INSIDE NIGERIA'S LOCAL REFINERIES

POLICY BRIEF

budgIT

About BudgIT

Founded in 2011, BudgIT is a civic organization that applies technology to intersect citizen engagement with institutional improvement, to facilitate societal change. A pioneer in the field of social advocacy melded with technology, BudgIT uses an array of tech tools to simplify the budget and matters of public spending for citizens, with the primary aim of raising standard of transparency and accountability in government.

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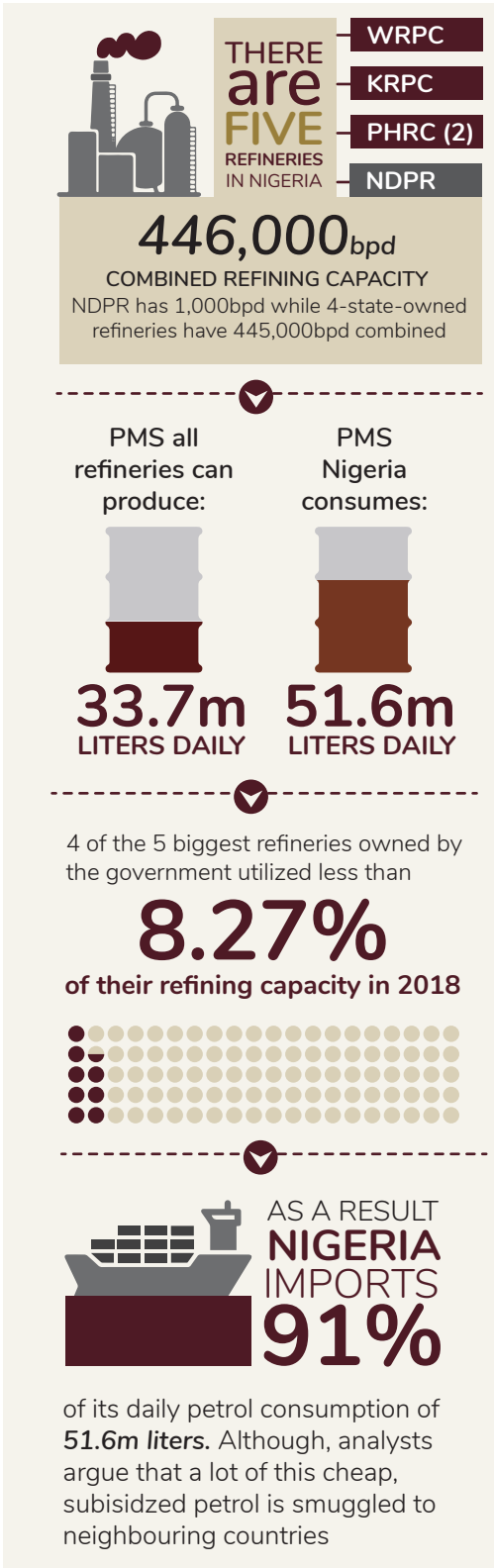


INTRODUCTION

In spite of having refineries with a combined capacity[1] to refine 446,000 bpd of crude oil to meet most of the country's local refining needs, Nigeria still imports at least 91% of the petrol[2] it consumes and a sizeable volume of other petroleum products to meet its local demands. Nigeria's refining of crude oil has been suboptimal with four of the country's five refineries operating at an average, consolidated capacity utilization[3] of 8.27% in the financial year 2018.

If all state-owned refineries in Warri, Port Harcourt and Kaduna operate at full capacity, they will only process about 33.7m liters[4] daily of petrol whereas the country consumes 51.6m liters[5] daily leaving a shortfall that still needs to be addressed by the private sector or via importation. With the country's population expected to grow from 196million[6] to 410 million[7] people by 2050, Nigeria's government should expect a significant surge in local demand for petroleum products including Jet fuels, PMS, DPK and AGO amongst others. In this light, it is imperative for stakeholders to think critically about what frameworks will be necessary to ensure the country's local refineries can meet current and future demands.

The forecast for local petroleum products refining by state-owned refineries in Nigeria is tainted with uncertainty due to poor maintenance culture, corruption, unpredictable supply of feedstock , theft of petroleum products during evacuation - all of these happening in a regulated downstream sector, that lacks discipline of a market driven economy. It is no surprise, therefore, that Nigeria's government has struggled to keep the poorly-maintained state-owned oil refineries operating profitably with very little luck; in 2018 financial year these refineries in Kaduna, Port Harcourt and Warri

1. BudgIT Extractives Department
2. PPPRA 2017 Annual Performance Report
3. Table 3.1.2: "Refineries Operations Consolidated", NNPC Monthly Financial & Operations Report, December 2018
4. BudgIT Research
5. PPPRA 2017 Annual Performance Report
6. https://www.populationpyramid.net/nigeria/2018/
7. https://esa.un.org/unpd/wpp/Publications/Files/WPP2017_KeyFindings.pdf

incurred a cumulative loss of N32.8bn in 2017 and N126.8bn in 2018 making a total loss of N159bn[8] in the past two years alone. Nigeria's present administration had introduced "The Seven (7) Big Wins" program in 2015; one of the Key Performance Indicator for this initiative was to increase the performance of the country's refineries especially their capacity utilization. While the refineries have improved from a consolidated capacity utilization of 4.9% in 2015 to 8.27% in 2018 this is still a far cry from the 85% - 95% desired for the country.

In the past decade, the Nigerian government has made other effort to boost the country's local refining capacity through the private sector. Since 2007 Department for Petroleum Resources, DPR awarded at least 44 licenses to private sector operators to establish local refineries, as at 2018, 29 of those licenses are still listed valid with a combined capacity of **1,540,000bpd**[9] if all 29 become operational. Twenty three (23) of these active licenses are for modular refineries, six (6) are for conventional refinery project types.

Refining in Nigeria

Refining in Nigeria started ten years after oil was discovered in the oil-rich Niger Delta region in the 1950s. A petroleum refinery is an industrial process plant where crude oil is transformed into more useful products such as petroleum naphtha, gasoline, diesel fuel, asphalt base, heating oil, kerosene, liquefied petroleum gas, jet fuel and fuel oils. The Nigerian petroleum industry has five (5) refineries; three in Port Harcourt and one each in Kaduna and Warri. The refineries have a combined capacity of 446,000 bpd. Four of the 5 refineries are state-owned and one is privately owned[10].

