Fitch Solutions

Q3 2019

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Nigeria

Oil & Gas Report

Includes 10-year forecasts to 2028

Contents

Key View

Key View: *Nigeria's stable environment and higher oil prices are bringing more focus to the country's oil and gas production. The 2019 elections are expected to catalyse renewed optimism for reform for the oil and gas sector but it is unlikely that the process will yield results in the near term. Improved fiscal and regulatory terms would revitalise the industry and spurn investment though the Petroleum Industry Bills still have yet to pass the first part relating to governance. The refining sector is due to be transformed with the start-up of the Dangote facility from 2022.*

HEADLINE FORECASTS (NIGERIA 2017-2023)

Indicator	2017e	2018e	2019f	2020f	2021f	2022f	2023f
Crude, NGPL & other liquids prod, 000b/d	1,971.1	1,992.0	2,099.4	2,097.9	2,081.2	2,159.6	2,292.0
Dry natural gas production, bcm	47.0	47.4	52.3	56.1	56.6	57.2	58.3
Dry natural gas consumption, bcm	15.0	15.8	16.0	16.1	16.6	16.8	17.8
Refined products production, 000b/d	70.1	32.7	33.6	33.6	34.7	693.1	908.0
Refined products consumption & ethanol, 000b/d	280.2	635.3	571.8	571.8	597.5	621.4	646.2
Brent, USD/bbl	54.75	71.69	73.00	80.00	84.00	85.00	85.00

e/f = Fitch Solutions estimate/forecast. Source: NNPC, EIA, Fitch Solutions

Latest Updates And Key Forecasts

- We forecast Nigerian crude and condensate to average 2.0mn b/d in 2019, an increase of 5% compared to 2018 as production numbers to date indicate mixed compliance with OPEC+ targets for reduced output though compliance would leave production flat for the year compared to 2018. A key area for growth is the Egina field which produces condensate which is not counted towards OPEC production cuts.
- 2019 election results confirm Buhari's second term, however, important structural reform within the oil and gas industry is needed to spur investment.
- NNPC demands for back taxes totally USD20bn will further cool IOC appetite for further investment ahead of the passage of the Petroleum Industry Governance Bill expect in 2019.
- There have been limited incidents of supply disruption in the Niger Delta region in 2018 with theft and vandalism totaling 264 incidents in December and January reports of 230 incidents.
- April 2019 outages have begun to mount as theft related impacts to production have cause force majuere to be declare for Bonny Light in April and May as a result of the Nembe Creek pipeline suffering damage.
- Nigerian commercial gas production is estimated to average 48.19bcm in 2019. Additional supply from the start of projects such as Forcados Yokri Integrated gas and the Southern Swamp associated gas project is expected to buoy production in 2019.
- Nigeria LNG is planning a seventh train at the Bonny LNG plant, proposing an FID on the project in 2019. Nigeria exported around 31.5bcm of LNG in 2017 and, if approved, capacity could rise to more than 40bcm with the additional train.
- The full operation of the Dangote refinery is likely to be delayed to 2022, though the fertiliser plant is expected to begin production in Q419. Dangote will be an essential development for Nigeria given the decrepit state of Nigeria's existing refineries, which operated at a utilisation rate of 7.3% in 2018.
- An MoU was signed with Saudi officials to study and possibly invest in the revamp of refining facilities and new refining and LNG capacity. In addition, the deal will include crude and refined products trade.
- Data for early 2018 show demand for gasoline and diesel continue to grow at double-digit pace. Consumption of refined products is forecast to rise by 6.6% y-o-y in 2018, reaching 298,600b/d.

SWOT

Oil & Gas SWOT

SWOT Analysis	
Strengths	• Large discovered hydrocarbon resource base. • Crude is predominantly high-quality low-sulphur, light oil. • Diversified hydrocarbons exports between oil, gas and LNG. • A large population with substantial fuels and gas demand market.
Weaknesses	• Fiscal and regulatory uncertainty with the ever pending Petroleum Industry Bill. • Current fiscal terms are poor and less competitive in a weaker price environment, dissuading investment. • Poor inclusion of local communities has led to physical attacks on oil infrastructure resulting in disruption. • Oil theft, illegal refining and trading remain widespread. • Refining sector is decrepit and inefficient.
Opportunities	• The efficient monetisation of associated gas, which could reduce extensive flaring, support the power sector and expand LNG exports. • A number of large, proven pre-FID offshore oil projects which could drive long-term production growth. • Improved fiscal terms through the effective Petroleum Industry Bill could attract more investment. • Modernisation of the refining sector to add more value to the economy through better quality fuels products.
Threats	• The resurgence of militant activities in the Niger Delta. • Continued pipeline sabotage could incentivise IOCs to further divest onshore Nigerian assets. • No improvements in fiscal terms keeping investment away. • Growing competition from light, sweet crude exports from the US. • Relapse of reform policy if oil prices rise.

Industry Forecast

Upstream Exploration

Key View: *Given Nigeria's substantial proven resources and the country's pipeline of pre-FID projects, exploration will be minimal as IOC capex budgets remain flat. It will gradually pick up in 2020-2022 as investor appetite slowly returns and as the Nigerian National Petroleum Corporation's activity picks up.*

Latest Updates

- From 2018, offshore rig numbers averaged five (up from four in 2017) and onshore rigs averaged eight (up from four 2017) indicating improving sentiment.
- April 2019 rigs counts show further improvement with 14 total rigs in operation though this is one less than in January.
- **Nigerian National Petroleum Corporation** (NNPC) E&P subsidiary **Nigerian Petroleum Development Company** is set to increase exploration spending as it moves to become the largest upstream player in Nigeria.
- Alternative financing agreements with the Chevron and Shell JVs will spur exploratory activities according to NNPC reports which should help to build off of producing fields and existing production facilities.
- NNPC is due to begin exploration in the Gongola Basin in the North East of the country. Exploration will be undertaken in collaboration with Abubakar Tafawa Balewa University.
- New drilling for the Kolmani River Well 2 in the Benue Trough was expected in January 2019.
- Exploration activity in the Chad Basin while still on hold is expected to resume once the security situation stabilises.

Structural Trends

Investment in new exploration remains lacklustre as regulatory uncertainty and high operational risk reduced potential opportunities. The main operational risks include oil theft and pipeline sabotage as well as the threat of militant strikes against oil infrastructure, particularly in the Niger Delta. On the regulatory side, the delayed passage of the Petroleum Industry Bills (PIB) is the ever-present source of uncertainty in the long-term investment environment. This uncertainty will continue to dampen the exploration investment sentiment.

In addition to the high-risk environment, there is already a large existing resource base in Nigeria - meaning many companies have existing assets on which to work before chasing new exploration opportunities. Exploration activity around existing offshore assets could pick up, with tie-back concepts sought to maximise the use of infrastructure currently in place. While marginally improving oil prices may support more exploration spending, regulatory and fiscal uncertainty will continue to weigh on IOC project sanctioning.

Improving Environment Helps But Exploration Activity Challenges Remain

Deepwater projects costs are nearing historic lows supporting new exploration and development in offshore Nigeria. Continued decrease rig rates continue to lower drilling costs for deep water rigs worldwide. Low oil prices in 2014 to 2016 helped costs deflate and costs for wells to decrease significantly making exploration more attractive. Coupled with leaner more efficient operations through the use of new technology and standardised design have lower break evens attracting the interest of oil and gas investors.

Companies have been deterred from investing further in Nigeria due to security problems related to oil theft and pipeline vandalism. Disruptions in the country's midstream due to repeated theft and pipeline attacks have worsened investor sentiment. Although 2018 has shown a rise in pipeline vandalisation over 2017 as the environment remains relatively subdued compare the height of

disruption.

With tighter capital management, IOCs are focusing their investments towards markets which are capable of generating more stable returns, rather than the higher risk Nigeria. Other companies will be patient and see how the overall situation evolves before committing finances for exploration in the aim of developing new projects in the country over the long term.

Lastly, the continued uncertainty surrounding the PIB has also slowed the exploration and production scene in Nigeria. The long-promised sector reform has been repeatedly delayed, creating uncertainty among investors with respect to the future legal and fiscal environment. Delays in adopting the bill and the uncertain content of the bill have resulted in FID on several major projects being delayed and has certainly led to a slowdown in exploration activity. If the bill is signed into law it could rekindle interest.

Lake Chad And Benue Trough Upside

Under the direction of President Muhammadu Buhari, NNPC has been tasked with stepping up exploration in the Lake Chad Basin and Benue Trough areas of North East Nigeria.

NNPC started oil and gas exploration in Lake Chad at the end of 2016. The four blocks are located onshore in the Borno State of north-eastern Nigeria, which currently does not have any petroleum production. Halliburton has been hired to support exploration drilling activity. Operations remain limited given the security situation in the north and danger to oil workers, though developments are slowly restarting.

The four blocks are located in the Lake Chad sub-basin of the prospective Chad Basin, which contains oil deposits in Niger, Chad and Cameroon. The Lake Chad sub-basin is also surrounded by two other producing sub-basins that lie in close proximity, namely the Temit sub-basin in Niger and the Doba sub-basin in Chad. The production proves the existence of a working petroleum system in the Chad Basin and somewhat de-risks exploration in the Lake Chad sub-basin.

In addition to Lake Chad, NNPC is also undertaking exploration in the Benue Trough in Nasawara State. Operations are currently in infancy but are in line with government plans to explore more of the countries inland basins. Though recent security concerns have stopped all work on the ground.

Upstream Projects

MAJOR UPCOMING UPSTREAM PROJECT					
Name	Field Name	Companies	Completion Date	Status Notes	Est.Peak Oil/ Liquids Range (b/d)
OML 133	Bosi	Royal Dutch Shell (43.75%), ExxonMobil (56.25%)	2020	March 2015 - The project has suffered FID delays due to low oil prices	135,000
OPL 214	Uge	Royal Dutch Shell (43.75%), ExxonMobil (56.25%)	2020	March 2015 - The project has suffered FID delays due to low oil prices	110,000
OML 118, 132, 140	Bonga South West/ Aparo	Total S.A. (10%), Chevron (19.6%), Sasol (0.3%), Royal Dutch Shell (44%), ExxonMobil (16%), Eni S.p.A (10%)	2022	FID is targeted for 2019	225,000
OPL 245	Zabazaba	Royal Dutch Shell (50%), Eni S.p.A (50%)	2022	Possible FID in 2019	120,000
OPL 245	Etan	Royal Dutch Shell (50%), Eni S.p.A (50%)	2022	The field will be developed as a tie-back to Zabazaba field which is also located in the same block	~
OML 130	Egina	Petrobras (16%), South Atlantic Petroleum (5%), NNPC (10%), Total (24%), China National Offshore Oil Corporation (45%)	2018	On stream in late 2018	200,000
OML 145	Uge, Uge North, Orso, Nza	Sasol (5%), NNPC (15%), Svenska Petroleum Exploration (20%), Oando Exploration and Production Limited (20%), Chevron (20%), ExxonMobil (20%)	2025	Uge will be developed via a leased FPSO vessel, with first production expected in 2025	110,000
OML 83, 85	Analay & Madu	First E&P (40%)	2019	FID in 2018 first gas by 2019	50,000
OML 99	Ikike	Total (40%)	2022	FID expected in 2019	45,000
OML 23	Soku	Shell/NNPC	2020		50,000

Source: Fitch Solutions

Upstream Oil Production

Key View: *Nigerian oil production has normalised to a point of delicate stability, though it faces a continual underlying threat from militancy, theft and vandalism. The country has an extensive backlog of pre-FID projects that have failed to progress due to security issues and fiscal uncertainty. The passage of all parts of the PIB, improved security and greater local community integration is needed to support output in the long term.*

Latest Updates

- We forecast Nigerian crude and condensate to average 2.0mn b/d in 2019, an increase of 5% compared to 2018 as production numbers for January indicate little compliance with OPEC+ targets for reduced output though compliance would leave production flat for the year compared to 2018.
- **Total**'s 200,000b/d Egina project achieved first oil in late-2018, which will boost output. The French IOC has said it may expand the Egina development and is reviewing plans to tie the nearby Preowei discovery in to the **Engina** FPSO once spare capacity becomes available.
- **Shell** has also signalled some progress on the long-delayed USD10bn Bonga Southwest project. In September 2018, Shell's Nigeria directors said a timeline for FID would be announced once commercial talks with the government were completed. The project could deliver an additional 175,000b/d in output.
- There have been steady incidents of supply disruption in the Niger Delta region with April impacts to the Nembe Creek Trunk Line which supplies crude to the Bonny Terminal causing force majeure to be declared twice and no firm commitment to resume operations on the line.
- The NNPC has demanded the payment of back taxes against upstream operators totalling USD20bn this stance may have longer-term implications on investment in the oil and gas industry.
- The NNPC is looking to farmdown its share of JVs in Nigeria to 40% which should strengthen IOCs control and allow critical investments to occur in a more timely manner while improving state finances as less capital will be required by the NNPC to meet its obligations.

Structural Trends

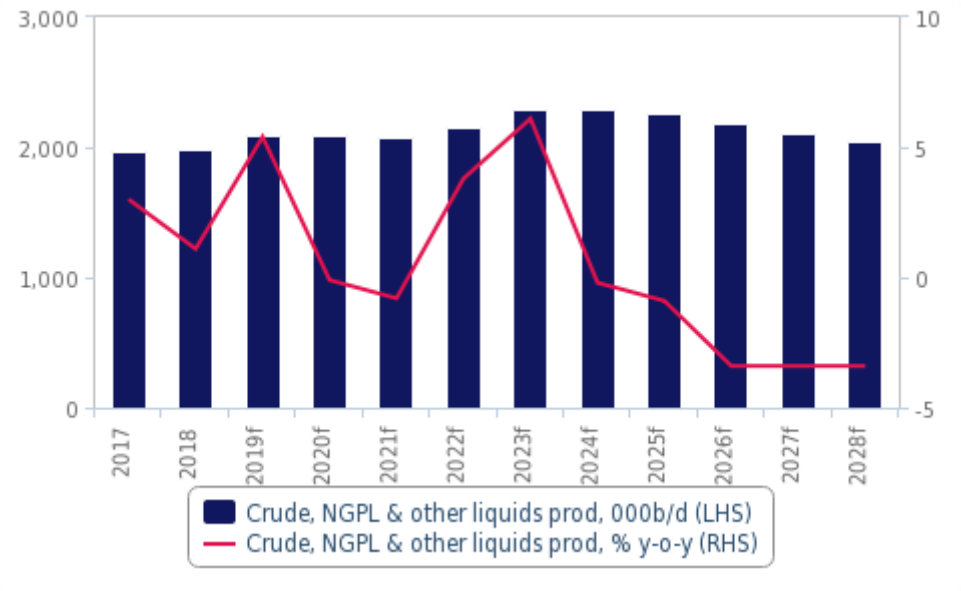
Much of the growth in oil output 2019 will stem from the start-up of Total's Egina project which is due to add 200,000b/d of new output at peak in 2020. We also see additional barrels from ramp-up at the Gbaran-Ubie field, as well as from the Sonam and Okam developments across 2019.

The December 2018 OPEC+ production cuts task Nigeria with the curtailment of 53,000b/d from October 2018 output. The cuts look to limit any 2019 growth in production, although non-compliance of 50,000b/d over the target has been at a steady level. Compliance with OPEC+ will likely be difficult to achieve as IOCs will resist government curtailment leaving little room to cut output.

From 2019, the outlook deteriorates somewhat given the substantial reduction of investment in Nigeria's oil sector since 2014. We forecast around 100,000b/d of gross additions from the Anyala, Madu and Ikike projects. Shell's Soku development is also due to deliver around 50,000b/d in 2020. However, these additions will fail to curb declines until 2022 when new deep water fields are expected to come online though they have yet to receive FID so the forecast may further deteriorate post 2022.

Liquids Production Set To Mildly Increase

Nigeria - Liquids Production Forecast (2017-2028)



f = Fitch Solutions forecast. Source: NNPC, JODI, Fitch Solutions

There remains tremendous upside risk to our post-2020 forecast due to a project pipeline that amounts to 875,000b/d of new production waiting for an FID. Of this, we currently only forecast progress at the Bonga southwest and Zabazaba-Etan projects in the mid-2020s. Both are expected to take FID in 2019 to achieve start-up in this timeframe. However, potential clarity in the regulatory environment - if the Petroleum Industry Bills pass successfully - and more attractive fiscal conditions, could result in more final investment taken in the coming years than we expect.

Companies remain wary of investing in Nigeria due to the high operational risks and regulatory uncertainty. If the PIB is passed, the clear regulatory framework it provides will give greater impetus behind those projects reaching FID.

At the time of writing the outlook for the Petroleum Industry Governance Bill (PIGB) was uncertain given is failed assent. President Muhammadu Buhari sent the PIGB back to lawmakers in a major setback for progress on the long-delayed overhaul. Pending changes to the bill Buhari has assured his support for passage of the landmark bill.

The Petroleum Industry Administration (PIAB), the Petroleum Industry Fiscal Bill (PIFB) and the Petroleum Host Communities Bill (PHCB), still need much work. Maintaining stability in the Niger Delta will be crucial, and greater integration of local communities in oil operations will be critical to strengthening the relationship between companies and citizens.

Stability And Clarity Needed To Attract Investment

The Minister of State for Petroleum Resources Ibe Kachikwu has set a target of attracting over USD10bn in new investment to Nigeria's petroleum sector to 2022. The aim is to increase Nigeria's production to 3mn b/d by 2022, up 800,000b/d from current reported levels. While we see a production target of 3mn b/d as unrealistic, we do see an improvement in investor confidence as security and project economics improve.

One of the major barriers to upstream investment in Nigeria has been the high (fiscal) cost of production. This has become ever more prevalent in the last two years as oil prices fell, leaving higher cost production more exposed. Additionally, Nigeria relies heavily on upstream investment from oil majors who have become increasingly under pressure to streamline their portfolios, only targeting investment in areas with the most competitive cost structure. The result has been companies such as **Chevron** and **ExxonMobil**, which have traditionally invested heavily in Nigeria, increasing their investment focus to higher margin projects elsewhere.

Nigeria is making efforts to move down in the cost curve in an increasingly competitive environment for investment. The **Nigerian National Petroleum Corporation** (NNPC) has made impressive savings, with unit technical costs per barrel falling from USD70/bbl to USD27/bbl since 2014, according to Makanti Baru, the group's managing director**.**

Ibe Kachikwu, is aiming for further cost cuts in order to keep Nigeria's upstream competitive, targeting an average range of USD10-15/bbl, without giving a timeframe of when these will be achieved. The contraction in offshore costs is particularly important for Nigeria's future production growth given, the majority of large scale projects awaiting FID are offshore developments.

Unproductively, in 2019 the NNPC debt collection arm has made demands for USD20bn in back taxes for upstream equity holders. The cooling effect of such demands for large payments will further weigh on investments if the claims are validated in court.

Factors Hampering Nigerian Oil Sector

Uncertain Business Environment: The most pressing issue is the legal uncertainty regarding the PIB. The PIB, long promised by the previous administration of President Goodluck Jonathan, has been repeatedly delayed, creating uncertainty among investors with respect to the future legal and fiscal environment. The bill was first created in 2000 and sent to the National Assembly eight years later.

