O&M Contracts. Refineries in India using private O&M models include:

- Bharat Petroleum (BPCL) Kochi Refinery
- Hindustan Petroleum (HPCL) Visakhapatnam Refinery
- Portions of Indian Oil Corporation (IOCL) refineries

Other examples of where O&M concessions have been successfully utilized are in the Middle-East and Latin America.

Public-Private partnership models have also been successfully utilized in refineries and petrochemical plants in the Middle East, and in Nigeria.

Examples in the Middle East include:

- SATORP (Saudi Aramco TotalEnergies Refining and Petrochemical Company), major joint venture between Saudi Aramco (62.5%) and TotalEnergies (37.5%), formed in 2008 to build and operate a world-class integrated refining and petrochemical complex in Jubail, Saudi Arabia.
- The Yanbu Aramco Sinopec Refining Company (YASREF) Ltd., a joint venture between Saudi Aramco and China Petrochemical Corporation (Sinopec). It is a world-class 400,000 bpd, full-conversion refinery in Yanbu, Saudi Arabia.

In Nigeria, the two most notable and successful examples of Public-Private Partnerships in the Oil and Petrochemicals Sector are the Nigeria LNG Limited (NLNG) and Indorama Eleme Petrochemicals (IEPL).

Nigeria LNG Limited (NLNG) is an incorporated joint venture (IJV) where NNPC Limited holds the largest (but minority) stake (49%), alongside Shell (25.6%), TotalEnergies (15%), and Eni (10.4%), operating under a unique structure that gives it significant autonomy, and with Shell as the Operating Partner. While NNPC manages its equity, NLNG functions almost like a separate entity, generating its own revenue, managing its projects, and paying dividends, making it a model for efficiency compared to some other NNPC entities.

Indorama Eleme Petrochemical Limited (IEPL) is a Poly-Olefins producer of a range of Polyethylene and Polypropylene products. IEPL was a 100% subsidiary of NNPC and was privatized 20 years ago (August 2006) with Indorama Corporation emerging as the core investor, turning the former state-owned Petrochemicals plant profitable in 2-short years. Ownership is primarily held by **Indorama Corporation (65%)**, with significant stakes also held by the Nigerian government entities (NNPC 10%, Federal Govt. 5%), Rivers State Government (10%), Host Communities (7.5%), and Employees (2.5%). IEPL has recorded several achievements of smooth & stable operations, enhanced production capacities, winning of several global awards & certifications and has become a successful model of the Nigeria's Privatization Program.

It is noted that the vast majority (> 95%) of refineries in North America and Western Europe are privately owned and run, and these have the best technical performance indices.

We recommend that a public-private partnership model be pursued for the NNPC refineries, petrochemical plants, pipelines and depots; with NNPC divesting itself of control, and becoming a minority partner in the Joint venture. The overriding factors driving the recommendation are as follows:

- The PPP model minimizes the risk of government/political interference – PPP partners makes technical decisions without government bottlenecks.
- The PPP model also minimizes (or eliminates) government expenditures for the large amount of investments that will be required for upgrades.
- The PPP model is more likely to be sustainable in the long term: there is a profit-driven incentive for the owners to optimize operations continuously.
- The O&M concessioning model requires that the existing refinery complexes be first made fully functional prior to engagement of the contractor. This is not the case at the moment.

Change management issues such as managing potential workforce reductions should be addressed in the transition to the PPP framework.

4.1 Specific Recommendations for Refineries and Petrochemical Plants

In conjunction with carrying out the upgrades described in Section 3.1, the NNPC Refinery complexes should be privatized as follows with operational control being managed by the new ownership. NNPC should hold strategic minority share/equity to avoid historical political interference while protecting domestic supply obligations, and no other partner should hold more than 49% equity.

- 1. Kaduna Refinery and Petrochemicals - BY MAJORITY PRIVATIZATION, AND NO ADDITIONAL CAPITAL CONTRIBUTION BY THE FGN**
- 2. Warri Refinery and Petrochemicals - BY MAJORITY PRIVATIZATION, AND NO ADDITIONAL CAPITAL CONTRIBUTION BY THE FGN**
- 3. Port Harcourt Refinery Complex – WITHOUT FEDERATION ACCOUNT LIABILITY, OTHERWISE BY PRIVATIZATION OF MINIMUM EQUITY POSSIBLE**

The Upgrade works must be completed in 36 months.