8. NNPC Monthly Financial & Operations Report, January 2018 – December 2018
9. Department of Petroleum Resources, DPR, "Licensed Refineries in Nigeria" (last updated by DPR as at 2018)
10. Department for Petroleum Resources, DPR, "https://www.dpr.gov.ng/downstream/refinery/"

Profile of Nigeria's refineries[11]:

Port Harcourt Refining Company: PHRC has two refineries; both have a combined crude oil processing capacity 210,000 bpsd (barrels per stream day). PHRC produces:- Liquefied Petroleum Gas (LPG), Premium Motor Spirit (PMS), Kerosene (aviation and domestic), Automotive Gas Oil (AGO - diesel), Low Pour Fuel Oil (LPFO) and High Pour Fuel Oil (HPFO).

Warri Refining and Petrochemical Company: WRPC was commissioned in 1978 and it has a current capacity of 125,000 barrels per day. WRPC adds value to some of the petroleum products produced. It uses propylene rich feed to produce polypropylene pellets and uses fuel oil to produce carbon black .

Kaduna Refining and Petrochemical Company: KRPC was designed to process both imported paraffinic and Nigerian crude oils into fuels and lubes products. In December 1986, the total refinery installed capacity was brought to to 110,000 BPSD.

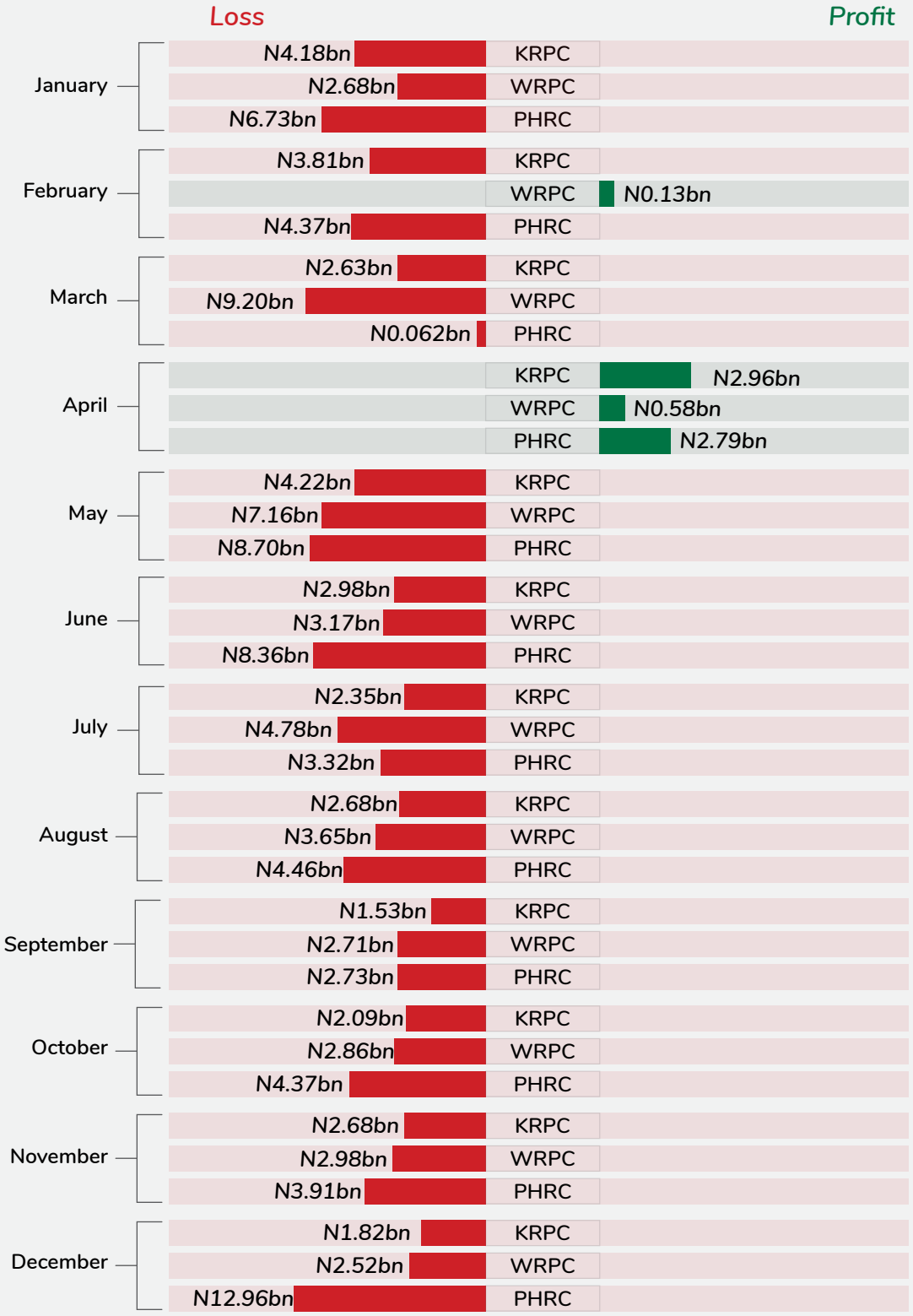
Niger Delta Petroleum Resources[12]: NDPR is a privately owned refinery comissioned with a capacity of 1,000 bpd in 2010.