In order to assist the passage of the PIB, it was split in to four separate units governing regulation (PIGB), administration (PIAB), fiscal terms (PIFB) and a host community bill (PHCB). The idea is that a clearer breakdown of the bill will enable at least certain parts of it to progress, unimpeded, through the President, Senate and House of Representatives.

The PIGB is the furthest progressed but its outlook remains uncertain. In August 2018, President Muhammadu Buhari refused to sign the bill, reportedly due to concerns it would allocate to much revenue to the regulatory bodies set up to administer regulations and pricing. The Senate passed and udpated version addressing the concerns and PIGB should be presented to Buhari for signature again in 2019. Assent could potentially put an end to some of the regulatory uncertainty and serve to give reform momentum, though changes to the fiscal terms and the local content requirements may be more challenging to progress.

Additionally, these bills would support new investment given the potential improvements to fiscal terms, and clarity around local content costs. This would enable companies to develop clearer project economics and modelling and allow developments to progress.

The PHCB will also be essential in the greater integration of local communities into the oil and gas business. This will be key to maintaining stability, in oil-producing regions, improving the trust between communities and companies, and boosting the prosperity of local communities. It will be challenging to achieve a balance between appeasing the local communities without exacerbating cost pressures on oil companies.

Uncertain Security Environment: Oil theft, vandalism and sabotage remain a major threat to oil and gas operations in Nigeria. Downtime and repair costs add an extra cost burden to projects straining the economics of many developments. The PHCB could work to support the inclusion of local communities to mitigate the impact of groups targeting oil infrastructure as a means of revenue generation.

Deeper communication and cooperation between the government, NNPC and local communities have seen a dramatic reduction in targeted attacks on oil infrastructure since 2017. More work and deeper collaboration with companies will be needed to improve this further.

NIGERIA OIL PRODUCTION (2017-2022)							
Indicator	**2017**	**2018**	**2019f**	**2020f**	**2021f**	**2022f**	**2023f**
Crude, NGPL & other liquids prod, 000b/d	1,971.1	1,992.0	2,088.5	2,102.1	2,095.1	2,174.3	2,308.2
Crude, NGPL & other liquids prod, % y-o-y	3.0	1.1	4.8	0.7	-0.3	3.8	6.2

f = Fitch Solutions forecast. Source: JODI, NNPC, Fitch Solutions

NIGERIA OIL PRODUCTION (2023-2028)						
Indicator	**2023f**	**2024f**	**2025f**	**2026f**	**2027f**	**2028f**
Crude, NGPL & other liquids prod, 000b/d	2,308.2	2,303.7	2,281.7	2,202.7	2,126.5	2,053.3
Crude, NGPL & other liquids prod, % y-o-y	6.2	-0.2	-1.0	-3.5	-3.5	-3.4

f = Fitch Solutions forecast. Source: JODI, NNPC, Fitch Solutions

Upstream Gas Production

Key View: *More consistent oil output and greater gas processing capacity is supporting gas production. Gas output will ramp up over the decade as new gas projects come online to meet pent up domestic power and industrial demand.*

Latest Updates

- Given limited disruption to oil pipelines, which had held back associated gas production, Nigeria's commercial gas production was 47.4bcm in 2018.
- The Forcados Yokri Integrated gas project is due to begin producing in 2019 after much delay.
- The Southern Swamp associated gas project, which is also facing delays, could also start in 2019.
- The additional volumes are forecast to boost upstream gas output to 52.3bcm in 2019, a 10% increase from the previous year.
- **Shell** has made FID on the Assa North/Ohaji South project late in 2018 and Gbaran Phase 3 and the Uzu development as potential projects for FID in 2019, which could unlock additional supply.

Structural Trends

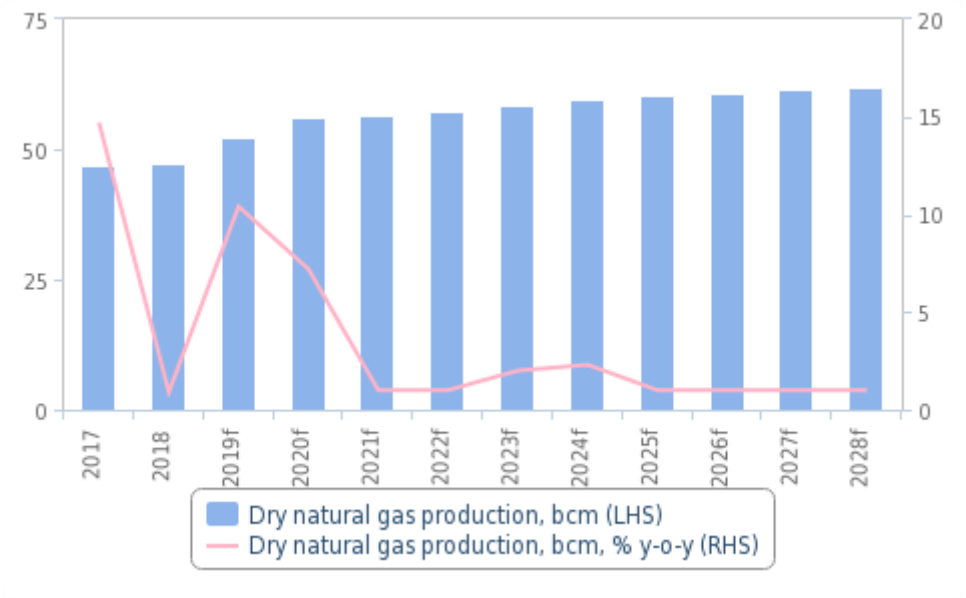
Nigeria has estimated proven gas reserves of 5.1tcm, according to the EIA, making the country one of the largest gas reserve holders in the world. The majority of natural gas reserves are associated with oil and are not effectively captured. Around 40% of natural gas produced in Nigeria is non-commercial as a result.

Increasing gas production and the development of gas infrastructure remains central to the Nigerian government's plans to support the power sector and develop a larger more reliable source of power for the economy. IOCs operating in Nigeria have increasingly turned their focus to gas developments, partly due to improving infrastructure and tougher regulations against gas flaring, but also due to rising domestic demand and export opportunities. The greater build out of infrastructure to process and deliver gas will be essential to driving Nigeria's gas sector forward.

Commercial natural gas production increased 10% to 52.31bcm in 2019, supported by more uptime of oil production resulting in more consistent associated gas output. In addition, Gbaran-Ubie Phase 2 started in 2017, boosting output over the second half of the year and by up to 2bcm in the coming years. In 2019, the delayed projects of Forcados Yokri and potentially Southern Swamp are expected to start up adding production capacity of around 1bcm each. Increased gas output from the Sonam & Okan fields will also support production.

Investments Increase Nigerian Gas Production

Nigeria - Gas Production Forecast (2017-2028)



f = Fitch Solutions forecast. Source: NNPC, Fitch Solutions

Beyond 2018 incremental associated gas capture projects will lead growth in production. Flaring reduction at existing and new project is expected to yield continuous but not burgeoning growth in production. Around 5% of gross gas production in 2018 was still flared, offering the potential of collecting a further 9.7bcm of gas from existing resources.

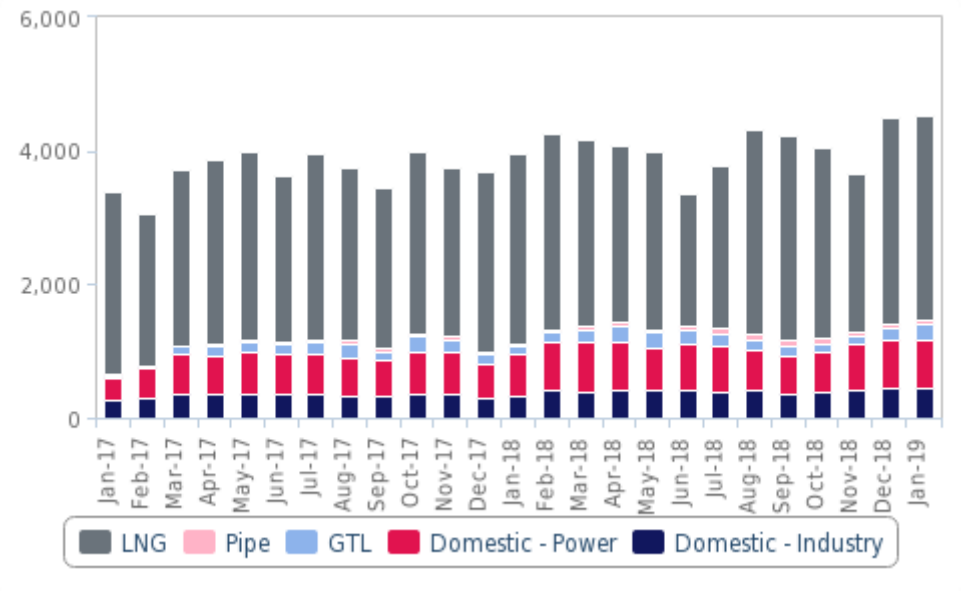
In addition, if the investment environment in the oil sector improves and pre-FID projects progress, the combined associated gas production will support output over the long term. Investment into the gas sector remains slow for a number of reasons, namely:

- **Gas Policy Lacking:** Nigeria's hydrocarbon sector was developed predominantly with oil in mind, resulting in gas being largely overlooked. Natural gas is sold into the domestic power and industrial sectors at a floor price of around USD0.4/mn BTU (at USD40/bbl oil) and a cap of around USD2.5/mm BTU, offering unattractive margins for producers.
- **Limited Gas Infrastructure:** Other than the LNG terminal and the GTL facility, there are few major gas demand centres in Nigeria. The cost of linking processing facilities with power plants and other gas users adds to development costs and prices. Support for the build out of such infrastructure will be critical to gas expansion. The OB3 pipeline and continuing expansion of thermal gas power plants would further incentivise commercial production.
- **Security Issues:** Natural gas production is affected by the same security problems as experienced by the oil industry given much of the output is associated with oil. When oil pipelines are impacted, the fields are shut in, stopping gas output. Additionally, gas gathering and processing plants have been targets for attacks.
- **Regulatory Uncertainty:** Similar to oil production, several projects are withheld due to regulatory uncertainty regarding the passage of the Petroleum Industry Bills (PIB). The PIB could clarify gas prices and sales/purchase terms. Investors are reluctant to invest large funds under so much uncertainty.

Cumulatively, these factors have led to chronic underinvestment in the country's gas sector. As a consequence, only around 60% of the gas Nigeria produces is commercialised and less than 30% of that commercial gas is consumed in the domestic market.

Nigerian Commercial Gas Mainly Exported

Nigerian Gas by End-Use (mcm)



Source: NNPC, Fitch Solutions

Boosting gas production will be key to addressing Nigeria's chronic power deficit; the power sector is plagued by recurrent outages and around half of the country's population lack any access to electricity. The bulk of Nigeria's electricity generation comes from thermal power plants, largely fed by natural gas. Plans to increase gas-powered electricity generation should see increasing domestic demand for gas. To some extent, the promising domestic demand from the power sector should help stimulate private investment in infrastructure to increase gas production levels. This is translating into a slow ramp-up in gas monetisation and production is, therefore, underway to feed these ambitious plans. However, this gas price increase is still insufficient to stimulate sufficient investment to fully address the problem.

GAS PRODUCTION (NIGERIA 2017-2022)

Indicator	2017	2018	2019f	2020f	2021f	2022f
Dry natural gas production, bcm	47.0	47.4	52.3	56.1	56.6	57.2
Dry natural gas production, bcm, % y-o-y	14.7	0.9	10.4	7.2	1.0	1.0
Dry natural gas production, % of domestic consumption	314.0	299.4	327.2	347.2	340.5	340.5

e/f = Fitch Solutions estimate/forecast. Source: NNPC, Fitch Solutions

GAS PRODUCTION (NIGERIA 2023-2028)

Indicator	2023f	2024f	2025f	2026f	2027f	2028f
Dry natural gas production, bcm	58.3	59.7	60.3	60.9	61.5	62.1
Dry natural gas production, bcm, % y-o-y	2.0	2.3	1.0	1.0	1.0	1.0
Dry natural gas production, % of domestic consumption	328.6	326.4	320.9	320.9	320.9	320.9

f = Fitch Solutions forecast. Source: NNPC, Fitch Solutions

Refining

Key View: *Although Nigeria has a large refining capacity, the country's poor maintenance and supply disruptions will keep utilisation rates low. The Dangote Refinery is forecast to reach near capacity by early 2022, adding 650,000b/d of new capacity. The fertilizer plant segment is expected to come online in 2020 taking advantage associated gas from surrounding developments.*

Latest Updates

- Despite assurances from Dangote that refinery operations will begin in 2020, the startup of the Dangote Refinery is likely to be delayed for refined fuels production. Officials with Dangote denied reports that fuels production was unlikely to commence before early 2022, we accordingly expect the refinery to come online several years later than first planned. An unnamed government adviser quoted in Reuters stated that major pieces of equipment were still under construction abroad and had not yet arrived and further stated that a lack of infrastructure would also result in delays.
- However, the first production for fertiliser, Urea pellets is expected to start receiving gas supplies in 2019 with production slated for early in 2020.
- Dangote refinery deliveries via the newly completed jetty have allowed the construction of key equipment with January marking the arrival of a Regenerator for the Residual Fluid Catalytic Cracker, a major element of the refining process.
- Nigeria's large downstream capacity continues to operate at cripplingly inefficient rates, with utilisation averaging 16.5% in 2017. The Kaduna refinery only operated between January and May 2017, the Warri refinery operated for eight months of the year and the Port Harcourt facility ran for nine months of the year.
- In August 2018, the **Nigerian National Petroleum Corporation** (NNPC) disclosed that it was considering plans to construct two 100,000b/d condensate refineries at its Port Harcourt and Warri locations in partnership with private sector investors.
- **Petrolex Oil & Gas** is undertaking a FEED study for a USD3.6bn 250,000b/d refining complex in Ogun state and is targeting completion of construction by 2021.
- As many as 10 modular refineries are also at 'advanced stages of development' according to vice president Osinbajo. This could add as much as 300,000b/d of processing capacity.

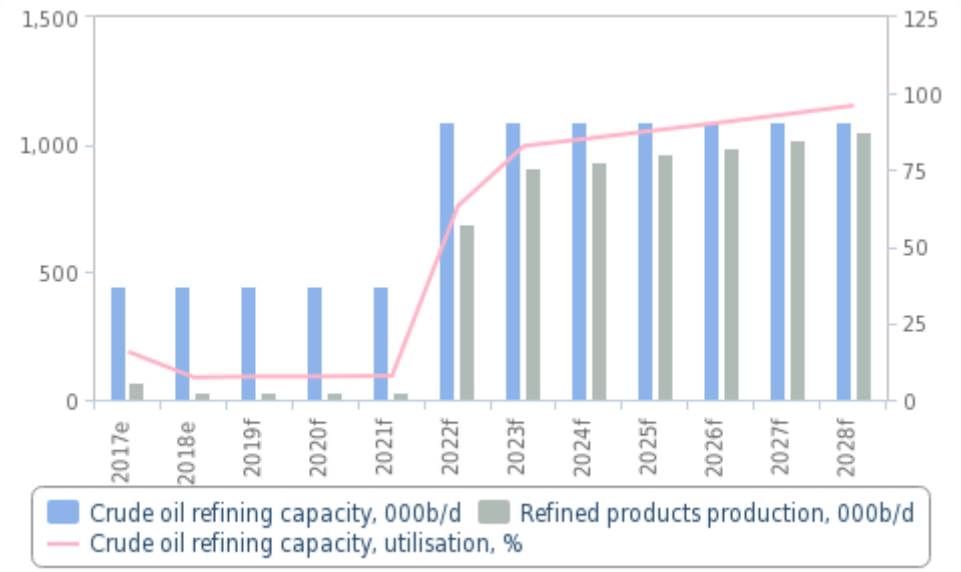
Nigeria has a nameplate refining capacity of 445,000b/d. However, these refineries operate sporadically and at different rates given limitations from age infrastructure and lack of regular maintenance and poor margins. As a result, outages are commonplace. In addition, the inconsistent supply of feedstock adds to rates of efficiency.

Over 2017, utilisation rates across Nigeria's four refineries were 16.5%. Given the Kaduna facility still operates with a 100% analogue system, there is little scope for it to operate and compete effectively. The Warri and Port Harcourt facilities have seen some improvements made, yet have failed to operate consistently and effectively.

Dangote's planned refinery in the Lekki Free Zone will change this, offering a significant capacity and efficiency boost to the sector. The vast 650,000b/d facility is under construction and likely to be ready by 2022, though there is increasing downside risk to this timeline amid reports of major delays. Dangonte will substantially increase Nigeria's refined fuel output once it comes online.

Dangote Refinery Will Boost Capacity

Nigeria - Refining Forecast (2017-2028)



f = Fitch Solutions forecast. Source: EIA, Fitch Solutions

Structural Trends

Reforms to fuels import liberalisation have been making headway. In July 2017, the NNPC launched its second Direct Sale of Crude Oil & Direct Purchase of Products Program (DSDP). The DSDP was designed to replace the previous Crude Oil Swap initiative that was suspended early last year due to a parliamentary committee revealing major corruption in the deals.

Under the DSDP model, the NNPC offers a tender to overseas refiners, trading companies and indigenous companies. These companies work in pairs, with one company procuring refined fuels which are exchanged for a shipment of crude oil of equal value. For example, a crude oil trader will combine with an international refiner to satisfy the requirements. The advantage of the DSDP model is that removes the costly middlemen that were involved in the Crude Oil Swaps and avoids the problems surrounding US Dollar liquidity and weak exchange rates.

The DSDPs will play an important role in plugging Nigeria's refined fuels deficit, with our forecasts showing Nigeria's refining sector will be unable to meet domestic demand until 2022.

NNPC reported December 2018 94.4% of domestic crude oil were processed under DSDP. In the last quarter of 2018, the NNPC and BP signed a supply agreement under the DSDP for crude swaps for refined fuels.

Moving Refining To The Private Sector

The 650,000b/d Dangote Refinery will be the most important change in Nigeria downstream in decades. The facility which was initially planned to start up in Q119 has been set back to Q120, and in mid-2018 delayed further to 2022. From 2022, Nigeria will have the capability to become a net refined fuels exporter, eradicating the need for refined fuels imports.

The USD11bn project, which will also integrate a fertiliser and petrochemical complex into the vast refinery, is under construction and not too far beyond schedule. The fertiliser plant is expected to begin producing Urea in 2019. The delays indicate the potential for further slippage in completion timeframe.

A second privately owned facility, backed by Petrolex Oil & Gas, is undergoing a feed study. The 250,000b/d refinery would be constructed in Ogun State and is initially due to cost USD3.6bn. A fertiliser plant, lubricants facility and LPG plant may also be constructed in combination with the refinery. The company is targeting a 2021 startup for the plant, though we are yet to include this in our forecast given the initial stages of development.

Modular Refiners

Modular refining licences were issued to 65 Nigerian companies in August 2015 as an attempt to use private investment to help domestic production of refined fuels. According to Vice President Osinbajo, as many as 10 modular refineries are at advanced stages of development, with two foreign built projects close to being shipped to Nigeria. This may add incremental capacity over the coming years, and more importantly, increase the local supply of products. However, we are yet to see any material progress with these projects.