- Minimum Quality Standards, Crude Oil and Product Storage capacities must be specified in the Privatization Tender Documents.
- Engineering Design activities for the facilities should largely be performed within Nigeria, taking advantage of remote collaboration capabilities, while leveraging a pool of experienced Nigerian professionals, and providing an opportunity for skills development for less experienced professionals. The minimum proportion of Nigerian Professionals engaged in engineering design shall be specified.
- Maximum local content in construction and equipment manufacturing shall also be specified. NNPC should consider engaging a broad based Professional Consultative/Advisory Team to develop more details of the Tender package and Prequalification criteria, to ensure fair level playing field and attraction of the serious-minded investors.
 - The basis of the tenders should include provisions under the Petroleum Industry Act (PIA) and the Federal Competition and Consumer Protection Act (FCCPC Act) to mitigate against industry over-concentration, collusion, and other anti-competition practices.
 - The Agreements should also include binding legal protections and penalties to ensure the primary performance objectives of the partnership are met, such as the facilities being continually and profitably operated as intended.

- In the event that NNPC do not find competent partners that are willing to bid for the assets, NNPC may directly negotiate partnerships with interested qualified partners.

For this and more related services, NSChE offers their professional support for NNPC. NSChE can also assist NNPC in identifying experienced professionals who can support NNPC during project development, execution and commissioning stages of the upgrade projects.

4.2 Specific Recommendations for Pipelines and Depots

Pipelines and depots offer lower incentives for returns than refineries and may be viewed as less attractive by investors. Thus, the following is recommended for the product evacuation facilities:

- 1.** Create a Nigerian National Products Pipelines and Depot Company Limited.
- 2.** Ownership shall be by compulsory Equity Contribution by all Licensed Petroleum Products Marketing Companies, including NNPC Retail holding Negotiated Minority Equity. Equity positions by the Licensed Petroleum Product Marketing Companies may be based on their market share/financial capacities.
- 3.** Ownership of existing Pipelines and Depots shall be transferred to the New Company at Negotiated Minimal Symbolic Price.
- 4.** In return, the New Company shall upgrade the Network to agreed standards of operating sustainability, security, and safety conditions.

This should be predicated on Government and security forces continuing to take a lead role in joint Government Industry efforts to secure the pipelines.

5 Role of Regulators

The critical key success factor in this Mid/Downstream sector of the Oil & Gas Industry in Nigeria, as in any other place, is the seamless interface management of the integrated operations of the Crude oil and Natural gas supply facilities and the processing plants:

- Upstream (for the flawless supply of Crude oil and Natural gas); to the
- Mid/Downstream (smooth Processing plants like Refineries & Petrochemicals, prompt Products Storage, evacuation & distribution)

This holistic strategic approach is critical for ensuring profitable, sustainable and competitive operations, in Nigeria's fully deregulated refining business of today (since June 1, 2023).

For effective results, Government should by all means possible enable high and Independent reliable performance of the key regulators in the industry. The two most important regulators are the Nigerian Upstream Petroleum Regulatory Commission (NUPRC) and the Nigerian Midstream and Downstream Petroleum Regulatory Authority (NMDPRA). The expectations of them, are:

5.1 Nigerian Midstream and Downstream Petroleum Regulatory Authority (NMDPRA).

This Authority is central to the successful cum-profitable investments in and operations of the Downstream Sector of the Nigerian Petroleum Industry mostly processing plants.

The Authority's responsibilities include:

- Ensuring Sustainable Competitive Pricing (**without subsidy**); by overseeing pricing mechanisms in transparency and fairness while protecting consumers, investment facilitation, and tariff oversight.
- Guaranteeing High-Quality and Environmentally compliant fuel products, via dispassionate Product quality Certification to National and International Standards, in owned and accredited third-party Laboratories.

- Facilitating uninterrupted Domestic market supply nation-wide via active supply chain monitoring and balanced Licensing of new venture Infrastructure (Brownfields & Greenfields) and products import make-up.
- Stakeholders Engagement to facilitate Consensus-based Certified Products Consumption/Demand Measurement, across Sectors and States/Regions, via a digital Standardized methodology. NMDPRA needs to roll out an Automated Downstream System (ADS) of monitoring this critical data for records and planning.
- Approval by Issuing of Licenses for new plants should be for **only** projects with Bankable terms like assured Crude Supply plan given tight Govt equity, Environmental Impact Assessments, Funding capability, and certified products quality aligned with National Specifications.
- Finally, superintending Regulatory Coordination and Reforms under an Inter-Agency collaboration with likes of the Standards Organization of Nigeria (SON), the National Environmental Standards and Regulations Enforcement Agency (NESREA) et al; and issuing updates under the PIA to support Privatization, Infrastructure development and Environmental compliance.