Niger Delta Petroleum Resources, NDPR refinery located at Ogbele, Rivers State, Nigeria

Commissioned in 2010, NDPR refinery was the first of such private refinery in Nigeria to receive a License to Operate (LTO) by the Federal Government in Nigeria. It produces mainly AGO (diesel)

11 Nigerian National Petroleum Corporation, NNPC
12. Department of Petroleum Resources, DPR

2018 financial scorecard of Nigeria's state-owned refineries



Source: *NNPC Monthly Financial and Operations Report, December 2018*

Scorecard of Nigeria's state-owned refineries

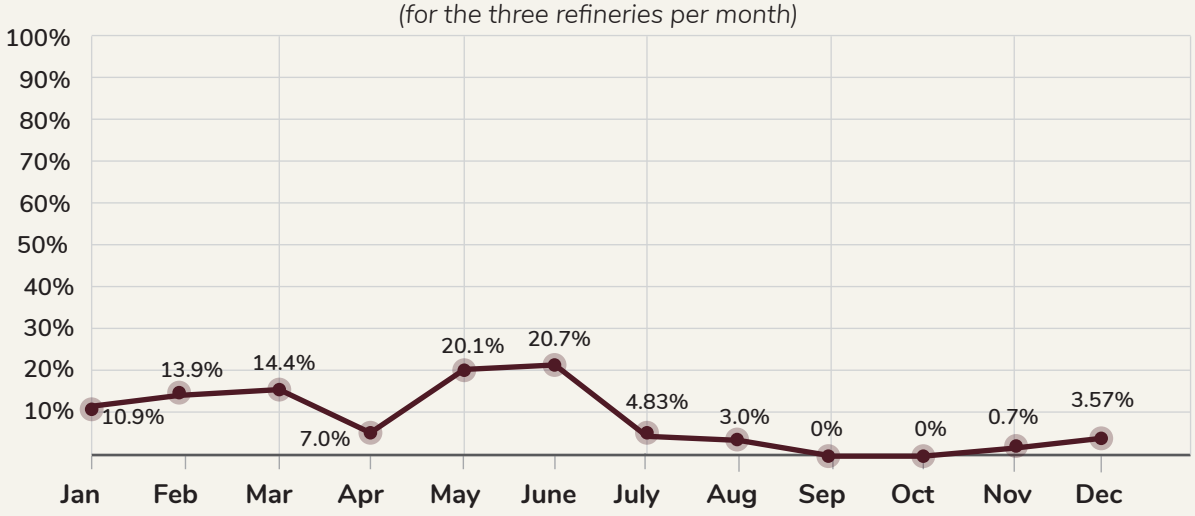
2018 Refineries Financial Performance

N126.2bn
NET LOSS

Source: *NNPC Monthly Financial and Operations Report, December 2018*

2018 Average Consolidated Capacity Utilization

(for the three refineries per month)



Source: *NNPC Monthly Financial and Operations Report, December 2018*

Highest Capacity Utilization

WRPC
51.3%
reached in March 2018

PHRC
27.7%
reached in June 2018

KRPC
4.7%
reached in January 2018

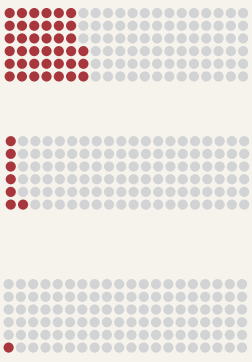
Worse Crude Stock Loss Rate

(as a % of crude processed per month per refinery)

WRPC
Occured in Nov. 2018
33.46%
equivalent to **4,081MT**
of crude oil processed lost

PHRC
Occured in April 2018
5.91%
equivalent to **6,518MT**
of crude oil processed lost

KRPC
Occured in Jan. 2018
0.87%
equivalent to **1,908MT**
of crude oil processed lost



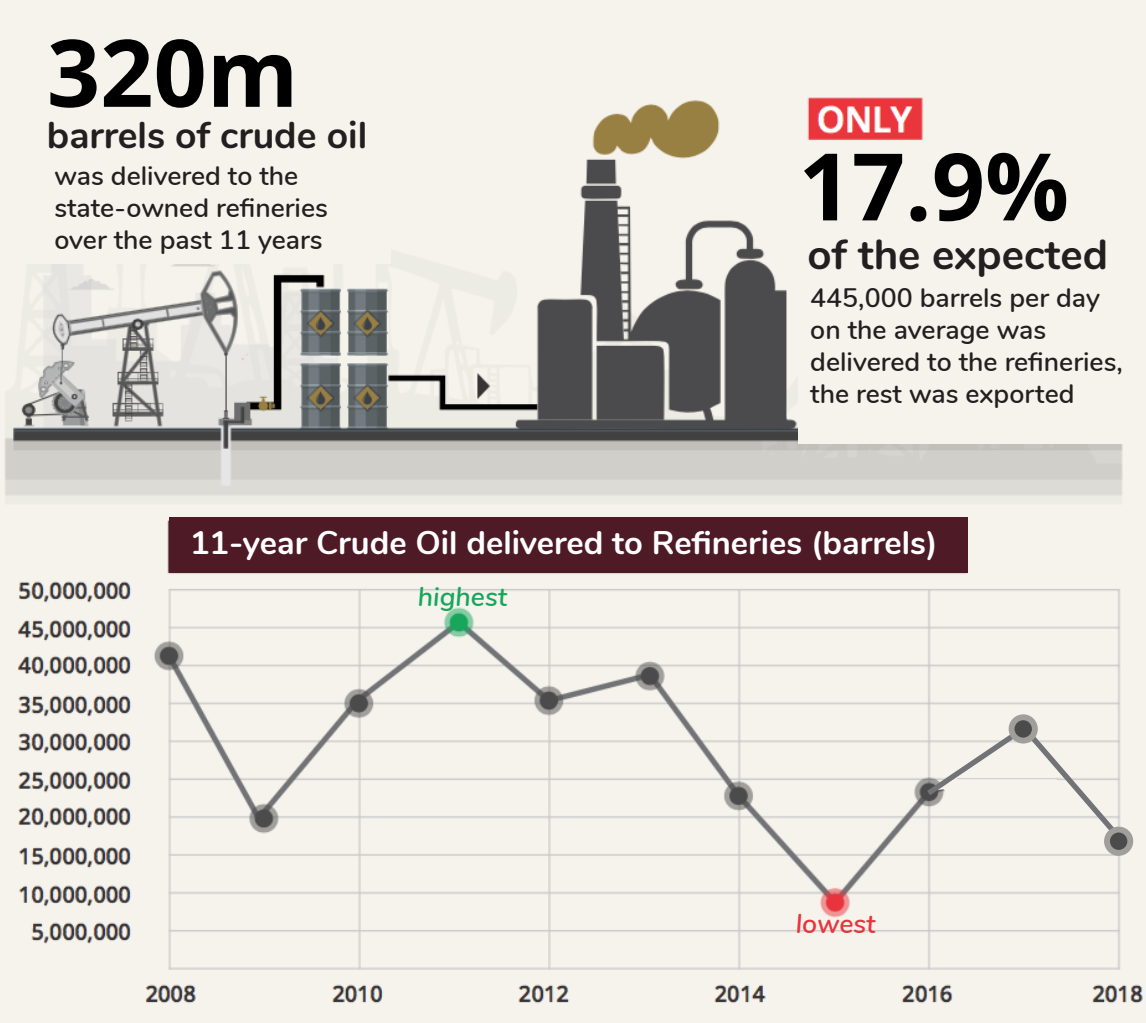
Source: *NNPC Monthly Financial and Operations Report, December 2018*