In principle, this is an astute short-term fix to Nigeria's refining woes, as modular refineries can be quickly set up and leverage off existing infrastructure. In practice, we believe that the likelihood of private investors setting up modular refineries remains slim, despite the reasonable incentives offered. Investors will be deterred by the domestic subsidies reducing profit margins, no federal guarantee to supply feedstock and the arrival of the 650,000b/d Dangote Refinery, which is likely to come online in 2022.

REFINING CAPACITY AND REFINED PRODUCTS PRODUCTION (NIGERIA 2017-2022)

Indicator	2017e	2018e	2019f	2020f	2021f	2022f
Crude oil refining capacity, 000b/d	445.0	445.0	445.0	445.0	445.0	1,095.0
Crude oil refining capacity, % y-o-y	0.0	0.0	0.0	0.0	0.0	146.1
Crude oil refining capacity, utilisation, %	15.7	7.3	7.6	7.6	7.8	63.3
Refined products production, 000b/d	70.1	32.7	33.6	33.6	34.7	693.1
Refined products production, % y-o-y	14.0	-53.4	3.0	0.0	3.0	1,900.0
Refined products production & ethanol, 000b/d	70.1	32.7	33.6	33.6	34.7	693.1
Refined products production & ethanol, % y-o-y	14.0	-53.4	3.0	0.0	3.0	1,900.0

e/f = Fitch Solutions estimate/forecast. Source: EIA, Fitch Solutions

REFINING CAPACITY AND REFINED PRODUCTS PRODUCTION (NIGERIA 2023-2028)

Indicator	2023f	2024f	2025f	2026f	2027f	2028f
Crude oil refining capacity, 000b/d	1,095.0	1,095.0	1,095.0	1,095.0	1,095.0	1,095.0
Crude oil refining capacity, % y-o-y	0.0	0.0	0.0	0.0	0.0	0.0
Crude oil refining capacity, utilisation, %	82.9	85.4	88.0	90.6	93.3	96.1
Refined products production, 000b/d	908.0	935.2	963.3	992.2	1,021.9	1,052.6
Refined products production, % y-o-y	31.0	3.0	3.0	3.0	3.0	3.0
Refined products production & ethanol, 000b/d	908.0	935.2	963.3	992.2	1,021.9	1,052.6
Refined products production & ethanol, % y-o-y	31.0	3.0	3.0	3.0	3.0	3.0

f = Fitch Solutions forecast. Source: EIA, Fitch Solutions

Refined Fuels Consumption

Key View: *Better economic conditions, fuel availability and sales monitoring are seeing a strong rebound in Nigerian fuels consumption. We expect this to continue as the wider economy sees improving growth and more domestically supplied fuel becomes available.*

Latest Updates

- Data released for 2018 show significant increases in gasoline and diesel demand with increases from 2017 at 124% and 149% respectively. Consumption of refined products is forecast to decline 10.0% y-o-y in 2019, reaching 570,800b/d as the increased supplies from the election tail off and shortages begin to impact demand.
- According to data from the **Nigerian National Petroleum Corporation**, refined fuels consumption increased by around 127% y-o-y in 2018. Gasoline and diesel have been the main conduit of demand growth, with fuel imports increasing in during the year to ease supply shortages and improve availability ahead of elections in early 2019.
- Nigeria's GDP is forecast to grow by 2.4% in 2019 after growing by 1.9% in 2018 and growing by just 0.8% after recovery in 2017 from 2016 negative growth of 1.6%. This will support further refined fuels demand growth but not till 2021.

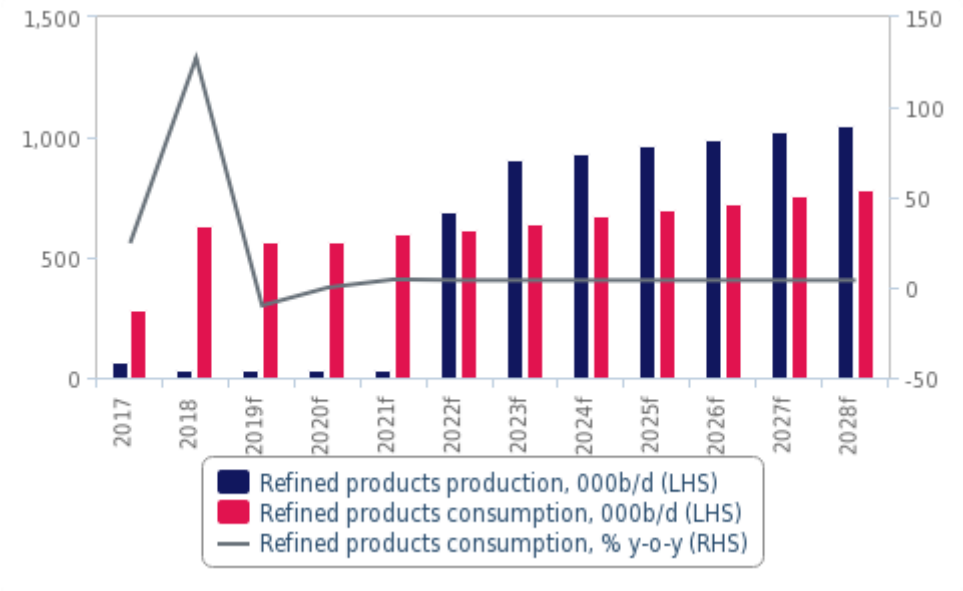
Structural Trends

We expected overall refined fuels consumption to increase throughout our forecast period, as the economy continues to develop and expand. Gasoline is the dominant fuel, with consumption forecast to moderate down to 448,600b/d in 2019, from 498,400b/d in 2018 as the run-up prior to elections wane and the supply surplus decreases. Direct Sale-Direct Purchase arrangements look to prevent shortages though any disruption could cause access to decrease stifling demand.

Kerosene, diesel and residual fuel are the secondary fuels in terms of consumption and are all set to steadily increase over the coming years. Transport is the main sector driving fuels consumption growth, with total vehicle fleet expected to expand from 2.1mn in 2017 to 3.1mn in 2022.

Net Exports Due As Consumption Fails To Keep Pace

Nigeria - Refined Products Production & Consumption Forecast (2017-2028)



f = Fitch Solutions forecast. Source: NNPC, JODI, Fitch Solutions

Fuels Consumption Growth Resetting Uptrend

Nigeria's refined fuel consumption is showing signs of recovery after three years of negative or weak demand growth. Many of the headwinds faced since 2014 have somewhat abated and will continue to dissipate over the coming quarters. The Nigerian economy is recovering from the recession and grew 1.9% in 2018 and is expected to grow 2.4% in 2019, while fuels import bottlenecks have eased and distribution efficiency improved. These factors are resulting in a substantially stronger uptake of fuels, in particular, diesel and gasoline ahead of 2019 elections.

With the better access to and more reliable availability of fuels, consumption has grown aggressively since early 2017. We anticipate much of this pent up demand has been satiated and consumption growth will return more in line with traditional correlating factors such as economic growth, population growth and vehicle ownership.

Oil In The Power Sector

The transport sector accounts for the largest share in Nigeria's refined fuels consumption. Electricity generation remains overwhelmingly gas-powered and accounted for 75% of electricity generation in 2018, followed by hydropower, which accounted for some 25% of power generation. Fuel use in power generation is expected to decrease over the coming years as gas supply grows and delivery becomes more consistent.

However, given the unreliability of the Nigerian power sector, diesel is commonly consumed by private generators, to provide cover during the regular power outages. Nigeria has one of the lowest net electricity generation per capita rates in the world. Because of constant power outages and insufficient generation to meet demand, many businesses and households depend on private generators as back-ups during outages, which results in increased oil consumption.

Price Hikes Will Not Impact Robust Consumption

In 2016, Nigerian Minister of Petroleum Resources Immanuel Kachikwu's broader downstream reforms, saw the official price of petrol increased 67.6% from NGN86.5/l to NGN145.0/l. In addition, there was a relaxation on rules governing how fuel importers gain access to dollars, extending the lifespan of the naira peg. As of 2018 gasoline prices remain fixed at NGN145/l.

There have been suggestions that prices will rise again, a possibility given Nigerian fuels remain among the lowest cost in the world, though unlikely in the near term given 2019 is an election year. We envisage any increase will be marginal, though depending on the aggressiveness of demand growth higher prices could be sought. The ministry ruled out a hike to start 2019 though this may change as the year progresses.

We forecast that Nigeria's fuels consumption will grow robustly over our 10-year forecast. This is typical for an emerging economy with strong demographics, construction sector growth and private consumption expansion. Our Infrastructure team expects Nigeria's construction industry to grow at an average of 7% y-o-y over the next decade and will be a major factor driving middle distillate demand. An improvement in supplies to Nigeria's poorly served fuels market presents upside risk to consumption.

This should further improve with greater domestic refining capability from 2022. In addition, the rapid increase in private consumption spending and vehicles sales will further compound Nigerian thirst for gasoline in the coming years.

REFINED PRODUCTS CONSUMPTION (NIGERIA 2017-2022)

Indicator	2017	2018	2019f	2020f	2021f	2022f
Refined products consumption, 000b/d	279.2	634.3	570.8	570.8	596.5	620.4
Refined products consumption, % y-o-y	24.6	127.2	-10.0	0.0	4.5	4.0

f = Fitch Solutions forecast. Source: NNPC, JODI, Fitch Solutions

REFINED PRODUCTS CONSUMPTION (NIGERIA 2023-2028)

Indicator	2023f	2024f	2025f	2026f	2027f	2028f
Refined products consumption, 000b/d	645.2	671.0	697.8	725.7	754.8	785.0
Refined products consumption, % y-o-y	4.0	4.0	4.0	4.0	4.0	4.0

f = Fitch Solutions forecast. Source: NNPC, JODI, Fitch Solutions

Gas Consumption

Key View: *Gas consumption will grow throughout our forecast period as greater availability drives more use in the power sector, however, gas will remain below the government's desired targets due to a lack of investment in vital infrastructure.*

Latest Updates

- More consistent gas supply will support greater use of natural gas in the power sector over 2019.
- Investment into natural gas projects should spur this further over the coming years.
- New gas pipeline infrastructure should improve the delivery and reliability of gas supply to power and industry as the OB3 pipeline project looks to provide steady supplies for thermal power generation in the Niger Delta region.

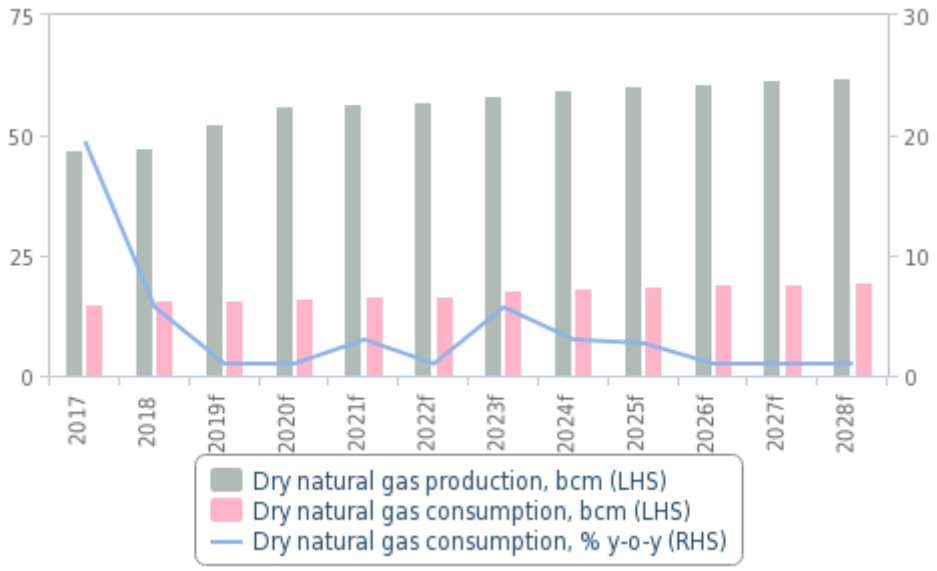
Structural Trends

Nigeria's electricity sector is dominated by gas power stations which accounted for around 75% of total generation in 2018. This is down from around 82% prior to supply disruptions in the Niger Delta. It has been this inconsistency in supply that has plagued Nigeria's gas sector.

We have become more optimistic over 2019, given our expectations for more stable gas feedstock supply to power stations which should result in restored levels of natural gas consumption. As a result, we expect that gas-fired power's contribution to total electricity generation will remain stable. Growing supply from new gas projects will also add to this uptrend, enabling more gas to be consumed. Increased and consistent supply of gas will be key to economic development and industrialisation.

Gas Consumption Stagnates As Investments Needed

Nigeria - Gas Production and Consumption Forecast (2017-2028)



f = Fitch Solutions forecast. Source: EIA, Fitch Solutions

Increasing Focus On Gas

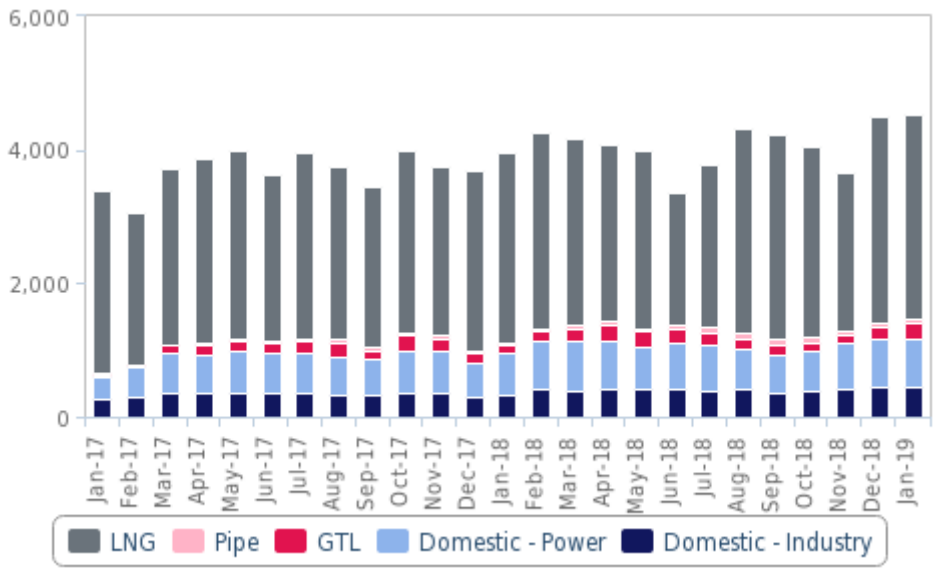
Nigeria is attempting to invigorate its domestic industry, following the country's passing of the new National Gas Policy. This follows the previously unsuccessful National Gas Master Plan implemented by then-president Yar'Adua, in 2008. The overall objective of the new policy is broadly the same as the last one - utilise Nigeria's vast gas reserves domestically in both power and industry and shift focus from exports (successfully developing its Bonny LNG terminal).

The 2008 plan aimed to simultaneously build out gas production, domestic gas power capacity and expand supporting infrastructure. Gas production has been a success story, growing from 32.5bcm in 2008 to 44.4bcm in 2017. We forecast around 6.3bcm of new gas production capacity will be brought online in 2019 from companies such as **Shell** and **Chevron**, which were encouraged to invest in monetising gas resources to supply the supposed burgeoning domestic demand.

However, the build out of domestic power, industry and infrastructure has not materialised. The infrastructural constraints are the main reasons we believe the government will not reach its ambitious target of tripling gas supply for domestic consumption from around 12.7bcm currently to 50bcm by 2020.

Gas Consumption Recovering

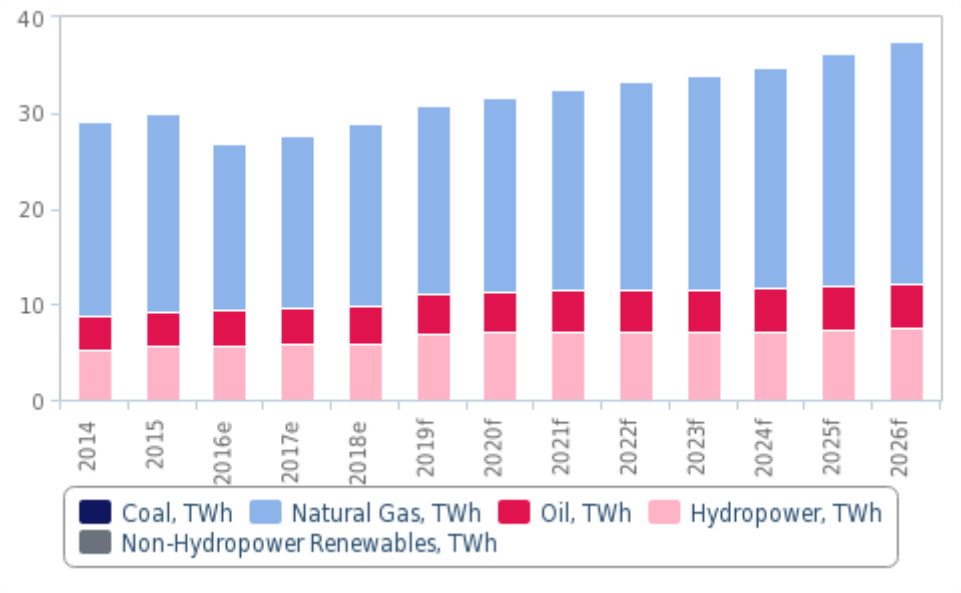
Nigeria's Domestic Power & Industry Gas Consumption, bcm



Source: NNPC, Fitch Solutions

More Gas = More Power

Nigeria - Electricity Generation, TWh



e/f = Fitch Solutions estimate/forecast. Source: National sources, Fitch Solutions

Effects Of A New Petroleum Industry Bill

- There is a greater focus on making the gas market more transparent with the creation of an independent regulator and a clear separation between public and private sector involvement.
- The **Nigeria Gas Company** will be split into two new companies, one focusing on transport and the other on gas-marketing.
- Greater LPG consumption will be encouraged for use in Nigerian homes, with efforts to debottleneck supply shortages of gas cylinders needed to transport the fuel around.

All these policies are welcomed additions and, if implemented, will encourage greater private sector involvement in the midstream and power assets.