5.2 Nigerian Upstream Petroleum Regulatory Commission (NUPRC)

This Commission is crucial to the success of the prime of the three (3) arms – **Upstream** - by ensuring timely and adequate Crude Oil supply to the Domestic refineries.

Such responsibilities include:

- The crude supply aspect, as approved by Fed Govt. to be payable in Naira instead of Dollars, and at agreed terms so to attract both local and foreign investments, in both the on-shore and off-shore. Aided by expected improvement in National Security services, the Authority need to expedite the achievement of reduction in Crude Oil Production Costs, which represents up to 80% of Refining input costs. This is so vital for a profitable Refining business in general.
- Exploit the grace of OPEC Crude Oil Production Quota for Export (being our major revenue source of foreign exchange) as not affected by whatever capacity we choose to refine locally, to take advantage of our Domestic and regional markets of

petroleum products. The much overdue 2010 target production of 3-4 million barrels per day of Crude Oil is therefore expedient for urgent action now, to meet increasing domestic market demand/refining obligations.

- The Gasoline or Petrol supply / consumption data from the NMDPRA Fact Sheet December 2025 indicates 53m litres/day consumption in November, and 64 m litres/day in December 2025. The total petrol supply in the same December 2025 was reported as 74.2 m litres/day out of which imports took 42.2m litres/day, while Dangote Refinery supplied 32m litres/day.

6 Conclusions and Recommendations

The Nigerian Society of Chemical Engineers (NSChE) is an embodiment of a large number of seasoned professionals with experience in a broad-based discipline of Chemical Engineering, with deep experience in the Refining and Petrochemical industry in Nigeria. A good number of our Fellows and Members are top Management retirees from International Oil Companies (IOCs) and NNPC (NNPC), hence with privileged detailed knowledge of Nigeria's Downstream Business – from Conceptualization, through Basic & Detail Design, Construction, Commissioning and Operations of the Refineries, Petrochemicals, LNG and even the associated Pipelines and storage facilities.

Out of genuine concerns and burdens from watching very fully functional facilities built between 1965 and 2000 now in a terrible state of declining performance since 2005, NSChE chose to constitute a team of Fellows to develop practical, implementable strategies for strengthening the downstream and midstream sectors of Nigeria's Oil and Petrochemical industry. This report is the first in a series by the NSChE Refining & Petrochemicals Technical Committee. The report was subsequently deliberated upon and adopted by the Fellows of the NSChE. It considers alternative governance models and proposes a recommended governance structure to reposition Nigeria's ailing Local refineries, and its crude supply and product distribution pipeline systems.

The state of the nation's owned 445,000 bpsd refineries and petrochemical plants is very precarious and worrying, especially from the governance structure and on account of huge expenditures over the past 20 years, whilst delivering minimal products. Sadly, it is the same situation with the over 5,000km of Crude Oil & Petroleum Product pipelines and 21 Depots, along with the Refineries, which are strategically located all over the country. Investigations to-date still show they are credible investments with premium potential, given a right Governance and Professional Management structure, in the likes of NLNG in Bonny Island and EPCL in Eleme, Port Harcourt.

After careful technical and commercial considerations of these assets' virtues and a review of alternative resuscitation options, we recommend, **with no extra capital contribution** by the Federal Government beyond these assets, the following:

1. An immediate change from current 100% Ownership and Management structure by Government (with attendant heavy political interferences) to a proven Public and Private Partnership PPP) model with Government represented by NNPC taking minority share equity.
 - a. The basis of the tenders should include provisions under the Petroleum Industry Act (PIA) and the Federal Competition and Consumer Protection Act (FCCPC Act) to mitigate against industry over-concentration, collusion, and other anti-competition practices.
 - b. The agreements should also provide binding legal protections and penalties to ensure the primary performance objectives of the partnership are met, such as the facilities being continually and profitably operated as intended.
2. The bids for the new PPP Company (or Companies) for the Refinery complexes shall be competitively tendered, to secure credible local and international partners. The work scope will upgrade the assets to the current state-of-the-art technology in the industry, produce products that meet current local or better-quality specifications and improve competitiveness, largely within the first three (3) years.
3. A new PPP Company for the Products evacuation facilities and Depots be formed with compulsory Ownership by Equity contribution of all the Licensed Petroleum Products Marketing Companies in Nigeria including NNPC Retail holding a negotiated minority equity.
4. Government to enhance local Security to encourage increased production of Crude Oil and Natural Gas to meet both Domestic and Exporting excess obligations.
5. Government should by all means possible enable high and Independent reliable performance of both the Nigerian Upstream Petroleum Regulatory Commission (NUPRC) and the Nigerian Midstream and Downstream Petroleum Regulatory Authority (NMDPRA) as key regulators in this industry.
6. NNPC should consider engaging the professional skills and services, such as offered by NSChE to provide input in developing the tender documents and assist during the transition to the new companies.