Nigeria's State-owned Refineries: 4 Prevailing Trends and Challenges

1. Crude Oil Delivery to Local Refineries is declining[13]

445,000 barrels of crude oil is supposed to be delivered to the four (4) refineries daily for refining amounting to 162.4m barrels per year. However, over the 11 - year period between 2008 and 2018 below 30% of this volume was delivered annually. The total crude delivered to the refineries has been declining from 41.3m barrels in 2008 to 16.9m barrels in 2018.

The lowest volume of crude oil delivered to the refineries occured in 2015 with 8.7m barrels delivered accounting for 5.38% of the expected volume. The rest often exported by NNPC.



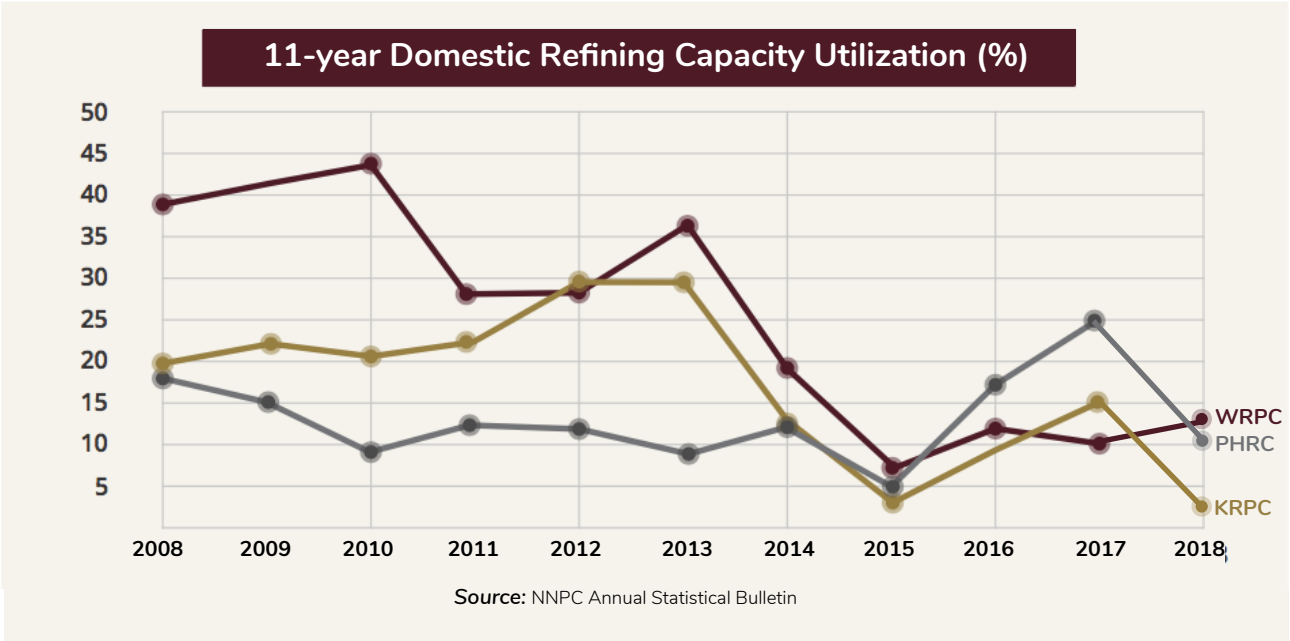
Source: NNPC Annual Statistical Bulletin

13. http://www.nnpcgroup.com/PublicRelations/OilandGasStatistics/AnnualStatisticsBulletin.aspx
14. 2017 NNPC Annual Statistical Bulletin, Table 5 (Page 6)

2. Domestic Refining Capacity Utilization has been falling since 2013

The Nigerian refineries has degenerated over time. In the last 18 years, the refineries became comatose, as successive governments failed to bring them up to their installed capacity due to the abandonments of the required Turn Around Maintenance, TAM, as at when due.

The highest average capacity utilization of the three refineries in the 11-year period under review was recorded in 2009 (26%). The capacity utilization declined to 4.90% in 2015, this only shows that despite the huge amount been spent on Turn Around Maintenance, it is not reflected in the performance of the refineries.



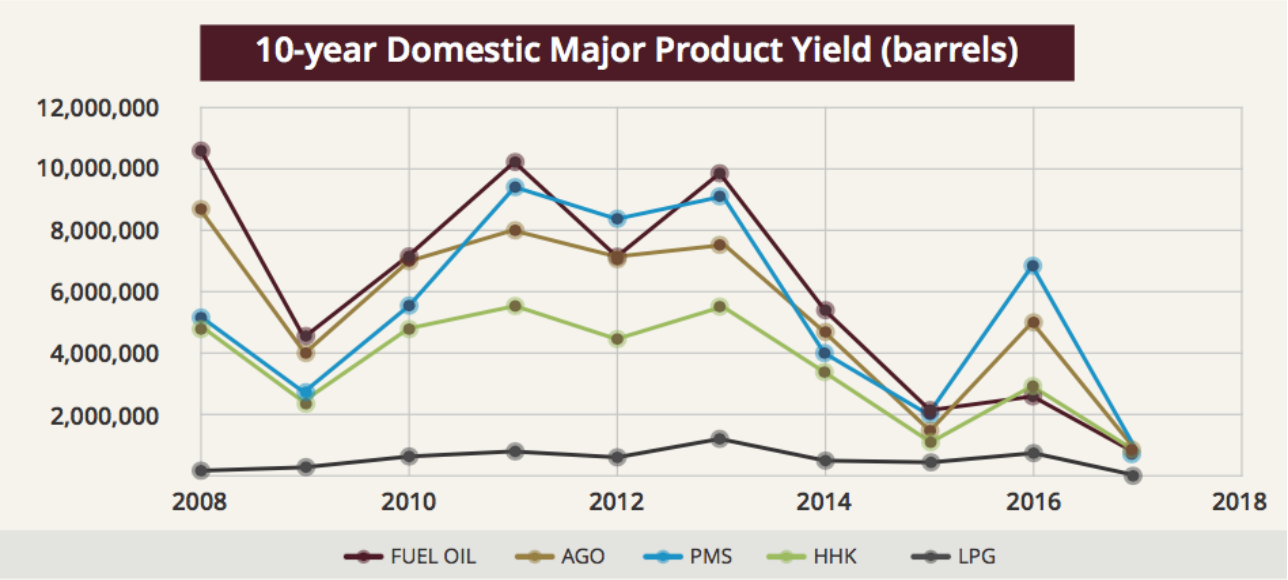
Source: NNPC Annual Statistical Bulletin