GAS CONSUMPTION (NIGERIA 2017-2022)						
Indicator	**2017**	**2018**	**2019f**	**2020f**	**2021f**	**2022f**
Dry natural gas consumption, bcm	15.0	15.8	16.0	16.1	16.6	16.8
Dry natural gas consumption, % y-o-y	19.5	5.7	1.0	1.0	3.0	1.0

f = Fitch Solutions forecast. Source: EIA, Fitch Solutions

GAS CONSUMPTION (NIGERIA 2023-2028)						
Indicator	**2023f**	**2024f**	**2025f**	**2026f**	**2027f**	**2028f**
Dry natural gas consumption, bcm	17.8	18.3	18.8	19.0	19.2	19.4
Dry natural gas consumption, % y-o-y	5.7	3.0	2.7	1.0	1.0	1.0

f = Fitch Solutions forecast. Source: EIA, Fitch Solutions

Oil Trade

Key View: *Nigeria's crude exports have recovered from the disruption in the Niger Delta. Higher oil prices should result in limited unrest in oil-producing regions and allow exports to return to remain at pre-disruption levels over 2019. The Dangote refinery, forecast for completion in 2022, will see Nigeria become a refined fuels net exporter by 2022.*

Crude Oil Trade Forecast

Latest Updates

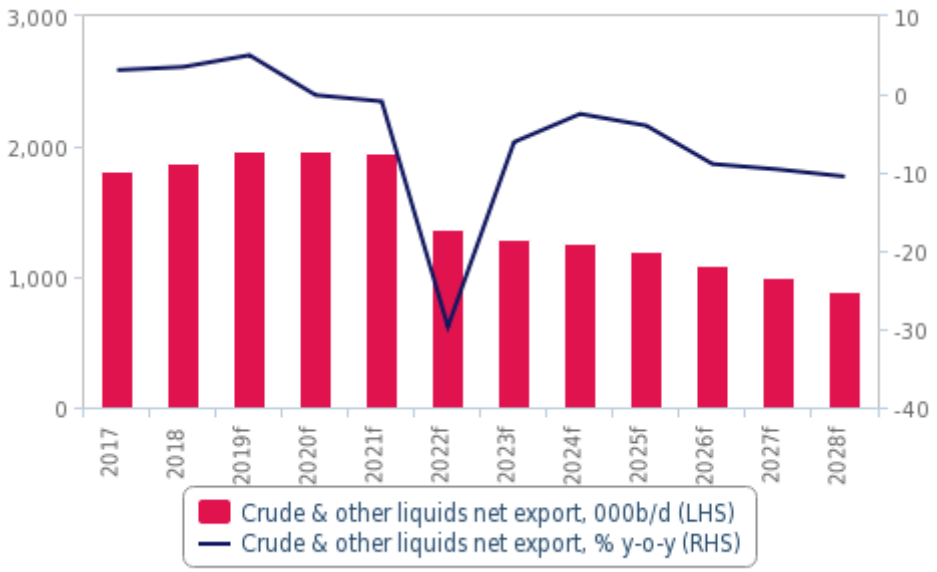
- Nigeria's crude oil exports have recovered from the disruptions in the Niger Delta over recent years.
- We expect exports reached 1.88mn b/d in 2018 and forecast a rise to 1.98mn b/d 2019 an increase of 5% over 2018.
- We forecast crude exports to remain at pre-disruption levels in 2019 but will decline heavily from 2022 when more oil is processed domestically.

Structural Trends

The limited pipeline of new oil production projects will weigh on Nigeria crude exports once the Dangote refinery starts up in 2022. Prior to this, we expect a recovery in oil exports over 2018 as disruptions to the operating environment remain mild. An improved operating environment over 2017-2018 has seen crude oil exports recover with the start-up of the Egina field in late 2018. However, the impacts of OPEC+ agreements will limit production and cap export volumes though the designation of condensate may allow total liquids exports to increase while still maintaining the OPEC production cuts though compliance has been lax year to date.

Crude Oil Net Exports Set To Drop In 2022

Nigeria - Crude Oil Net Exports Forecast (2017-2028)



f = Fitch Solutions forecast. Source: NNPC, EIA, Fitch Solutions

The 650,000b/d Dangote refinery will make a significant imprint on crude oil exports from 2022 when we expect more domestic crude to be processed at the facility. Additionally, the possibility of new refineries and/or improved utilisation rates at existing facilities may further erode the availability of crude oil for export, given our view for relatively flat supply crude supply over the next five years.

From The US To Asia

Nigerian crudes are having a minor resurgence in the US market filling the gap left by falling Lower 48 production. Prior to the US shale boom, the country was Nigeria's primary export market. However, the rapid growth in light tight oil displaced Nigeria's light sweet crude. The result was a fall from an average of around 1mn b/d between 2004-2007 to just 122,000b/d in 2017.

Nigeria has been building up its market share of Indian crude imports over the last three years, with Nigerian crudes increasingly heading to Asian countries. India is an important market for Nigeria as its booming economy demands more energy, making it one of the key global growth markets for crude.

We expect Nigerian crudes to remain in favour over the coming years as India seeks to satisfy its thirst for gasoline. The sweet, light composition of Nigerian crudes offers a higher inherent yield of gasoline, giving them a competitive advantage over heavier, sourer varieties. With gasoline demand forecast to continue its expansion, refiners will seek crude grades that produce higher gasoline yields, such as Nigeria's.

Additionally, the low sulphur content of Nigeria crudes will become more sought after following IMO regulations on shipping fuel in 2020. Light crudes like Bonny, still deliver a decent middle distillate yield and will be needed to support fuel standard compliance.

CRUDE OIL NET EXPORTS (NIGERIA 2017-2023)

Indicator	2017	2018	2019f	2020f	2021f	2022f	2023f
Crude & other liquids net export, 000b/d	1,818.2	1,881.1	1,975.8	1,973.3	1,954.8	1,373.7	1,290.4
Crude & other liquids net export, % y-o-y	3.1	3.5	5.0	-0.1	-0.9	-29.7	-6.1
Crude & other liquids net export, USDbn	34.8	47.9	50.5	55.5	57.8	41.1	38.6

f = Fitch Solutions forecast. Source: EIA, Fitch Solutions

CRUDE OIL NET EXPORTS (NIGERIA 2023-2028)

Indicator	2023f	2024f	2025f	2026f	2027f	2028f
Crude & other liquids net export, 000b/d	1,290.4	1,258.0	1,207.4	1,099.5	993.8	889.9
Crude & other liquids net export, % y-o-y	-6.1	-2.5	-4.0	-8.9	-9.6	-10.5
Crude & other liquids net export, USDbn	38.6	37.7	36.1	32.9	29.7	26.6

f = Fitch Solutions forecast. Source: EIA, Fitch Solutions

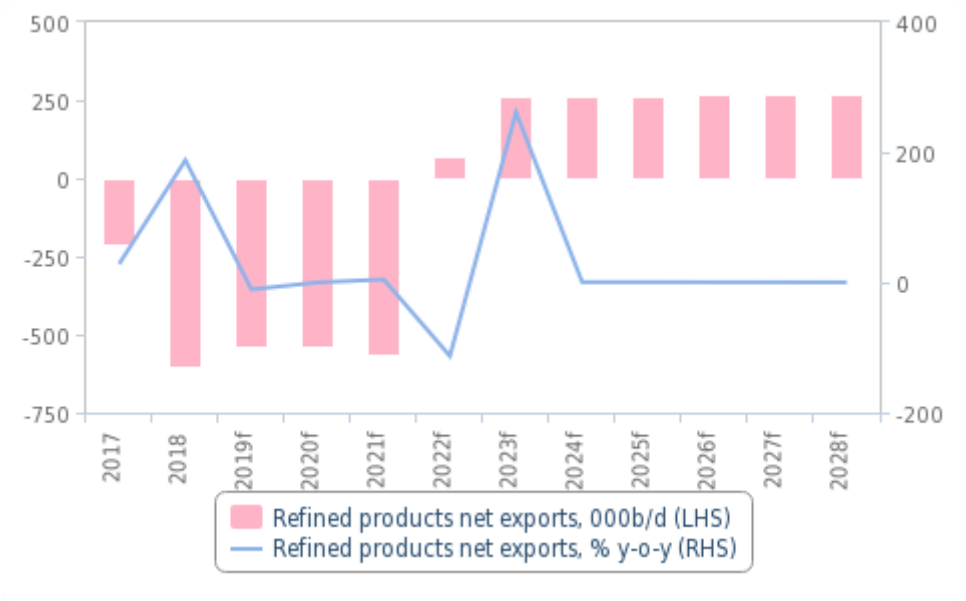
Refined Fuels Trade Forecast

Latest Updates

- **Nigerian National Petroleum Corporation** is trying to encourage greater uptake of LPG to reduce Nigeria's reliance on imported gasoline and diesel.
- The Dangote Refinery in Lekki will negate the need for refined fuel imports from 2022.
- Upside could develop from modular refining output and new refineries, though this is not factored into our forecast.

Dangote Refinery Creates Export Surplus

Nigeria Refined Products Net Exports Forecast (2017-2028)



f = Fitch Solutions forecast. Source: EIA, Fitch Solutions

Structural Trends

Despite having a refinery nameplate capacity that exceeds domestic demand, Nigeria relies on significant imports of refined fuels, due to low refinery utilisation rates. Nigeria's refined fuels consumption is forecast to increase steadily up to 2027, while refining output remains crippled by low utilisation rates. The start of the Dangote refinery in the 2022 has the potential to transform Nigeria into a net exporter again for the first time since 1997.

Nigeria imported some 210,000b/d of refined fuels in 2017, which will rose significantly in 2018 as demand improved as supplies increased through the import of 490,000b/d of refined fuels in 2018. This comes at a significant cost to Nigeria, as the majority of refined fuels imports originated from the US. Nigeria also imported a significant amount of refined fuels from Russia, Sweden and India.

REFINED FUELS NET EXPORTS (NIGERIA 2017-2022)

Indicator	2017	2018	2019f	2020f	2021f	2022f
Refined products net exports, 000b/d	-209.1	-601.6	-537.2	-537.2	-561.9	72.7
Refined products net exports, % y-o-y	28.5	187.7	-10.7	0.0	4.6	-112.9
Refined products net exports, USDbn	-5.0	-17.3	-15.8	-16.0	-17.0	4.9

f = Fitch Solutions forecast. Source: EIA, Fitch Solutions

REFINED FUELS NET EXPORTS (NIGERIA 2023-2028)

Indicator	2023f	2024f	2025f	2026f	2027f	2028f
Refined products net exports, 000b/d	262.8	264.2	265.5	266.4	267.2	267.6
Refined products net exports, % y-o-y	261.2	0.5	0.5	0.4	0.3	0.2
Refined products net exports, USDbn	11.6	11.6	11.8	11.8	12.0	12.1

f = Fitch Solutions forecast. Source: EIA, Fitch Solutions

Gas Trade

Key View: *Strong LNG exports, steady pipeline exports and increasing domestic demand, make the case for increasing LNG export capacity and investment thermal power generation more compelling.*

Latest Updates

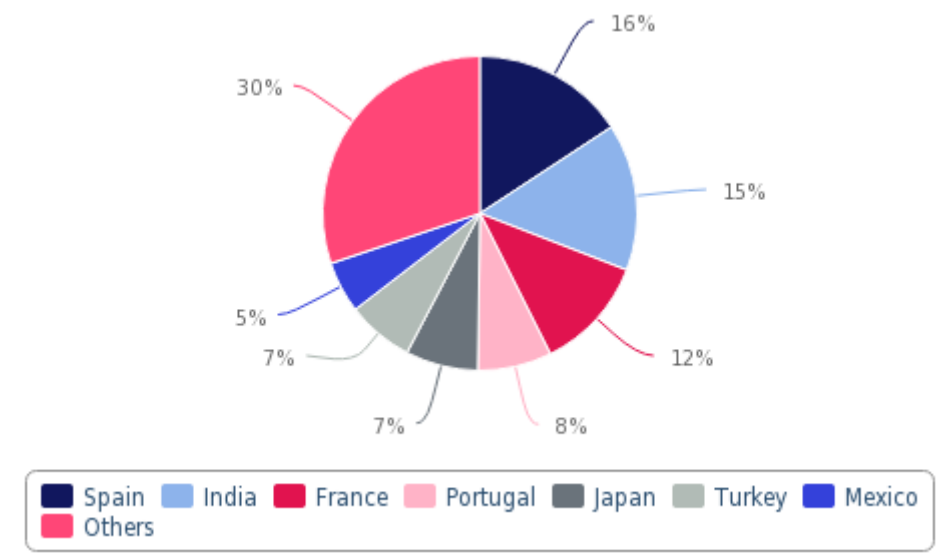
- **Nigeria LNG** (NLNG) is targeting an FID on a seventh LNG export train at the Bonny facility in 2019.
- More consistent gas production should result in greater gas delivery to the domestic power and industrial sectors.

Structural Trends

Nearly 40% of Nigerian gas is exported as LNG, whereas the rest is consumed domestically, used in non-commerical forms re-injection, fuel gas, and flaring with small amounts exported via the West African Gas Pipeline. Nigeria's LNG market has been growing quite significantly since the opening of the Bonny Island Terminal in 1999. The terminal currently has six liquefaction trains and a production capacity of about 30bcm per annum.

Nigeria exported around 35.8bcm of LNG in 2018 vs 31.5bcm in 2017, according to data from **Nigerian National Petroleum Corporation**. Spain-, India-, France-, Portugal- and Japan-led demand for Nigerian LNG in 2017. As global LNG capacity is set to expand over our forecast period, keeping prices competitive and supplies consistent will be imperative for Nigeria's LNG export sector.

Europeans Lead Offtakers
Nigeria LNG Exports By Country, 2017



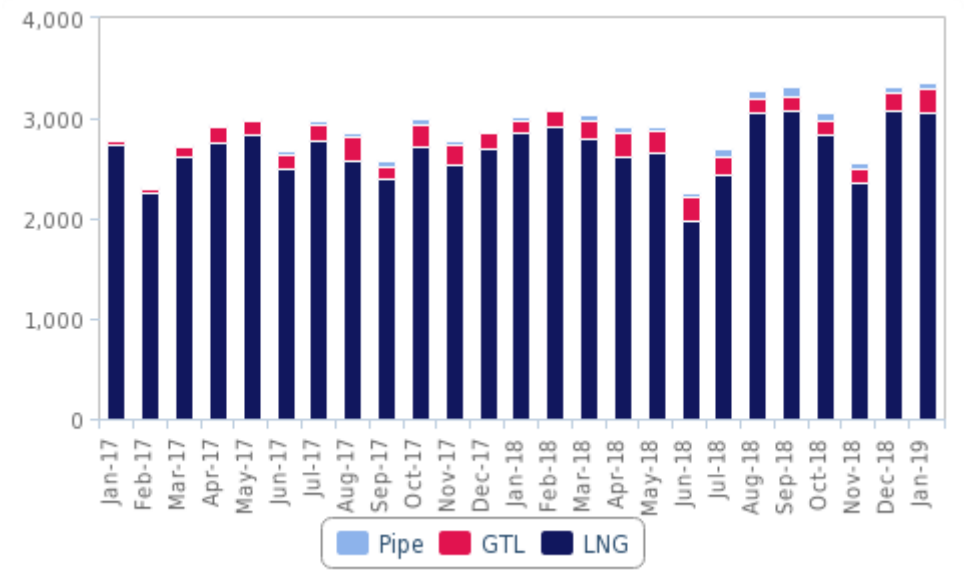
Source: GIIGNL, Fitch Solutions

Nigeria's LNG exports have been largely unimpacted by the Delta security situation, and the more recent stability has allowed greater exports from the West African Gas Pipeline, though payment for exported pipeline gas remains an issue and limits growth in the area.

The domestic appetite for gas in Nigeria remains underfed, consuming 14.8bcm in 2018 against 15.0bcm in 2017. For many years Nigeria has been attempting to foster and grow a gas-based economy, taking advantage of its vast reserves which at the end of 2017 stood at 5.11tcm, putting it ninth in our global rankings data.

LNG Exports Hold Up Despite Security Issues

Nigeria's Natural Gas Exports, bcm



**WAPG= West African Pipeline Gas, NLNG= Nigerian LNG. Source: NNPC, Fitch Solutions*

One bright spot of Nigeria's petroleum sector has been strong LNG exports. With NLNG operating at full capacity and new gas production capacity coming online without a home, the impetus behind developing additional LNG capacity will grow. A seventh train at the NLNG Bonny facility is being touted, with an FID planned by Q119. If the project materialises, it would increase export capacity to around 41bcm.

The consistency in supply shown during the intense insurgency over 2016, will give some reassurance to investors worried about security issues if NLNG was pushed for expansion.

GAS NET EXPORTS (NIGERIA 2017-2022)

Indicator	2017	2018	2019f	2020f	2021f	2022f
Dry natural gas net exports, bcm	32.0	31.6	36.3	39.9	40.0	40.4
Dry natural gas net exports, % y-o-y	12.6	-1.4	15.0	9.9	0.2	1.0
Dry natural gas net exports, USDbn	8.4	11.0	12.6	15.3	16.1	16.5
Pipeline gas net exports, bcm	0.4	0.7	0.4	0.4	0.4	0.4
Pipeline gas net exports, % y-o-y	254.5	87.2	-45.2	0.0	0.0	0.0
Pipeline gas net exports, % of total	1.2	2.3	1.1	1.0	1.0	1.0
LNG net exports, bcm	31.7	30.8	31.0	31.0	31.0	31.0
LNG net exports, % y-o-y	11.7	-2.6	0.5	0.0	0.0	0.0
LNG net exports, % of total gas exports	98.8	97.7	85.4	77.6	77.5	76.7

f = Fitch Solutions forecast. Source: EIA, Fitch Solutions

GAS NET EXPORTS (NIGERIA 2023-2028)						
Indicator	**2023f**	**2024f**	**2025f**	**2026f**	**2027f**	**2028f**
Dry natural gas net exports, bcm	40.6	41.4	41.5	41.9	42.3	42.8
Dry natural gas net exports, % y-o-y	0.5	2.0	0.2	1.0	1.0	1.0
Dry natural gas net exports, USDbn	16.6	16.9	16.9	17.1	17.3	17.4
Pipeline gas net exports, bcm	0.4	0.5	0.5	0.5	0.5	0.5
Pipeline gas net exports, % y-o-y	0.0	25.0	0.0	0.0	0.0	0.0
Pipeline gas net exports, % of total	1.0	1.2	1.2	1.2	1.2	1.2
LNG net exports, bcm	41.0	41.0	41.0	41.0	41.0	41.0
LNG net exports, % y-o-y	32.3	0.0	0.0	0.0	0.0	0.0
LNG net exports, % of total gas exports	101.0	99.0	98.8	97.8	96.8	95.9

f= Fitch Solutions forecast. Source: EIA, Fitch Solutions

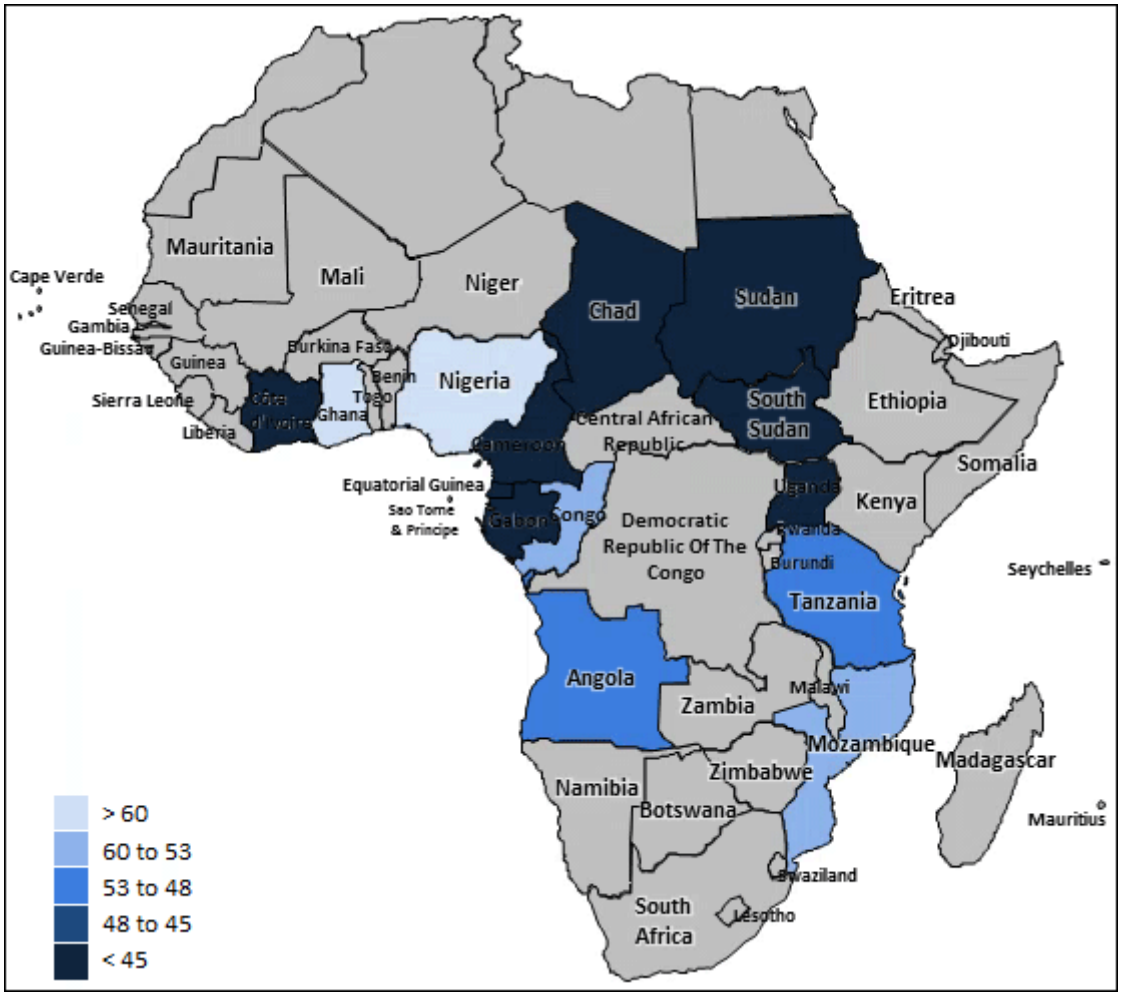
Industry Risk/Reward Index

SSA Upstream Oil & Gas Risk/Reward Index

Key View: *SSA continues to underperform every other region in our Upstream Risk/Reward Index globally. A large reserves and production base and substantial under-explored acreage is offset by elevated risks above ground, deterring investment.*