The NSChE Fellows remain available for a formal presentation and any clarification request thereof. This is very crucial to actualize the long-term National vision and plan, especially under this new Administration favorable terms of Products market full deregulation and embrace of professionalism in managing these precious assets.

The major benefits for the nation include saving foreign exchange in importation of petroleum products when we have and can still manage the production locally; as well as reversing our exported labour market in this industry.

We anxiously await a positive and active engagement with NNPC Management.

7 Appendix: Euro 5 Fuel Quality Specifications

The Tables in this Appendix summarize the critical parameters for the Euro 5 Fuel Quality Specifications for different product grades.

EURO 5 PETROL (GASOLINE) SPECIFICATION

Standard Reference: EN 228

Property	Unit	EURO 5 Limit
Research Octane Number (RON)	–	≥ 95
Motor Octane Number (MON)	–	≥ 85
Sulphur Content	mg/kg	≤ 10 ppm
Benzene Content	% vol	≤ 1.0
Aromatics	% vol	≤ 35
Olefins	% vol	≤ 18
Oxygen Content	% wt	≤ 2.7
Lead	mg/L	≤ 5
Density @15°C	kg/m ³	720 – 775
Final Boiling Point	°C	≤ 210
Gum Content	mg/100 ml	≤ 5
Appearance	—	Clear & Bright

EURO 5 DIESEL SPECIFICATION

Standard Reference: EN 590 (ULSD – 10 ppm)

Property	Unit	EURO 5 Limit
Cetane Number	–	≥ 51
Cetane Index	–	≥ 46
Sulphur Content	mg/kg	≤ 10 ppm
Density @15°C	kg/m ³	820 – 845
Viscosity @40°C	mm ² /s	2.0 – 4.5
Flash Point	°C	≥ 55
Polycyclic Aromatics	% m/m	$\leq 8-11$
Water Content	mg/kg	≤ 200
Total Contamination	mg/kg	≤ 24
Carbon Residue	% m/m	≤ 0.30
Ash Content	% m/m	≤ 0.01
FAME Biodiesel Blend	% vol	≤ 7

Aviation Kerosene (Jet A-1 Fuel Quality Requirements)

Property	Jet A-1 Specification	Importance
Appearance	Clear & bright	No contamination
Density @15°C	0.775 – 0.840 kg/L	Energy content control
Flash Point	≥ 38°C	Safe handling
Freezing Point	≤ -47°C	High-altitude operation
Net Heat of Combustion	≥ 42.8 MJ/kg	Engine power
Aromatics	≤ 25 vol%	Seal compatibility
Sulfur	≤ 0.30 wt% (typically <0.05%)	Emission & corrosion
Smoke Point	≥ 25 mm	Low soot formation
Viscosity @ -20°C	≤ 8.0 mm ² /s	Pumpability
Final Boiling Point	≤ 300°C	Combustion quality
Thermal Stability	Pass (JFTOT test)	No deposits
Existent Gum	≤ 7 mg/100 ml	Storage stability

Typical VLSFO Specification- IMO 2020 Fuel Oil Quality Compliant

(ISO 8217:2017 — RMG/RMK Grades)

Property	Unit	Typical Limit
Sulphur	% m/m	≤ 0.50
Density @15°C	kg/m ³	≤ 991
Viscosity @50°C	cSt	≤ 380
Flash Point	°C	≥ 60
Water	% vol	≤ 0.5
Ash	% m/m	≤ 0.10
Carbon Residue	% m/m	≤ 18
Aluminium + Silicon	mg/kg	≤ 60
Pour Point	°C	Report
Net Specific Energy	MJ/kg	~40

COMMITTEE MEMBERSHIP

NSChE Fellows Refining and Petrochemical Technical Committee

1. Dr. Layi Oyeleye (Chairman)
2. Engr. Samuel Babatunde (Secretary)
3. Engr. Tunde Akinpelu (Member)
4. Prof. Mohammed Dabo (Member)
5. Engr. Ayokunle Solanke (Member)
6. Engr. Babajide Soyode (Member)
7. Engr. (Mrs.) Ibidun Toweh (Member)
8. Engr. Mark Williams (Member)



Engr. Dr. Layi Oyeleye, FNSChE

Chairman



Engr. Samuel Babatunde, FNSChE

Secretary

NSChE LEADERSHIP



Engr. Bayo Olarewaju-Alo, (FAEng.)

NSChE (National President)