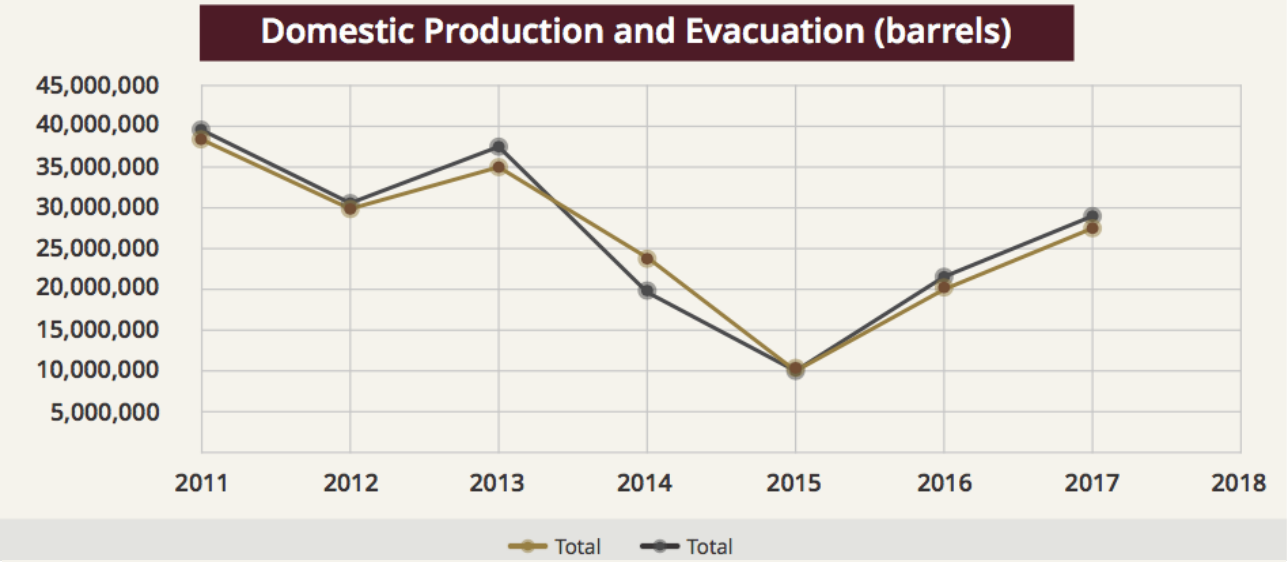
3. Domestic Major Product Yield declining since 2013

The refineries produce 5 major products - Liquefied Petroleum Gas (LPG), Petrol (PMS), Kerosene (DPK), Diesel (AGO) and Fuel Oil. The yield of these products from the state-owned refineries has dropped consistently since 2013, reaching their lowest points in 2017.

4. Consistent discrepancy between Domestic Production and Evacuation data

There is always a discrepancy between actual production and product evacuated by PPMC at the refineries without additional records published for each refinery's closing stock. In the interests of accountability, there is a need to publish records of what stock is left after evacuation on a daily, monthly and yearly basis. This is because what is not published cannot be monitored and what is not monitored is more often than not, a loophole for corruption.

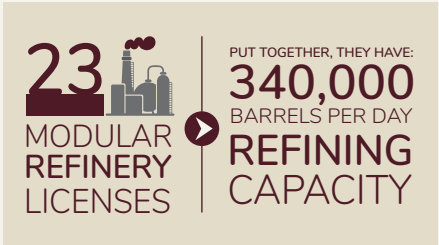




Source: NNPC Annual Statistical Bulletin

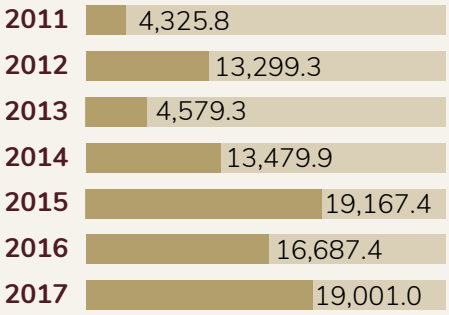
There are several efforts being made by the government, private sector and unlicensed artisans to meet local petroleum product demand through local refining of petroleum products. We'd highlight five (5) of such efforts:

1. Modular Refineries
2. Conversion Refineries
3. Refinery Feasibility Studies
4. Artisanal Refineries
5. Turn Around Maintenance, TAM



NDPR Modular Refinery, Ogbele[16]

Diesel Production by Year (Metric Tonnes)



What other efforts are being made to boost local refining capacity?

1. Modular Refineries

These are portable, mini-refineries with specified product output unlike conventional refineries which have the capacity to produce multiple finished petroleum products.

For Modular Refineries, routine turn around maintenance and on-stream inspections require less personnel and downtime and also, if an area becomes unfit for refining business, this type of refinery can be disassembled faster and moved to a new location. For regions with non-cohesive geopolitics like Nigeria, modular refineries can be scattered throughout the country to each serves the needs of the various areas of the country.

A modular refinery can be set up at a reduced cost. A total of 23 modular refinery licenses are still active and have a combined capacity of 340,000 bpd if they all come on-stream.