Above Ground Weakness Masking Opportunities Below Ground

SSA - Upstream Oil & Gas Risk/Reward Index



Note: Scores out of 100; higher score = more attractive market. Source: Fitch Solutions

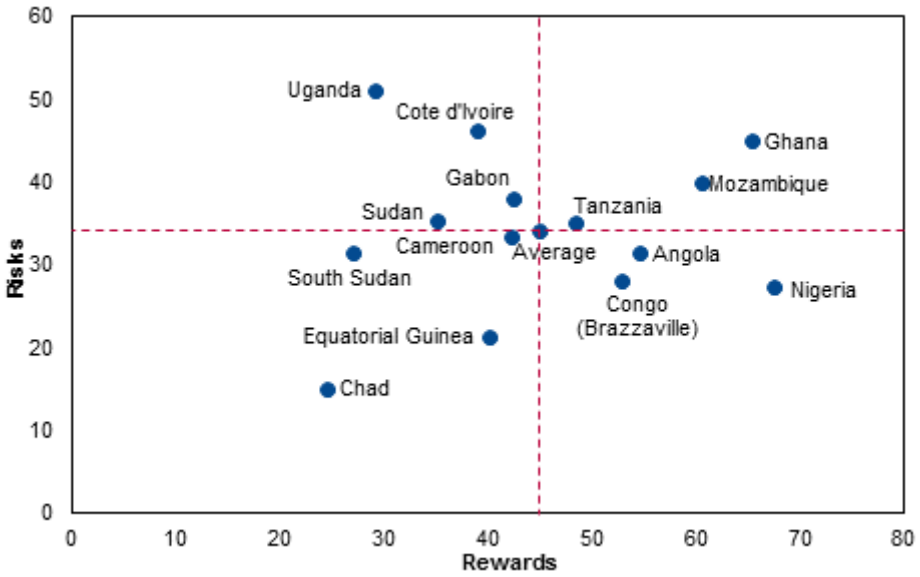
Main Regional Features And Latest Updates

- SSA's upstream, despite a large discovered resource base and significant production potential, continues to be dogged by weak risk profiles, which drag on the region's overall Risk/Reward Index (RRI). The region is the global underperformer, with an average upstream RRI score of 43.8 out of a maximum 100.0.
- Risks are elevated across the region owing to chronic political and economic instability, challenging operating environments and unfavourable fiscal and licensing terms. This is only partly offset by a stronger rewards showing, supported by a high discovery rate, strong production growth and a diverse competitive landscape.
- West Africa continues to dominate the rankings, although a large resource base and expanding projects pipeline have buoyed Mozambique into third position.

- The region's underperformers, including Chad, Sudan and South Sudan, typically boast large resource bases. However, pervasive insecurity has derailed exploration and production efforts, while operational, political and economic risks are critically high.

High Risk, Low Reward Region

SSA - Upstream Risk/Reward Snapshot



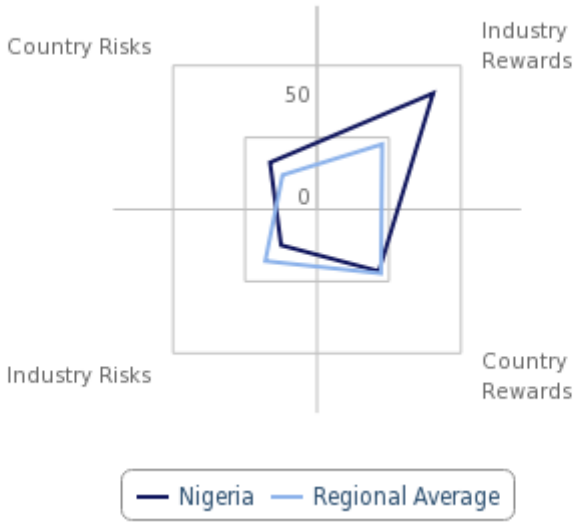
Note: Scores out of 100; higher score = more attractive market. Source: Fitch Solutions

West Africa Topping The Charts

Five markets in SSA boast a composite Upstream RRI score above the global average - Nigeria, Ghana, Mozambique, Angola and Congo-Brazzaville. Nigeria and Angola are the dominant producers in the region, but have faced a challenging few years. Nigeria holds a large oil reserves base, but a fractious political and security environment and wide-ranging fiscal and regulatory uncertainties have led to chronic underinvestment in the sector, curtailing exploration and production. The Petroleum Industry Bill holds the potential to unlock a new wave of investment, but progress towards its passage remains slow. Both Nigeria and Angola are characterised by a heavy state presence in the sector, a bloated bureaucracy, pervasive corruption and an unfavourable fiscal and licensing regime. However, ongoing reform efforts in Angola are beginning to reflect in the RRI, with the country moving from fifth to fourth position this quarter.

High Industry Risk Marring Rewards

Nigeria & SSA - Upstream Risk/Reward Index

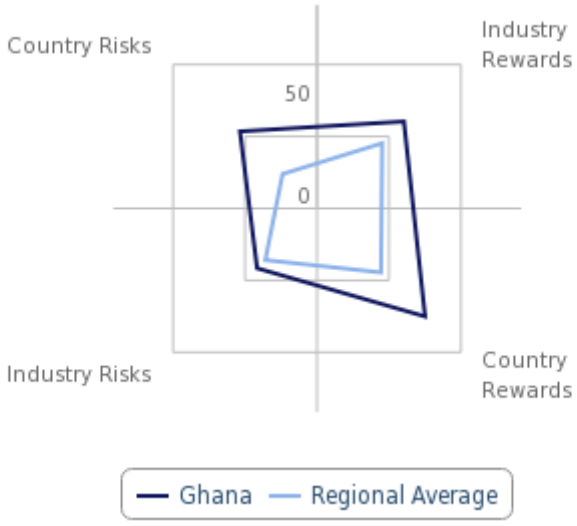


Note: Scores out of 100; higher score = more attractive market. Source: Fitch Solutions

Ghana and Congo-Brazzavile have both emerged as bright spots in the region over recent years. The resource base in both Ghana and Congo-Brazzaville is small in global terms, but significant investment has supported strong production growth in recent years. Combined with a relatively low level of risk, this has allowed them to eclipse a number of the region's heavyweights in our Upstream RRI. The lifting of the offshore drilling moratorium is a positive sign for exploration and development in Ghana and progress towards monetisation of a number of discovered fields, including Pecan, have substantially improved longer-term prospects for production.

Ghana Making Its Presence Felt

Ghana & SSA - Upstream Risk/Reward Index



Note: Scores out of 100; higher score = more attractive market. Source: Fitch Solutions

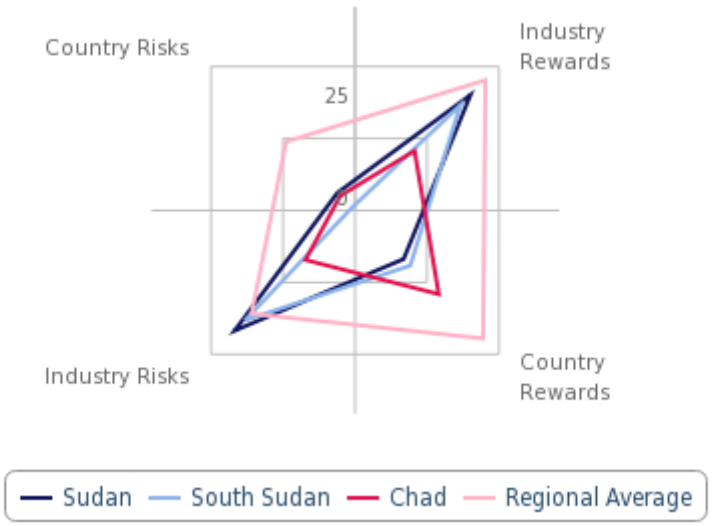
Mozambique holds a similar Risk/Reward profile. Its position in the index is supported by a large offshore gas resource base and strong forecast production growth. An FID has been taken on the Coral FLNG project, and the planned FID on a larger onshore facility underscores the market's potential. Incremental sector reforms have subdued Industry Risk, but broader political and economic risks remain elevated.

Underperformers Crippled By Risk

The region's underperformers - Chad, Sudan and South Sudan - share a number of common features. Chronic and pervasive instability has caused widespread disruption to the upstream oil sector, limiting industry rewards, despite large resource bases. Heavy state ownership of assets, poor infrastructural and high operating risks combine with unfavourable fiscal and licensing terms to deter investment. The outlook on all three is bearish and we see little upside risk over the coming quarters.

Major Producers Struggling

South Sudan, Sudan, Chad & SSA - Upstream Risk/Reward Index



Note: Scores out of 100; higher score = more attractive market. Source: Fitch Solutions

UPSTREAM RISK/REWARD INDEX

	Industry Rewards	Country Rewards	Rewards	Industry Risks	Country Risks	Risks	RRI	Regional Rank	Global Rank
Nigeria	84.2	42.5	67.5	26.1	32.6	27.4	63.5	1	10
Ghana	58.4	75.9	65.4	42.8	53.5	45.0	63.3	2	11
Mozambique	62.4	57.7	60.5	45.1	18.9	39.8	58.4	3	20
Angola	52.4	57.7	54.5	32.5	26.9	31.4	52.2	4	30
Congo (Brazzaville)	52.2	53.7	52.8	31.5	14.4	28.1	50.4	5	34
Tanzania	49.0	47.5	48.4	34.3	38.6	35.2	47.1	6	41
Gabon	35.1	53.2	42.3	39.9	30.7	38.0	41.9	7	48
Cameroon	37.8	49.0	42.3	35.4	25.5	33.4	41.4	8	49
Cote d'Ivoire	29.4	53.5	39.0	49.1	34.5	46.2	39.7	9	54
Equatorial Guinea	46.1	31.3	40.2	22.7	15.5	21.3	38.3	10	55
Sudan	47.5	16.7	35.1	42.5	6.1	35.2	35.2	11	60
Uganda	25.1	35.3	29.2	56.1	31.0	51.1	31.4	12	63
South Sudan	32.2	19.2	27.0	39.0	1.0	31.4	27.4	13	65
Chad	21.5	28.9	24.4	17.5	5.1	15.0	23.5	14	68
Global Average	50.0	50.0	50.0	50.0	50.0	50.0	50.0	~	~
Regional Average	45.2	44.4	44.9	36.7	23.9	34.2	43.8	~	~

Note: Scores out of 100; higher score = more attractive market. Source: Fitch Solutions

UPSTREAM INDUSTRY RISKS							
	Royalties	Income Tax	Licence Type	Bureaucratic Environment	Legal Environment Risk	Industry Risks	Risks
Nigeria	50.0	4.5	41.8	9.0	25.4	26.1	27.4
Ghana	50.0	35.1	29.1	35.8	64.2	42.8	45.0
Mozambique	58.2	41.8	59.7	52.2	13.4	45.1	39.8
Angola	91.0	11.9	41.8	17.9	0.0	32.5	31.4
Congo (Brazzaville)	21.6	49.3	59.7	10.4	16.4	31.5	28.1
Tanzania	21.6	49.3	29.1	19.4	52.2	34.3	35.2
Gabon	58.2	35.1	59.7	16.4	29.9	39.9	38.0
Cameroon	72.4	23.1	29.1	20.9	31.3	35.4	33.4
Cote d'Ivoire	50.0	70.9	29.1	49.3	46.3	49.1	46.2
Equatorial Guinea	26.9	35.1	29.1	3.0	19.4	22.7	21.3
Sudan	72.4	70.9	29.1	28.4	11.9	42.5	35.2
Uganda	91.0	49.3	71.6	25.4	43.3	56.1	51.1
South Sudan	72.4	70.9	29.1	1.5	20.9	39.0	31.4
Chad	21.6	23.1	29.1	6.0	7.5	17.5	15.0
Global Average	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Regional Average	54.1	40.7	40.5	21.1	27.3	36.7	34.2

Note: Scores out of 100; higher score = more attractive market. Source: Fitch Solutions

UPSTREAM COUNTRY RISKS							
	Long-Term Economic Risk Index	Short-Term Economic Risk Index	Long-Term Political Risk Index	Short-Term Political Risk Index	Operational Risk Index	Country Risks	Risks
Nigeria	49.3	55.2	19.4	14.9	28.4	32.6	27.4
Ghana	32.8	40.3	86.6	71.6	44.8	53.5	45.0
Mozambique	7.5	7.5	28.4	28.4	20.9	18.9	39.8
Angola	13.4	16.4	38.8	65.7	13.4	26.9	31.4
Congo (Brazzaville)	10.4	9.0	16.4	29.9	10.4	14.4	28.1
Tanzania	28.4	23.9	59.7	53.7	32.8	38.6	35.2
Gabon	37.3	20.1	55.2	32.8	19.4	30.7	38.0
Cameroon	45.5	47.8	11.9	17.9	14.9	25.5	33.4
Cote d'Ivoire	51.5	58.2	17.9	16.4	31.3	34.5	46.2
Equatorial Guinea	11.9	13.4	9.0	44.0	7.5	15.5	21.3
Sudan	9.0	4.5	6.0	8.2	4.5	6.1	35.2
Uganda	35.8	30.6	32.8	35.8	25.4	31.0	51.1
South Sudan	0.0	3.0	1.5	1.5	0.0	1.0	31.4
Chad	3.0	11.9	4.5	8.2	1.5	5.1	15.0
Global Average	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Regional Average	24.0	24.4	27.7	30.7	18.2	23.9	34.2

Note: Scores out of 100; higher score = more attractive market. Source: Fitch Solutions

UPSTREAM INDUSTRY REWARDS							
	Oil Reserves	Gas Reserves	Discoveries Rate	Hydrocarbon Production	Hydrocarbon Production Growth	Industry Rewards	Rewards
Nigeria	86.6	86.6	88.1	79.1	80.6	84.2	67.5
Ghana	40.3	52.2	79.9	31.3	88.1	58.4	65.4
Mozambique	22.4	82.1	88.1	20.9	98.5	62.4	60.5
Angola	71.6	34.3	69.4	65.7	20.9	52.4	54.5
Congo (Brazzaville)	44.8	80.6	88.1	37.3	10.4	52.2	52.8
Tanzania	0.7	74.6	69.4	4.5	95.5	49.0	48.4
Gabon	50.7	11.9	69.4	26.9	16.4	35.1	42.3
Cameroon	20.9	25.4	54.5	17.9	70.1	37.8	42.3
Cote d'Ivoire	11.9	56.7	39.6	11.9	26.9	29.4	39.0
Equatorial Guinea	43.3	62.7	79.9	29.9	14.9	46.1	40.2
Sudan	68.7	79.1	16.4	19.4	53.7	47.5	35.1
Uganda	55.2	9.0	54.5	6.0	0.7	25.1	29.2
South Sudan	58.2	3.0	16.4	25.4	58.2	32.2	27.0
Chad	47.8	3.0	16.4	22.4	17.9	21.5	24.4
Global Average	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Regional Average	44.5	47.2	59.3	28.5	46.6	45.2	44.9

Note: Scores out of 100; higher score = more attractive market. Source: Fitch Solutions

UPSTREAM COUNTRY REWARDS					
	State Asset Ownership	Competitive Landscape	Infrastructure Integrity	Country Rewards	Rewards
Nigeria	48.5	19.4	59.7	42.5	67.5
Ghana	82.8	59.7	85.1	75.9	65.4
Mozambique	73.1	82.1	17.9	57.7	60.5
Angola	62.7	25.4	85.1	57.7	54.5
Congo (Brazzaville)	62.7	55.2	43.3	53.7	52.8
Tanzania	73.1	41.8	27.6	47.5	48.4
Gabon	82.8	52.2	24.6	53.2	42.3
Cameroon	48.5	80.6	17.9	49.0	42.3
Cote d'Ivoire	68.7	89.6	2.2	53.5	39.0
Equatorial Guinea	32.8	43.3	17.9	31.3	40.2
Sudan	26.9	16.4	6.7	16.7	35.1
Uganda	48.5	32.8	24.6	35.3	29.2
South Sudan	26.9	28.4	2.2	19.2	27.0
Chad	48.5	31.3	6.7	28.9	24.4
Global Average	50.0	50.0	50.0	50.0	50.0
Regional Average	56.2	47.0	30.1	44.4	44.9

Note: Scores out of 100; higher score = more attractive market. Source: Fitch Solutions