Case: Niger Delta Petroleum Resources, NDPR Modular Refinery

Of the licenses issued by Department of Petroleum Resources, DPR, the Niger Delta Petroleum Resources, NDPR Refinery is the only one that has commenced operation in Ogbele, Rivers State. It had an initial capacity of 1,000bpd[17] and has producing AGO since 2011. It is currently being re-engineered to increase its capacity to 10,000bpd.

15. Department of Petroleum Resources, DPR, "Nigerian Oil and Gas Industry Annual Report, 2017"
16. Department of Petroleum Resources, DPR, "Nigerian Oil and Gas Industry Annual Report, 2017" (Page 61)
17. Department of Petroleum Resources, DPR, "Petroleum Refineries in Nigeria", https://www.dpr.gov.ng/downstream/refinery/ (retrieve May 10th, 2018)

Dangote Refinery: Quick Numbers

Refining Capacity

500,000
BARRELS PER DAY

this is the actual figure available from DPR as opposed to the 650,000 bpd popularly quoted in the public domain

Projected Yield (Petrol)

32.1m
LITERS OF PETROL PER DAY*

excluding other petroleum products like Diesel, Jet Fuel, Propane and others

Projected Investment

$9bn
INVESTMENT

The project was initially estimated to cost $9bn, but current estimates put the total cost of the refinery and petrochemical plant between $12bn to $18bn

2. Conversion Refineries

Case: Dangote Refinery

One of the six (6) conventional refinery licenses issued by Department for Petroleum Resources, DPR was given to Dangote Group to set up the popular 500,000 bpd[18] Dangote Refinery. The project is an integrated refinery and petrochemical complex sitting on 2,635 hectares of land in the Lekki Free Trade Zone near the Lekki Lagoon[19].

The license for this refinery was issued in 2014, seven years after the sale of Nigeria's refinery assets to Dangote (through Bluestar) was reversed by President Yar'dua. This new refinery project was estimated to gulp $9bn investment. 33.3% of this amount is provided via equity by Dangote Group while they balance 66.7% (or $6bn) will be sourced via loan capital. However, the refinery and associated petrochemical plant is is now expected to cost between $12bn-$18bn.

A training grant for $1million was provided by United States Trade and Development Agency, USTDA, to develop human resources for operating the new Dangote refinery.

Aerial view of Dangote Refineries
Source: AutoReportNG

18. Department of Petroleum Resources, DPR, "Nigerian Oil and Gas Industry Annual Report, 2017"
19. https://www.hydrocarbons-technology.com/projects/dangote-refinery-lagos/

* This analysis utilizes a yield rate per barrel of crude oil refined of 20gallons of PMS (that is 75.7Liters) as quoted by the United States Energy Information Admnistration, EIA for US Refineries. We assume a combined capacity utilization (CU) of 85% for 330 days of operation per year for Dangote Refinery.

BP-OWNED REFINERY BEING IMPORTED FROM TURKEY

AGE

56

YEARS

Comissioned in 1962 in Turkey and abandoned in 2004 by BP, this refinery is currently being reinstalled in Port Harcourt through a co-location agreement with NNPC

SUCCESSFUL FEASIBILITY STUDIES FOR CONSTRUCTION OF NEW REFINERIES HAVE BEEN ABANDONED BY THE GOVERNMENT SINCE 2011

Affected projects with completed feasibility studies:

Lagos State Refinery

200,000 bpd

Bayelsa State Refinery

100,000 bpd

Kogi State Refinery

100,000 bpd

Case: Jil-Amber Consortium Refinery

Jil-Amber Consortium also received another of the nine (9) conversion licenses issued by the country's Department for Petroleum Resources, DPR to set up a 100,000 bpd refinery. This refinery will be colocated with the country's state-owned Port Harcourt Refinery which is operated by Nigerian National Petroleum Corporation, NNPC. The refinery asset being converted for use in Nigeria by Jil-Amber Consortium was previously owned by BP in Turkey[20] with a last known capacity utilization of 50%. This refinery is 56 years old.

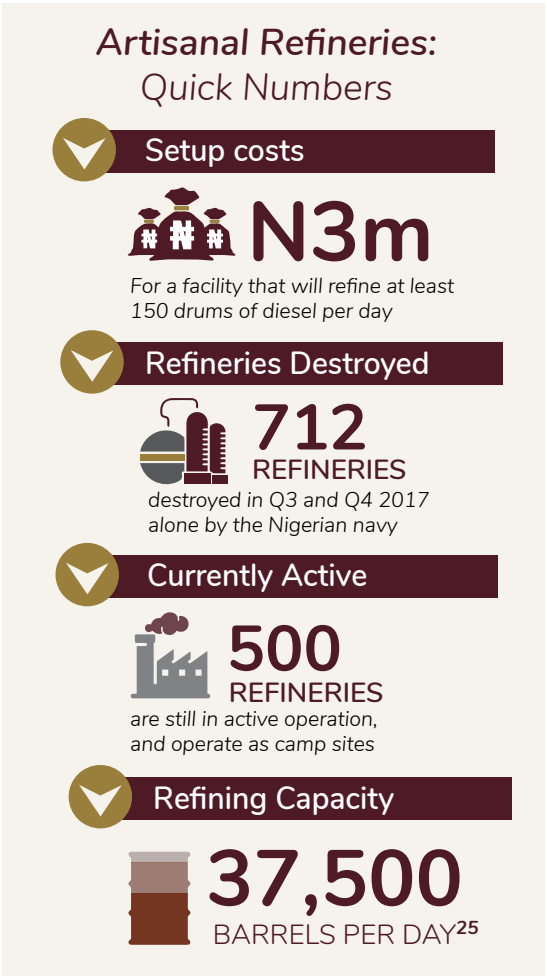
Jil-Amber also has quite list of technical partners which it believes will successfully convert the refining asset for use in Nigeria.

3. Refineries Feasibility studies

In 2005, the Nigeria National Petroleum Corporation created a greenfield refinery department[21] to boost local refining capacity. Feasibility studies for setting up three greenfield refineries in Lagos (200,000bpd) , Kogi (100,000bpd) and Bayelsa states (100,000bpd) with a combined capacity of 400,000 bpd were commissioned and carried out by Messrs Wood Mackenzie Energy Consulting Limited and Messrs Foster Wheeler Energy Limited.

Although these feasibility studies were fully paid for, successfully completed, seven years down the line, these three refinery projects have been abandoned.

20. https://www.africanrefineryph.com/
21. http://nnpcgroup.com/NNPCBusiness/MidstreamVentures/GreenfieldRefineryInitiative.aspx

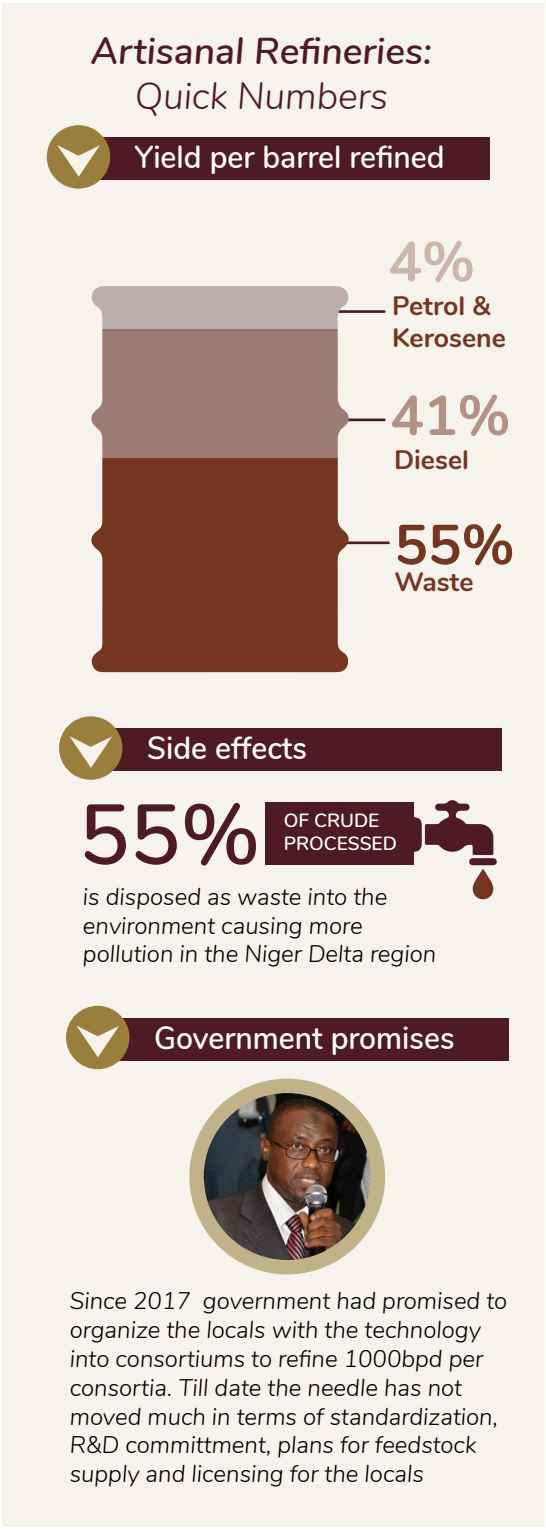


4. Artisanal Refining

Artisanal refining, popularly referred to by the Nigerian government as illegal refining, is a growing trend in the Niger Delta. The artisanal refining of crude oil draws on the indigenous technology used to distil locally made gin – ogogoro – from the juice of Raffia palm tree, a technology that has been with indigenes of the Niger Delta area for centuries[22]. This form of refining involves boiling the crude oil in makeshift drums in the creeks and mangroves of the Niger Delta to produce low-grade diesel and other fuels for the local market.

The Nigerian navy claimed to have destroyed[23] a total of 712 artisanal refineries in the Niger Delta region in Q3 and Q4 of 2017 alone. There are currently approximately 500 artisanal refineries in Niger Delta Region located mainly in the creeks. It costs as low as N3million to set up a mini-refinery that can produce up to 150 drums of diesel[24], so, as more of these unlicensed refineries are destroyed, more are incentivized to spring up due to the profits they make. Alhtough setting up

22. https://scitechafrica.com/2018/11/16/how-niger-delta-youths-use-indigenous-gin-distilling-technology-to-refine-crude-oil/
23. https://www.vanguardngr.com/2018/01/navy-destroys-712-illegal-refineries-n-delta-says-foc/
24. Stakeholder Democracy Network, SDN, "Communities not Criminals – Illegal Oil Refining in the Niger Delta"
25. Stakeholder Democracy Network, SDN, "Communities not Criminals – Illegal Oil Refining in the Niger Delta"



artisanal refineries is illegal in Nigeria, the sector is estimated to be worth N8.4billion per month - and is becoming a source of livelihood for the locals in some oil producing communities.

Artisanal crude oil refineries in Nigeria are inefficient especially when it comes to processing the heavy end of crude; as much as **55%** of this type of crude cannot be refined by the artisan's local technology and are discarded into the environment causing serious forms of pollution. These thriving, but unlicensed refineries in Nigeria do not get crude oil feedstock from the federal government and so provide a ready market and an additional incentive for stolen crude oil trade to thrive.

There have been promises by the government to work with these local artisans; the group managing director of NNPC, Mr. Maikanti Baru, at the 53rd International Conference and Exhibition of the Nigerian Mining and Geosciences Society (NMGS) in Abuja in 2017, said the government would organise the youth now engaged in illegal refining of crude into consortia. Each consortium will refine 1000 bpd of crude oil. Very little action has been seen from the government in this regard.

5. Turn Around Maintenance

Nigeria's state-owned refineries have degenerated over time as successive governments failed to do the needful "Turn Around Maintenance" (TAM) as at when due. At regular intervals, the news media is awash with details of funds earmarked for TAM; however, this has not contributed to any meaningful progress in terms of capacity boost in production or in the output of these refineries. Hon. Isiaka told the

House that the sums of $308 Million, $57 million, $200 million and lately, more than ₦264 billion had been spent on maintenance of the refineries but that the Nigerian National Petroleum Corporation (NNPC) is reportedly seeking for $1.8 billion to carry out another Turn Around Maintenance on the refinery.

RECOMMENDATIONS

1. Provide Technical Support for Refinery Licenses granted

The government in collaboration with international development partners and civil society in Nigeria should develop a technical assistance program to support all 29 license holders with the right technical advice to their respective refinery projects become a reality. Advisory should cover financing and deal structuring and appropriate monitoring.