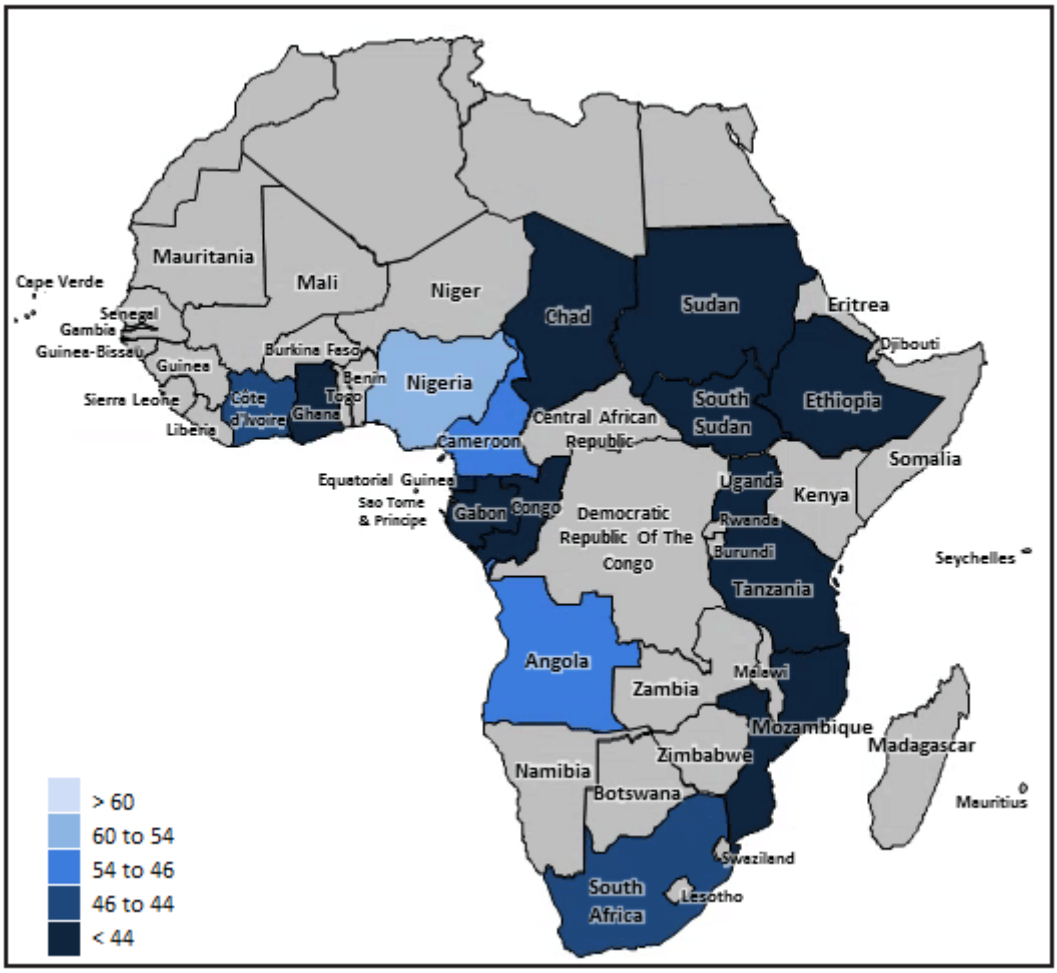
Please Note: *Our Risk/Reward Indices are updated frequently; as a result, scores in this section may not match scores in the rest of the report.*

SSA Downstream Oil & Gas Risk/Reward Index

Key View: *SSA substantially underperforms every other region in our Downstream Risk/Reward Index globally. Recovering economic growth and rising populations suggest the potential for reward, but market conditions remain challenging and the risks to investment are critically high.*

Opportunities To Invest Thin On The Ground

SSA Downstream - Regional RRI Heatmap



Note: Scores out of 100, higher score = more attractive market. Source: Fitch Solutions

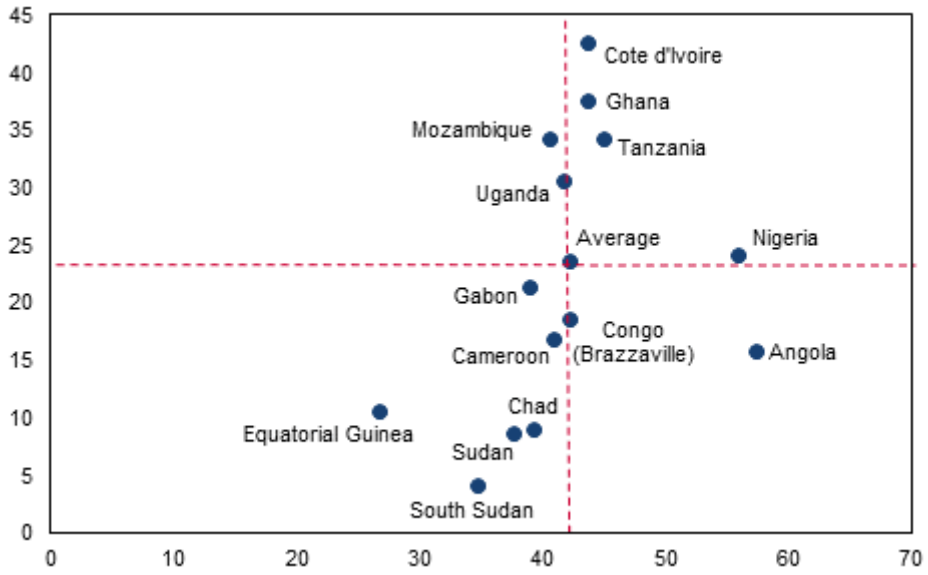
Regional Features And Latest Updates

- SSA significantly underperforms every other market in our global Downstream Risk/Reward Index (RRI) with a regional average score of 40.3.
- The region suffers from chronic underinvestment in its downstream sector, its refining capacity is ageing, inefficient and suffers frequent outages owing to insufficient crude feedstock and unplanned outages.
- A rising population and a strong fuels demand growth outlook help support SSA's Rewards profile. However, this is undermined by a high level of risk across the region, at both the sector and broader country level.
- The regional outperformers are Nigeria and Angola owing to the size of the domestic markets and the potential for growth.
- South Africa is showing creeping improvements across the board, although its performance in the index remains relatively poor, given the size of the domestic market and the scale of its refining capacity. It moved from fourth to third place this quarter, its second consecutive move up the table.

- Chad, Sudan, South Sudan and Equatorial Guinea lag in the index owing to their small domestic fuels markets, lack of infrastructure, unfavourable investment climates and chronic instability.

High Risks Cloud The Index

SSA - Downstream Risk/Reward Index



Note: Scores out of 100, higher score = more attractive market. Source: Fitch Solutions

SSA Plagued By Risk

The regional average Risk score for SSA is 23.7 out of a possible 100. Unstable political and economic outlooks, high logistical and operational risks, and the widespread use of fuel subsidies all weigh to the downside. Rewards are significantly greater with an average score of 42.2. Fuels demand growth is relatively strong, although it occurs from a low base. Large populations and recovering economies will present opportunities in some countries. However, most of the domestic markets are small and intra-regional connectivity is relatively poor. The size of refining capacity varies widely across SSA, but refineries are typically low complexity and suffer from weak utilisation rates and repeated outages.

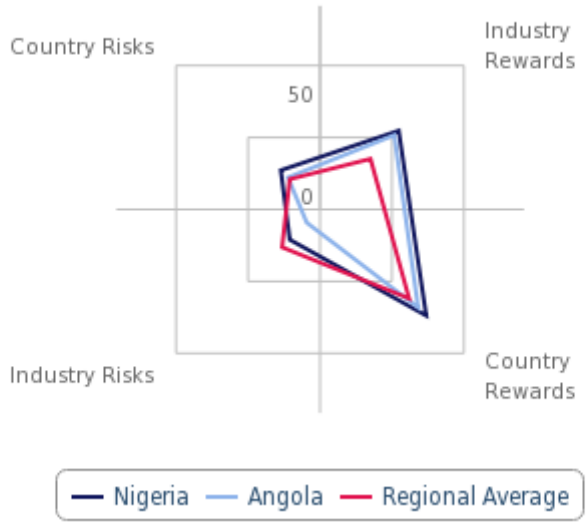
Nigeria And Angola Leading The Pack

Nigeria and Angola have emerged as the regional outperformers. This is led by the countries' Rewards profiles which are buoyed by large (in the case of Nigeria) and growing populations, strong forecast fuels demand growth and access to domestic crude feeds. Nevertheless, the refining sectors in both countries are relatively poor with ageing and low complexity facilities underscoring the challenges to a profitable downstream investment. Nigeria is set for substantial refining capacity growth with the Dangote refinery, which should support its performance in the coming years.

South Africa is notably lacking from the top of the table. It is the largest demand market in SSA but has among the lowest forecast growth. In addition, its refining sector is inefficient and uncompetitive globally and in need of large-scale maintenance and upgrade works. Continued fuel subsidisation and an uncertain policy environment continues to choke off private and foreign investment. That said, demang growth prospects are beginning to firm, supporting its move up into third place this quarter.

Large Markets Dominating The Index

Nigeria, Angola & SSA - Downstream Risk/Reward Index



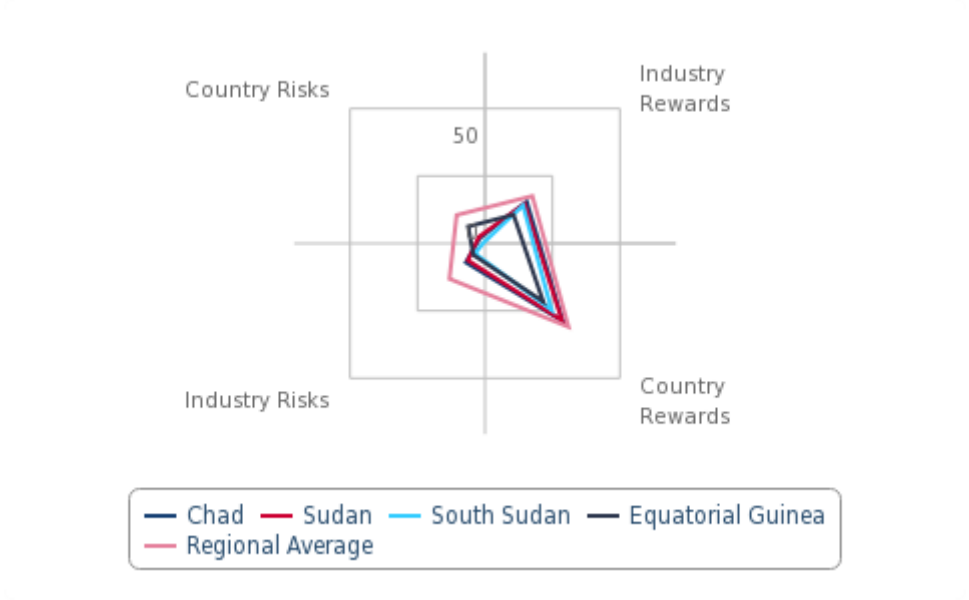
Note: Scores out of 100; higher score = more attractive market. Source: Fitch Solutions

Outside of Angola and Nigeria, other strong performers in our RRI this quarter include a number of high-growth markets, such as Ghana, Côte d'Ivoire and Tanzania. This is supported by economic recoveries, supportive demographics and fuel switching from traditional biomass. However, in most of the countries growth is occurring from a relatively low base. The scores for these markets are dragged down by a host of other factors, such as the low level of infrastructural development, underdeveloped downstream segments, lack of domestic crude production and challenging operating and business environments – issues that are common across many countries in the region.

At the bottom of the index lies Equatorial Guinea followed by South Sudan, Sudan and Chad. These markets have insufficient and under-utilised refining capacity, limited consumption, a high level of fuel subsidisation and a myriad of security, economic and political risks. Given these factors - and the weak prospects for improvement - investment in these markets will likely remain low for the foreseeable future.

Highest Risk Markets Sliding To The Bottom

Equatorial Guinea, South Sudan, Chad & Region - Downstream Risk/Reward Index



Note: Scores out of 100; higher score = more attractive market. Source: Fitch Solutions

RISKS VS REWARDS

	Industry Rewards	Country Rewards	Rewards	Industry Risks	Country Risks	Risks	RRI	Regional Rank	Global Rank
Angola	52.5	68.2	57.2	9.2	22.2	15.7	53.1	1	39
Nigeria	48.1	73.8	55.8	21.0	27.2	24.1	52.6	2	41
South Africa	41.6	50.8	44.4	44.5	43.7	44.1	44.3	3	60
Tanzania	30.5	78.9	45.0	36.2	32.2	34.2	43.9	4	62
Cote d'Ivoire	34.6	64.8	43.6	56.3	28.8	42.6	43.5	5	63
Ghana	33.2	67.8	43.6	29.0	46.0	37.5	43.0	6	64
Ethiopia	28.3	77.0	42.9	38.5	14.2	26.3	41.3	7	66
Uganda	29.8	69.2	41.6	35.1	26.1	30.6	40.5	8	67
Mozambique	27.9	69.7	40.5	53.4	14.9	34.2	39.8	9	69
Cameroon	35.1	58.4	42.1	15.8	21.4	18.6	39.8	10	70
Congo (Brazzaville)	35.7	52.9	40.9	22.1	11.5	16.8	38.5	11	72
Gabon	33.1	52.5	38.9	16.7	26.0	21.3	37.1	12	76
Chad	31.4	57.7	39.3	14.1	3.9	9.0	36.2	13	78
Sudan	29.3	57.1	37.6	12.6	4.7	8.7	34.7	14	80
South Sudan	28.2	49.4	34.6	7.5	0.8	4.1	31.5	15	86
Equatorial Guinea	19.7	43.1	26.7	8.6	12.5	10.6	25.1	16	88
Global Average	50.0	50.0	50.0	50.0	50.0	50.0	50.0	~	~
Regional Average	33.7	61.9	42.2	26.3	21.0	23.7	40.3	~	~

Note: Scores out of 100; higher score = more attractive market. Source: Fitch Solutions

DOWNSTREAM INDUSTRY RISKS				
	Logistics Risk	Fuel Subsidies	Industry Risks	RISKS
Angola	5.7	12.6	9.2	15.7
Nigeria	13.8	28.2	21.0	24.1
South Africa	50.6	38.5	44.5	44.1
Tanzania	17.2	55.2	36.2	34.2
Cote d'Ivoire	29.9	82.8	56.3	42.6
Ghana	19.5	38.5	29.0	37.5
Ethiopia	21.8	55.2	38.5	26.3
Uganda	14.9	55.2	35.1	30.6
Mozambique	24.1	82.8	53.4	34.2
Cameroon	3.4	28.2	15.8	18.6
Congo (Brazzaville)	16.1	28.2	22.1	16.8
Gabon	11.5	21.8	16.7	21.3
Chad	0.0	28.2	14.1	9.0
Sudan	12.6	12.6	12.6	8.7
South Sudan	2.3	12.6	7.5	4.1
Equatorial Guinea	4.6	12.6	8.6	10.6
Global Average	50.0	50.0	50.0	50.0
Regional Average	15.5	37.1	26.3	23.7

Note: Scores out of 100; higher score = more attractive market. Source: Fitch Solutions

DOWNSTREAM COUNTRY RISKS							
	Long-Term Economic Risk Index	Short-Term Economic Risk Index	Long-Term Political Risk Index	Short-Term Political Risk Index	Operational Risk Index	Country Risks	Risks
Angola	10.3	12.6	32.2	57.5	10.3	22.2	15.7
Nigeria	41.4	47.1	16.1	12.6	23.0	27.2	24.1
South Africa	46.0	26.4	42.5	50.6	48.3	43.7	44.1
Tanzania	23.0	21.8	50.6	44.8	26.4	32.2	34.2
Cote d'Ivoire	43.1	50.6	14.9	13.8	25.3	28.8	42.6
Ghana	28.7	35.6	74.7	65.5	35.6	46.0	37.5
Ethiopia	18.4	13.8	8.0	10.3	17.2	14.2	26.3
Uganda	31.0	28.2	26.4	29.9	20.7	26.1	30.6
Mozambique	5.7	5.7	23.0	23.0	16.1	14.9	34.2
Cameroon	38.5	41.4	10.3	14.9	11.5	21.4	18.6
Congo (Brazzaville)	8.0	6.9	13.8	24.1	8.0	11.5	16.8
Gabon	32.2	19.0	47.1	27.6	14.9	26.0	21.3
Chad	2.3	9.2	3.4	6.3	1.1	3.9	9.0
Sudan	6.9	3.4	4.6	6.3	3.4	4.7	8.7
South Sudan	0.0	2.3	1.1	1.1	0.0	0.8	4.1
Equatorial Guinea	9.2	10.3	6.9	37.4	5.7	12.5	10.6
Global Average	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Regional Average	21.6	20.9	23.5	26.6	16.7	21.0	23.7

Note: Scores out of 100; higher score = more attractive market. Source: Fitch Solutions

DOWNSTREAM INDUSTRY REWARDS

	Refining Capacity	Utilisation Rates	Domestic Fuel Demand	Fuel Demand Growth	Regional Fuel Demand	Life Span Of Infrastructure	Theoretical Net Crude Exports	Industry Rewards	Rewards
Angola	21.8	54.0	31.0	83.9	10.9	75.3	90.8	52.5	57.2
Nigeria	65.5	14.9	63.2	25.3	10.9	63.8	93.1	48.1	55.8
South Africa	64.4	24.1	67.8	58.6	10.9	47.1	18.4	41.6	44.4
Tanzania	4.6	4.6	21.8	97.7	10.9	25.3	48.3	30.5	45.0
Cote d'Ivoire	25.3	58.6	11.5	89.1	10.9	4.0	42.5	34.6	43.6
Ghana	19.5	16.1	23.0	12.6	10.9	75.3	74.7	33.2	43.6
Ethiopia	4.6	4.6	24.1	89.1	10.9	15.5	49.4	28.3	42.9
Uganda	4.6	4.6	10.3	92.0	10.9	21.8	64.4	29.8	41.6
Mozambique	4.6	4.6	8.0	98.9	10.9	15.5	52.9	27.9	40.5
Cameroon	24.1	23.0	18.4	90.8	10.9	15.5	63.2	35.1	42.1
Congo (Brazzaville)	12.6	52.9	4.6	46.0	10.9	47.1	75.9	35.7	40.9
Gabon	13.8	29.9	6.9	77.0	10.9	21.8	71.3	33.1	38.9
Chad	11.5	35.6	0.0	85.1	10.9	7.5	69.0	31.4	39.3
Sudan	28.7	26.4	32.2	39.7	10.9	7.5	59.8	29.3	37.6
South Sudan	4.6	4.6	3.4	96.6	10.9	4.0	73.6	28.2	34.6
Equatorial Guinea	4.6	4.6	2.3	27.6	10.9	15.5	72.4	19.7	26.7
Global Average	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Regional Average	19.7	22.7	20.5	69.4	10.9	28.9	63.7	33.7	42.2

Note: Scores out of 100; higher score = more attractive market. Source: Fitch Solutions

DOWNSTREAM COUNTRY REWARDS					
	State Asset Ownership	Population	Population Gowth	Country Rewards	Rewards
Angola	52.9	54.0	97.7	68.2	57.2
Nigeria	40.8	93.1	87.4	73.8	55.8
South Africa	27.0	74.7	50.6	50.8	44.4
Tanzania	64.4	77.0	95.4	78.9	45.0
Cote d'Ivoire	59.8	49.4	85.1	64.8	43.6
Ghana	72.4	51.7	79.3	67.8	43.6
Ethiopia	59.8	88.5	82.8	77.0	42.9
Uganda	40.8	70.1	96.6	69.2	41.6
Mozambique	64.4	52.9	92.0	69.7	40.5
Cameroon	40.8	48.3	86.2	58.4	42.1
Congo (Brazzaville)	52.9	17.2	88.5	52.9	40.9
Gabon	72.4	6.9	78.2	52.5	38.9
Chad	40.8	37.9	94.3	57.7	39.3
Sudan	21.8	65.5	83.9	57.1	37.6
South Sudan	21.8	36.8	89.7	49.4	34.6
Equatorial Guinea	27.0	3.4	98.9	43.1	26.7
Global Average	50.0	50.0	50.0	50.0	50.0
Regional Average	47.5	51.7	86.6	61.9	42.2