2. Invest in Downstream Research and Development

The Nigerian government needs to invest at least 5% of its annual budget for the ministry of petroleum on research and development especially concerning optimizing the local refining technology in Niger Delta. As an example, Prof. Ibrahim Mohammed-Dabo and his team from Ahmadu Bello University, ABU have developed an early prototype for local crude oil refining, but this isn't receiving sufficient attention from the government and the private sector for further research, development and commericialization.

3. Standarize local refining practice

Government needs to standardize and create a lower-cost license category for the artisanal refineries instead of branding them illegal.

4. Maintain high equipment reliability

A major consideration for boosting a refinery profitability and improving operational safety is to keep operating units running and available for service. Routine turnaround maintenance should be diligently performed and monitored.

5. Deregulate the downstream sector

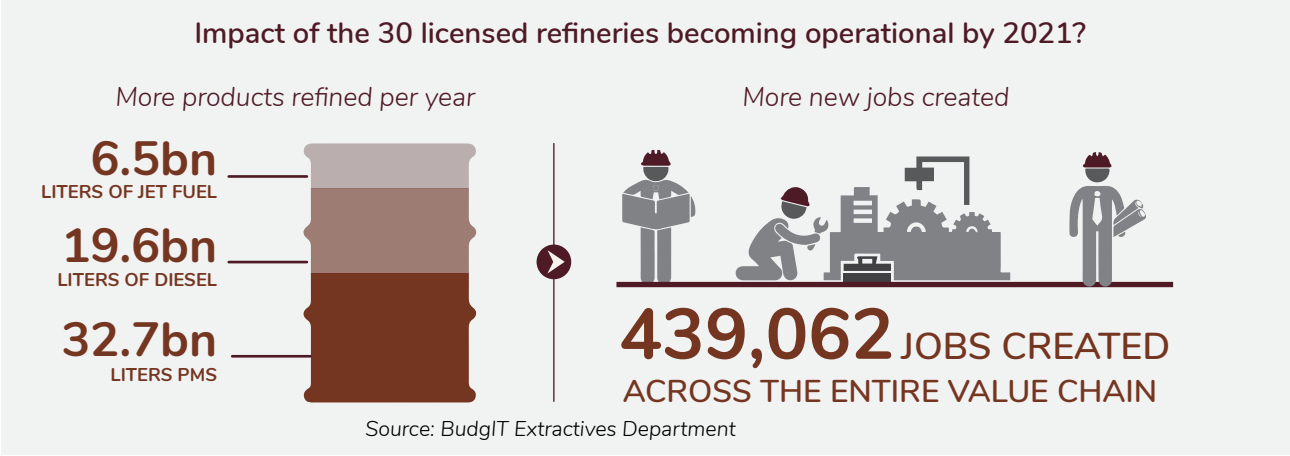
The Nigerian government should consider deregulating the downstream sector. It is no coincidence that the only Modular Refinery that has commenced operation is the NDPR (Niger Delta Petroleum Resource) which produces AGO (diesel) one of the refined petroleum products that is fully deregulated.

6. Privatise state-owned refineries

Losing N126.2bn on our refineries is a huge strain on the country's fiscals. Nigeria needs to privatize at least 3 of its 4 state-owned refineries to reduce the 'bleeding.'

Conclusion

It is commendable that United States Trade and Development Agency, USTDA, is providing ongoing support for Dangote Refinery to become a reality. There are 29 other active* refinery license holders who could use the technical and financial support of USTDA and other development agencies like it as they walk through the valley of the shadow of death that is Nigeria's downstream sector. Supporting these 29 other modular and conventional refinery projects till they become operational means helping Nigeria to successfully unlock refining capacity of nearly 32.7billion liters of PMS per year, 19.6billion liters of Diesel per year and 6.5billion liters of Aviation fuel per year. This is sufficient to meet the country's refined products needs and also supply the West African market. A refinery industry this vibrant could generate product sales of nearly N13.1trillion per annum for investors and create additional 439,062 well-paying jobs for Nigerians across the entire value chain**.



Source: BudgIT Extractives Department

To accomplish this new reality, the federal government needs to deregulate the downstream sector so the efforts of investors and development agencies does not go down the drain. A downstream sector with 29 operational refineries and the proposed capacities as licensed by DPR could generate nearly N395billion per year in Value Added Tax*** for the federal government - aside from Corporate Income Tax. Governors of states that will host the new refineries should be excited too as there will be more revenue for them via PAYE (Pay As You Earn) tax from new jobs created.

As for the government-owned refineries - WRPC, PHRC(2) and KRPC, they have been nothing but a cancer on the economy of Nigeria in the last 20years; in the past 2 years alone, they incurred a N159billion loss[26] on behalf of Nigerian citizens. The priority of any proactive government should be to rid the country of these 4 afflictions currently managed by NNPC. The government needs to urgently privatise its comatose refineries, but, which investor will buy these liabilities? Will the country find investors that trust it enough to buy the refineries considering that the Nigerian government, 12 years ago revoked sale of the refineries to Bluestar Oil Services Limited[27] consortium even after they had paid $721m required? If the country finds new buyers, at what price will they acquire the ailing refineries?

26. *NNPC Monthly Financial and Operations Report (January 2016 - December 2018)*
27. http://www.ocnus.net/artman2/publish/Africa_8/How_Yar_Adua_Cancelled_Sale_of_Refineries.shtml

* Although 44 refinery licenses have been granted by DPR since 2007, 15 of those are currently expired leaving only 29 active ones.

** This analysis utilizes a yield rate per barrel of crude oil refined of 20gallons of PMS, 12 gallons of Diesel and 4 gallons of Jet fuel (that is 75.7L, 45.4L and 15.1L respectively) as quoted by the United States Energy Information Admnistration, EIA for US Refineries. It assumes a combined capacity utilization (CU) of 85% for 330 days of operation per year for the new refineries. It also assumes that a downstream sector is fully deregulated and prices are market driven without subsidies.

*** Projected Value Added Tax is calculated on only 60% of projected yield which is estimated for local consumption, 40% is esimated for export and extant laws do not charge VAT on exports.