Note: Scores out of 100; higher score = more attractive market. Source: Fitch Solutions

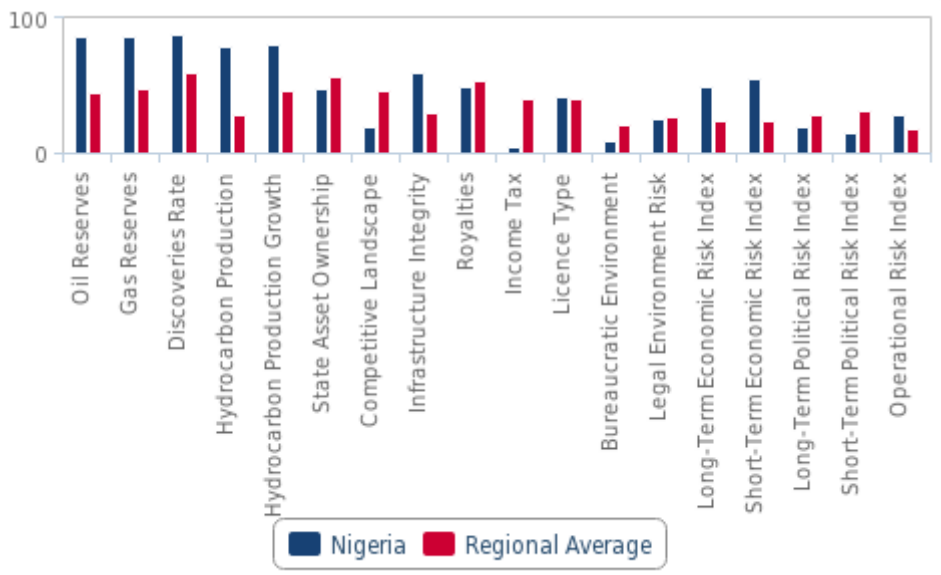
Please Note: *Our Risk/Reward Indices are updated frequently; as a result, scores in this section may not match scores in the rest of the report.*

Upstream Risk/Reward Index

Key View: *Nigeria is ranked 10th globally in our Upstream Risk/Reward Index and second in SSA. This strong performance in our Risk/Reward Index highlights Nigeria's vast resource potential, which has attracted a large number of IOCs. The country's score, however, is weighed down by an unpredictable regulatory climate due to lack of progress of the long-awaited petroleum industry bill.*

Below Ground Advantages Boost Nigeria

Nigeria and SSA Region - Upstream Risk/Reward Index By Component



Note: Scores out of 100, higher score = more attractive market. Source: Fitch Solutions

Global And Regional Ranks

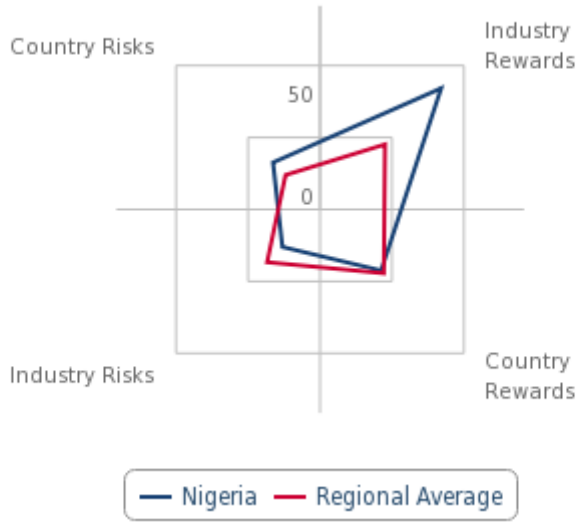
- Regional Rank (out of 14): 1st
- Global Rank (out of 68): 10th

Key Features And Latest Updates

- Nigeria's Upstream Risk/Reward Index score outperforms both the regional and global average, highlighting the country's vast resource base and openness foreign and private investment. However, upstream investors also face high political risks and a challenging and uncertain investment climate.
- Nigeria has a substantial resource base, with the largest oil and gas reserves in SSA. Production remains high, but the country's output has proven vulnerable to disruption resulting from both sabotage and neglect. A lack of investment, stemming from both instability and regulatory uncertainty, could see Nigeria's output decline in the coming years.
- Nigeria's Country Rewards Index is attractive but is weakened by the dominance of state-run **Nigerian National Petroleum Corporation** in the competitive landscape and the government's continued heavy intervention in the sector.
- Nigeria ranks poorly on Industry Risks, scoring below Sudan overall. The country scores especially poorly on Income Tax and Bureaucratic Environment, in part a reflection of the uncertainty of the long-delayed Petroleum Industry Bill.
- Nigeria also ranks poorly on Country Risks, namely due to high political risks both in the short and long term. Political uncertainty and election violence with persistent instability remain impediments to upstream investment. Peaceful elections will help improve this score.

Risks Vs Rewards

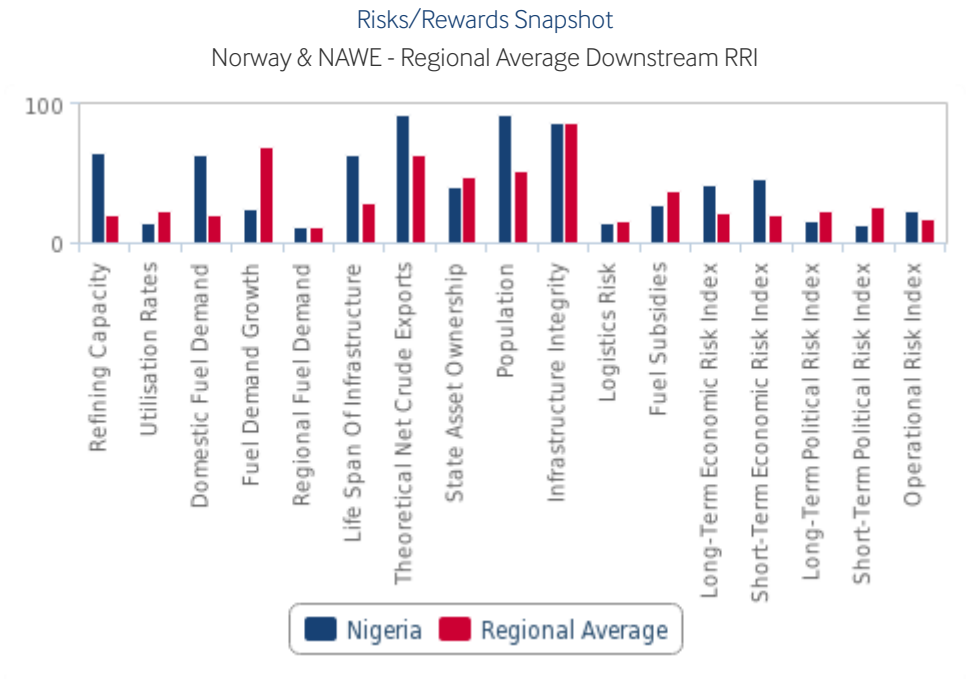
Country & Industry Risks & Rewards



Note: Scores out of 100, higher score = more attractive market. Source: Fitch Solutions

Nigeria Downstream Oil & Gas Risk/Reward Index

Key View: *Nigeria is ranked second in the SSA Downstream Risk/Reward Index and 41st globally. This performance is underpinned by Nigeria's large market size and high economic, political and operational risk profile.*



Note: Scores out of 100, higher score = more attractive market. Source: Fitch Solutions

Global And Regional Ranks

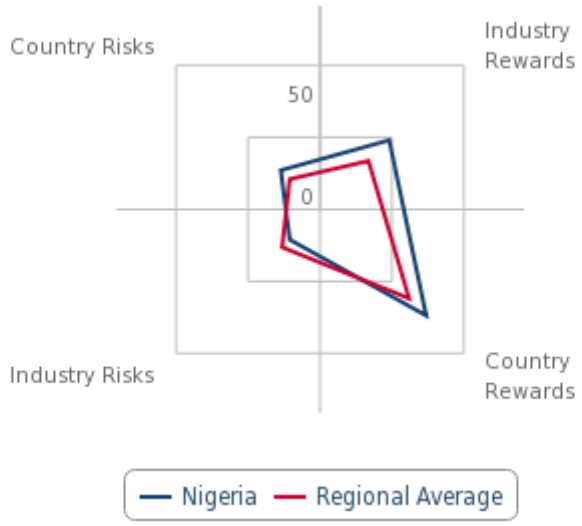
- Regional Rank (out of 16): 2nd
- Global Rank (out of 88): 41st

Key Features And Latest Updates

- Nigeria's downstream RRI profile is characterised by high low risks, but high potential rewards, primarily due to its large market size.
- The country has a large domestic fuels market and the demand outlook remains strong, but investor interest has been deterred by fuel subsidies and poor logistics infrastructure. Nigeria's has SSA's largest refining capacity but due to neglect and a lack of investment, utilisation rates are extremely poor, averaging just 18% in 2018.
- Nigeria hopes to modernise its downstream sector with private investment, namely the 650,000b/d Dangote refinery, which will see Nigeria will have the capability to become a net refined fuels exporter, further raising downstream competitiveness. There is less certainty on the outlook for other proposed refining projects such as the Petrolex-backed 250,000b/d facility in Ogun.
- Investors are also deterred by high operational and political risks, including corruption, complex bureaucracy and persistent security challenges.

Risks Vs Rewards

Country & Industry Risks & Rewards



Note: Scores out of 100, higher score = more attractive market. Source: Fitch Solutions

Market Overview

Nigeria Energy Market Overview

Overview/State Role

Nigeria is attempting to reform its oil and gas sector which will be undertaken through the Petroleum Industry Bill (PIB). Current regulatory and fiscal legislation is summarised below, with the proposed changes under the four sections of the PIB, below that.

Key Legislation

Production Sharing Agreements are regulated by The Deep Offshore and Inland Basin Production Sharing Contracts Decree No. 9 1999 Act (Cap D3) LFN 2004. Royalties are paid in line with the provisions stipulated in the Petroleum Act and the Petroleum Drilling Regulations 2004. Companies involved in upstream operations are subject to tax under the Petroleum Profits Tax Act 2004. Other key legislation includes the Associated Gas Reinjection Act 2004 and the Nigerian Oil & Gas Industry Content Development Act 2010.

Regulatory Bodies

There are two main regulatory bodies, the Department of Petroleum Resources (DPR) and the Nigerian Content Development & Monitoring Board (NCDMD). The DPR is responsible for ensuring compliance of the petroleum laws, regulations and guidelines in the oil and gas industry. The DPR's remit extends across the industry from the upstream to the downstream.

The NCDMD is responsible for ensuring compliance with the Nigerian Content Act and the Joint Development Authority. Another relevant regulatory body is the Petroleum Products Pricing Regulatory Agency which regulates the rates for the transportation and distribution of petroleum products.

National Oil Company

The **Nigerian National Petroleum Corporations** (NNPC) is the state oil company which participates in the petroleum industry. The NNPC is a fully integrated petroleum company that operates in its own right, through subsidiaries and in joint ventures with other petroleum companies. Under the NNPC Act, the NNPC remit includes, among others, the following:

- Exploring for or otherwise acquiring, possessing and disposing of petroleum.
- Refining, treating, processing and generally engaging in the handling of petroleum for the manufacture and production of petroleum products and its derivatives.
- Purchasing and marketing petroleum, its products and by-products.
- Providing and operating pipelines, tankers or other facilities for the carriage or conveyance of crude oil, natural gas and their products and derivatives, water and other liquids or other commodities related to the NNPC's operations.
- Taking the necessary actions to effect agreements entered into by the government with a view to securing participation by the government or the NNPC in activities connected with Petroleum.
- Generally engaging in activities that would enhance the petroleum industry in the overall interest of Nigeria.

Foreign companies can operate in Nigeria under either a joint venture agreement (JOA) with NNPC or through a PSC. In a JOA NNPC has the right though not obliged to be an operator, it also takes a majority share in the company. Partners in JOAs can sell their portion of production subject to royalties and profit taxes. Most JOAs are produced from onshore and shallow water regions in the Delta. Shortly after winning re-election, President Buhari called on the NNPC to reduce its stake in Joint Ventures to 40% to reduce

captial expenditures burdens on the state and create a one-time windfall. The majority of stakes would be reduced by 15% to 20% and it was unclear if the stakes would be offered outside the current partners but the budget ministers expects the farm downs to occur this year.

JVS WITH NNPC

JV	Companies	Region
Shell Petroleum Development Company of Nigeria	NNPC (55%), Shell (30%), Elf (10%), Agip (5%)	Onshore, Swamp
Chevron Nigeria	NNPC (60%), Chevorn (40%)	Warri, Niger River, Shallow water
Mobil Producing Nigeria Unlimited	NNPC (60%), Mobil (40%)	Akwa Ibom
Nigerian Agip Oil Company	NNPC (60%), Agip (20%), Phillips (20%)	Onshore
Elf Petroleum Nigeria Limited	NNPC (60%), Elf (40%)	On and Offshore
Texaco Overseas Petroleum Company of Nigeria Unlimited	NNPC (60%), Texaco (20%), Chevron (20%)	Offshore

Source: NNPC, Fitch Solutions

PSCs are predominantly used for deeper water offshore fields, where the fiscal terms are marginally better. Under a PSC concessions are fully owned by NNPC, though the contractor is generally the operator, with NNPC receiving a higher percentage of profit oil.

Fiscal Regime

NIGERIA - FISCAL TERMS

Income Tax	Royalties	Fees And Bonuses	Resource Rent Tax	Export Duties	Import Duties	Other Key Fiscal Terms
First Five Years (New entrants) - 65.75%. First Five Years (existing companies) - 85%. Subsequent Years (all companies) - 85%	Monthly Payments: Between 0-20%. Onshore production - 20%. Offshore up to 100m - 18.5%. Offshore over 100m - 16.67% (Maximum amount - decreasing the rate the deeper the water)	Signature bonus paid for awarding concessions	NGN5,000 per sq km of an oil exploration licence.USD10 per sq km of OML or OPLUSD20 per sq km of producing OML	na	Exempt from import duties	VAT is not payable on supplies for downstream gas operations

na = not applicable. Source: E&Y 2015 Tax Guide, Fitch Solutions

NIGERIA - LICENCES AND CONTRACT TERMS					
Contract	**State Participation**	**Local Content Requirement**	**Domestic Supply Requirements**	**Stabilisation Clause**	**Arbitration**
Production Sharing Contract- normally 10 years exploration, 20 years production	Yes - NNPC is the holder of the concession while the IOC is the contractor	Yes - provide technology transfer and train local employees in accordance to the Nigerian Oil and Gas Industry Content Development Act 2010	Preference for local supplies	Yes	Yes. In accordance with Arbitration and Conciliation Act 1990 Chapter 19

Source: Freshfields, E&Y 2015 Tax Guide, Fitch Solutions

The Petroleum Industry Bill

In order to assist the passage of the PIB, it was split into four separate units governing:

- Regulation - Petroleum Industry Governance Bill (PIGB)
- Administration - Petroleum Industry Administration
- Fiscal Terms - Petroleum Industry Fiscal Bill
- Local Content - Petroleum Host Community Bill

The idea is that a clearer breakdown of the bill will enable at least certain parts of it to progress through the House of Representatives, Senate and President, unimpeded.

The Petroleum Industry Governance Bill: New Version Preparing For Second Asset Attempt

The PIGB focuses on reforming the structure of the NNPC and the entities that regulate it. The 2019 election campaign saw President Buhari vow to sign the PIGB as did the main opposition candidate Atiku Abubakar spurring renewed optimism that the long-awaited reforms would begin in earnest. Buhari's refusal to sign the bill stemmed from a belief that is unconstitutional and would foster further opportunity for corruption. Many cite the dilution of the president's power over petroleum decisions as the key reason for the bill's failure. The Senate passed an updated version which addressed Buhari's concerns in April 2019. The bill will undergo harmonisation with the House of Representatives version after which it will be presented to Buhari for ascension.

The central objections stemmed from the allocation of revenues to the Petroleum Regulatory Commission (PRC) and Petroleum Equalisation Fund (PEF). PRC functions mainly as a regulatory body in lieu of those functions at the Department of Petroleum Resources. PEF would oversee the pricing of petroleum products and related regulatory activities.

The passing of the bill in the Senate is positive news as it suggests that breaking the bill up has made it more palatable. However, the more controversial sections are yet to come. The regulation regarding the fiscal terms will be more contentious and will have a more material impact on companies' long-term investment plans. The senate will have to balance the need to secure revenues from their oil reserves but also keep the fiscal terms competitive in order to attract international capital. The balance is delicate since if it is done incorrectly, IOCs much-needed capital will not materialise.

What Are The Latest Changes Under PIGB?

- The NNPC will be broken into three entities - The **Nigerian Petroleum Liability Management Company**, the **Nigerian Petroleum Assets Management Company Limited** and the **National Petroleum Company** (NPC). The management company will manage and hold assets under existing PSCs and back-in-rights assets on behalf of the government, while the NPC will take responsibility of all the remaining assets held by the NNPC. The liability management company will take on the NNPC's

liabilities and the pension liabilities of the DPR, with the aim of not burdening the new entities with existing liabilities. The aim will be to wind down the company as and when the liabilities have been settled.

- Introduction of new regulator- the Nigerian Petroleum Regulatory Commission (NPRC) - which will replace the Petroleum Inspectorate, the DPR and the Petroleum Products Price Regulatory Agency.
- The Petroleum Equalisation Fund Act will be repealed but the Petroleum Equalisation Fund will continue to exist.

Overall, we believe that the PIGB is the first step in the right direction. The NNPC is in need of re-organisation and the proposed reforms are welcome. The regulation by three departments has been convoluted and ineffective, so bringing all regulation under one roof could strengthen oversight as there will be less confusion over mandates. Furthermore, the addition of a special investigation unit to the NPRC will bring additional weight to the regulator.

Oil & Gas Infrastructure

Oil Refineries

Nigeria's four state-owned oil refineries have a combined nameplate capacity of 445,000b/d. Two of the plants, both in Port Harcourt, are run as a single unit but are identified individually by **Nigerian National Petroleum Corporation** (NNPC). Despite capacity being theoretically well above domestic consumption, problems including sabotage, fire, poor management and lack of regular maintenance contribute to severe inefficiency and underutilisation.

The Kaduna refinery still runs on analogue equipment from the 1970s, making it almost impossible to be competitive in the modern refining sector. Official data from the NNPC shows that the country's average utilisation rate for the past 10 years was around 27.0%, with a peak of 47.55% reached in 2002 and a low of 5.0% in 2007 and 2015.

A new 650,000b/d refining facility being built in the Lekki Free Zone could be game-changing for Nigeria if run effectively. The Dangote Refinery is under construction and due to be completed by late 2020 and begin commercial operations in 2022. This single facility would turn Nigeria into a net exporter of fuels.

NIGERIA REFINERIES

Facility	Region	Capacity b/d	Status
Port Harcourt (Old)	Rivers State	60,000	Operating inconsistently
Port Harcourt (New)	Rivers State	150,000	Operating inconsistently
Warri	Delta State	125,000	Operating inconsistently
Kaduna	Kaduna State	110,000	Operating inconsistently
Dangote	Lekki Free Zone, Lagos	650,000	Under Construction, 2022
Escravos GTL	Delta State	33,000	Operating

Source: Fitch Solutions

Port Harcourt Refineries (Active): The two refineries in Alesa-Eleme, near Port Harcourt, are counted separately by NNPC despite several of the units having been interconnected in 1993. The two plants, known as the Old Port Harcourt and New Port Harcourt refineries (Port Harcourt I and II), have a combined capacity of 210,000b/d, making it the largest refining centre in Nigeria.

Kaduna Refinery (Semi-Active): The 110,000b/d Kaduna refinery, the only such plant in the north of the country, was restarted in February 2010 following two years of inactivity. The refinery, which was completed in 1980, with technology from the 1970s has never been effectively upgraded. The refinery contains four main units: a Fluid catalytic cracking unit, an asphalt blowing unit, a catalytic reforming unit and two crude distillation units. Optimising operations to be competitive is near impossible due to the analogue control.

Warri Refinery (Active): The 125,000b/d Warri refinery is located on the coast of the southern Delta State. The refinery typically produces significantly below capacity because of problems with storage and transportation of products, which forces it to run intermittently. The refinery is integrated with nearby NNPC petrochemical plants, including a 35,000tpa polypropylene plant and an

18,000tpa carbon plant.

Escravos GTL (Active): Chevron operates a 33,000b/d GTL facility at Escravos in the Niger Delta. The facility uses **Sasol Chevron**'s Fischer-Tropsch process to predominantly produce diesel and naphtha.

Dangote Refinery (Under Construction): Dangote Industries moved forward in September 2013 with plans for a USD9bn refinery (recent projections put the project at USD14bn), fertiliser plant and petrochemical complex, to be located in South West Nigeria. The project would have a 650,000b/d refining capacity, nearly doubling the country's current capacity. Dangote has said it hopes to complete the facility by 2020, but we forecast that production is likely to be delayed until 2022.

Oil Terminals/Ports

Nigeria has six export terminals. These are Forcados and Bonny, operated by **Shell**; Escravos and Pennington, operated by Chevron; Qua Iboe, operated by **ExxonMobil**; and Brass, operated by **Eni**/**Agip**. Deeper offshore production is directly exported from floating production, storage and offloading platforms.

LNG Terminals

Nigeria's first and most ambitious gas project, the Nigeria LNG facility on Bonny Island, was completed in September 1999. The fourth and fifth trains entered production in 2005. A sixth train has added 5.5bcm to the plant's annual capacity, bringing the total to 31bcm. The facility is supplied from dedicated gas fields, but it is expected that half the input gas will later consist of associated (which is flared) gas from the Akri/Oguta, Otumara, Utapate and offshore blocks. Additional capacity will come from a seventh train at Bonny Island, for which an FID is being planned for 2019.

Gas Pipelines

West African Gas Pipeline (Active): The Chevron-operated West African Gas Pipeline runs from Nigeria through Benin, Togo and into Ghana. Inaugurated in 2010, after nearly 30 years in the planning, it is the first regional gas transmission system in Sub-Saharan Africa. The activation of the pipeline was delayed many times, owing to instability around the feedstock fields in the Niger Delta and attacks on the pipeline in that area as well as technical difficulties, such as high levels of moisture in the gas. The delays also resulted in cost overruns.

With a 5bcm capacity, the 678km pipeline feeds two Ghanaian power stations in Tema and Takoradi. The 569km offshore section starts at the Itoki terminal in Lagos, Nigeria and runs through the territorial waters of Benin, Togo and Ghana, on a route approximately parallel to the coastline and located 15-20km offshore in a water depth of 30-75m. The onshore section, situated in Nigeria, connects the offshore compressor station at Lagos Beach with the Chevron-owned Escravos-Lagos pipeline system, operational since 1989.

Under the initial contract, it was agreed that at the start-up of the pipeline some 3.8mn cm/d, or an annualised 1.4bcm, would be transported. After seven years exports are planned to be increased to 2.2bcm and reach a final through-flow of 4.1bcm some 15 years after start-up. The importing countries have been trying to increase the initial volume to 2.4bcm per annum, but Nigeria has not agreed to this owing to its own growing domestic gas requirements.

Obiafu-Obrikom-Oben Gas Pipeline (Under construction), also called the OB3 Pipeline is expected to be completed in

September 2019. The 48 inch pipeline will total 140km in length with the ability to transport up to 2bn cu f/d per day of gas. It will conclude at gas treatment plant in Oben in Edo State. As the largest gas pipeline in Nigeria will help facilitate the steady deliver of gas to power plants in the Niger Delta.

Competitive Landscape

Competitive Landscape Summary

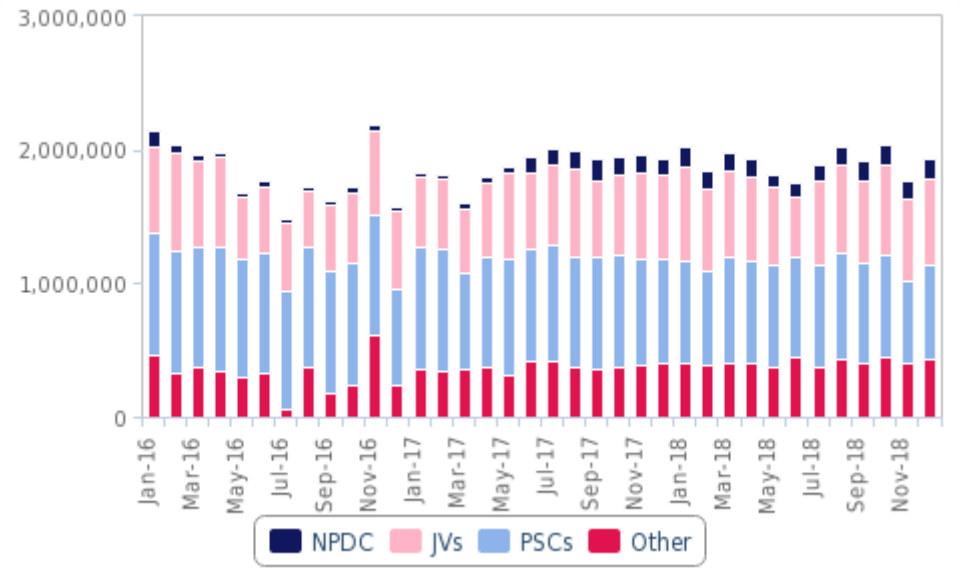
Nigeria remains heavily state-influenced with **Nigerian National Petroleum Corporation** (NNPC) largely responsible for upstream production through joint ventures and production sharing contracts. Through its subsidiaries, the company also owns all of the large refineries in the country, other than the GTL facility, though its fuels production dominance will be eroded when the Dangote refinery is completed.

NNPC produces oil directly through **Nigerian Petroleum Development Company**, its crude oil marketing division, and through licence arrangements with a number of leading IOCs, such as **Shell**, **Chevron**, **Total**, **Eni** and **ExxonMobil**.

Domestic oil companies account for around 10% of local oil production. Nigeria's independent oil and gas companies are increasingly expanding their operations and presence amid asset divestments in the country by IOCs.

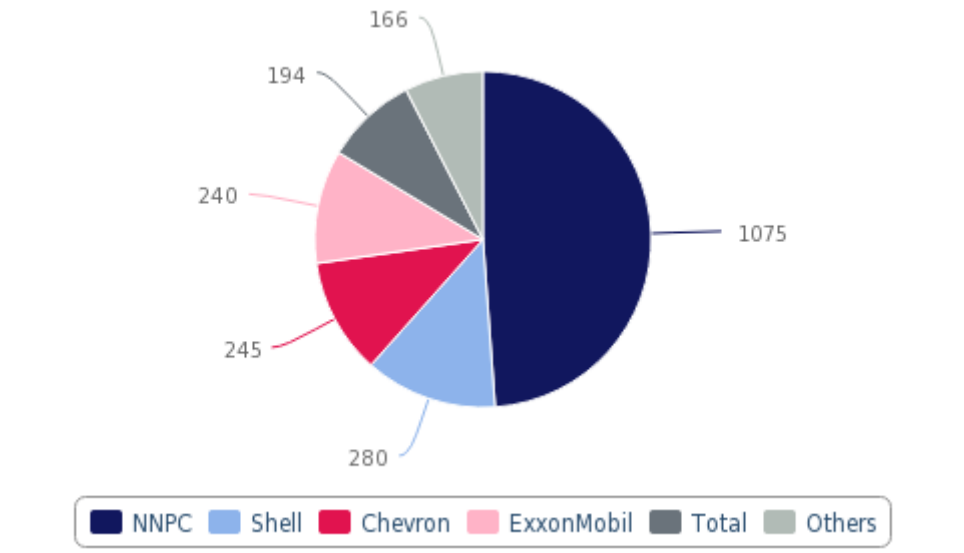
JVs & PSCs Add The Bulk

Nigerian Oil Production By Contract Source b/d



Source: NNPC, Fitch Solutions

Nigerian Production By Company
2017 Output Net To Company ('000b/d)



Source: Fitch Solutions

Nigeria's four refineries are all owned through NNPC subsidiaries. Gradual moves towards fuel price liberalisation have seen international interest in Nigeria's downstream, though price caps have kept IOCs away. Aliko Dangote GCON, a Nigerian business tycoon, is building a new refinery in the Lagos Free Trade Zone. The delayed 650,000b/d facility is planned to start up in 2022.

Recently, the NNPC has signed a memorandum of understanding with Saudi energy officials to possibly take a stake in existing state refineries and provide investment to improve up time and expand capacity. The deal may also examine the expansion of LNG facilities with both refineries and LNG exports looking to take advantage of Nigeria's central location in Africa for both regional and international exports.

Company Profile

Nigerian National Petroleum Corporation

Latest Updates

- The Buhari administration as instructed the Nigerian National Petroleum Corporation (NNPC) to reduce it stakes in JVs to 40% from between 55-60%. We expect this to create a significant one time cash windfall while reducing yearly capital expenditure demands at the expense of state revenue.
- While on the whole the situation has improved, the NNPC continues to struggle to supply sufficient volumes of fuel due to poor refinery utilisation, and curbs on imports due to the high cost of subsidies.
- Nigerian Petroleum Development Company (NNPC subsidiary) is targeting an increase in oil production to 500,000b/d by 2022, up from around 165,000b/d in 2018.
- The shallow water project is due to develop the Anyala and Madu fields to produce around 50,000b/d. NNPC, which will operate the project with a 60% stake, is targeting an FID.
- Efforts to undertake exploration drilling in the Benue Trough at the Kolmani River Well are progressing. Lake Chad basin efforts continue to be hampered by the poor security situation.

SWOT Analysis	
Strengths	• Dominant position in the upstream through large stakes in joint ventures and production sharing agreements, as well as direct control of production licences. • Substantial production upside potential from a proven resource base. • Partnerships with IOCs provide valuable expertise and project funding.
Weaknesses	• Inefficient and substantially under performing refining sector. • Limited financial and operational freedom. • Ingrained corruption and inefficiencies limit strategy advancement. • Pays for subsidies on refined fuels.
Opportunities	• Successful passing of the Petroleum Industry Bill. • Gas capture and sale from flare reduction programmes through the gas master plan. • Exploration in the Lake Chad Basin. • Oil production growth from a pipeline of pre-FID joint venture and PSC projects. • Refining upgrades or modular refining projects.
Threats	• Simmering tensions in the Delta region and insecurity in the northern regions. • Possible departure of vital IOC partners. • Changes in national energy policy. • Possibility of union disruption in reaction to reforms.

Company Overview

NNPC is dominant across all segments of the energy chain. The company produces oil and gas through joint venture and production sharing agreements partnerships with IOCs, owns and operates an extensive network of refining and distribution facilities and operates the country's gas transport pipelines that supply industry and power plants. The government has launched a shake-up of NNPC in an effort to redress the corruption that has long blighted Africa's most populous country.

A key strategy of the NNPC is to utilise and expand the extensive gas resources in the country, through flare reduction and tapping

gas resources. The company is looking to position itself as a major international gas supplier as well as deliver natural gas to the domestic economy to improve the security of energy supply. New gas pipeline infrastructure to connect supply with demand inside Nigeria, and a potential seventh train at Nigeria LNG Limited, will be at the heart of this drive.

Shell

Latest Updates

- In December 2018, Shell granted FID to the Assa North Gas Development Project which is comprised of the Assa North and Ohaji South gas project. First gas is expected in Q419 with peak production reported at 300mn cu f/d.
- Shell is currently working on two projects in Nigeria for 2018/2019 completion. The Forcados Yorki Integrated Project (40,000boe/d) and the Southern Swamp associated gas project (40,000boe/d).
- Shell also has in the region of 500,000boe/d of pre-FID projects in Nigeria including the Bonga Main redevelopment, the Bonga South West project and a number of gas projects.
- Shell launched the second phase of the Gbaran-Ubie project, due to supply 175,000boe/d of oil and gas equivalent at peak in 2019. The 70,000boe/d third phase is still in the planning stage.

SWOT Analysis	
Strengths	• Established presence in mature assets and second largest producers in the country. • Strong relationship with state oil company. • Long-term oil and gas production upside potential. • Involvement in gas export projects/infrastructure.
Weaknesses	• Exposure to troubled Niger Delta region. • Limited growth prospects outside of Oil Mining Lease 118. • Ongoing high-risk capital commitment.
Opportunities	• Considerable untapped gas export potential. • Large areas of unexplored territory. • Oil Mining Lease 118 - Bonga group - field developments.
Threats	• Uncertain local political situation. • No change in fiscal and regulatory terms. • Revival of militant activity targeting infrastructure. • No change to unattractive fiscal regime/cost structure.

Company Overview

Shell has been present in Nigeria for decades. It has, arguably, the greatest exposure to Nigeria in comparison to principal IOCs. That said, the company has undertaken a significant divestment programme, selling more than seven onshore oil licences and a number of other assets over recent years.

The Shell Petroleum Development Company (one of four subsidiaries for Shell Nigeria) produces around 280,000boe/d in Nigeria from an array of near-shore and offshore assets. Its main growth potential lies in the Bonga fields on Oil Mining Lease 118, where the development of the Bonga Southwest and Bonga North projects could add upwards of 300,000b/d of production if progressed. As with all major projects, the potential changes with the petroleum industry bill and low oil prices are holding back investment decisions at major potential projects.

Shell also has a growing number of domestic gas projects in its sights, with the FYIP and the SSAG projects set to start production in 2018/19, supplying gas to the local market. A number of other mid-volume gas projects are also in Shell's plans to grow its Nigerian business. They also have a 25.6% stake in six LNG trains on Bonny Island that make up Nigeria LNG.

SHELL KEY GROWTH FIELDS

	Field Type	Peak Production (boe)	Status
Forcados Yorki Integrated Project	Gas	40,000	2019 Start
Southern Swamp Associated Gas	Gas	40,000	2019 Start
Bonga Mainlife	Oil	90,000	Awaiting FID
HI Development	Oil & Gas	75,000	Awaiting FID
Assa North	Oil & Gas	60,000	Late 2019 Start
Bonga Southwest	Oil	225,000	Planning
Bonga Northwest	Oil	40,000	Planning
Gbaran Ph 3	Gas	70,000	Planning
Uzu Development	Oil & Gas	45,000	Planning

Source: Shell, Fitch Solutions

SHELL KEY FINANCIAL DATA (USDBN)

	2016	2017	2018	2019e
Revenue, Adj	233.6	305.1	388.4	369.2
EBITDA, Adj	28.1	46.6	50.2	59.4
Capital Expenditure	22.1	20.8	23	23.8

e = Bloomberg estimate. Source: Bloomberg, Fitch Solutions

Chevron

Latest Updates

- Chevron report net production of 200,000b/d of liquids from Nigeria in 2018 compared to 213,000b/d in 2017. Net gas production grew in 2018 to 233mn cu f/d from 223mn cu f/d in 2017.
- Chevron's Sonam Field Development Project will continue to ramp up adding around 39,000b/d of oil and 280mn cu f/d of gas to Nigeria's production at peak. Drilling was completed in early 2019.
- Chevron is a partner in the Bonga Southwest project and holds a 55% interest in Oil Mining Lease 140, the potential Nsiko development, both of which are major pre-FID projects.
- 3D seismic is planned for OML140 and 132 in 2019.

SWOT Analysis

Strengths

- Asset diversification across shallow, deepwater, LNG and GTL.
- Strong relationship with the state oil company.
- Long-term production upside potential.
- Leading role in LNG and GTL.

Weaknesses

- Exposure to the troubled Niger Delta region.
- Ongoing high-risk capital commitment.

Opportunities

- Considerable untapped gas export/GTL potential.
- Large areas of unexplored acreage.
- Production maximisation and phase projects.

Threats

- Uncertain local political situation.
- Changes in national energy policy.

CHEVRON KEY GROWTH FIELDS

	Field Type	Peak Production (boe)
Dibi Long-Term	Oil	70,000
Nsiko	Oil	100,000
Sonam	Oil & Gas	70,000

Source: Fitch Solutions

Company Overview

Chevron operates and holds a 40% interest in eight concessions, predominantly in the onshore and near-offshore regions of the Niger Delta. The company also holds acreage positions in three operated and six non-operated deepwater blocks, with working interests ranging from 20-100%. In 2018, Chevron's net production in Nigeria (including gas) totalled around 239,000boe/d.

Chevron's natural gas commercialisation efforts in the Escravos area are expected to monetise total potentially recoverable natural gas resources of approximately 510bcm through a combination of domestic and export sales, power generation and use as fuel in company operations.

Major commercialisation projects include the continued optimisation of the Escravos Gas Plant, the Escravos Gas to Liquids facility and the Sonam Field Development Project. Access to planned LNG plants nearby and expansion of domestic infrastructure may

provide additional future commercialisation opportunities.

CHEVRON KEY FINANCIAL DATA (USDBN)				
	2016	2017	2018	2019e
Revenue, Adj	103.6	127.6	158.9	165
EBITDA, Adj	16.9	21.0	34.8	42.2
Capital Expenditure	18.1	13.4	13.8	14

e = Fitch Solutions estimate. Source: Bloomberg, Fitch Solutions

ExxonMobil

Latest Updates

- There are reports emerging that ExxonMobil is looking to divest USD3bn of upstream assets which include share in JVs for onshore OMLs 66, 68, 70 and 104 with potential for offshore assets as well.
- ExxonMobil's key Qua Iboe export terminal loadings have recovered over 2018, averaging 215,000b/d, well below the 2017 average of 276,000b/d.
- ExxonMobil continues to sit on major offshore projects in Nigeria, awaiting a better fiscal and oil price environment to improve margins at its deepwater projects.
- NNPC is reportedly looking to enter into crude for product swaps with Exxon to bolster exports and reduce fuel import costs.

SWOT Analysis	
Strengths	• Established presence in the Gulf of Guinea. • Strong relationship with the state oil company. • Long-term production potential from pre-FID projects. • Extensive deepwater exploration portfolio. • Producer of key Qua Iboe and Ebok grades.
Weaknesses	• Absence from gas export/infrastructure projects. • Ongoing high-risk capital commitment. • Potential higher costs of deepwater oil production. • Fiscal terms limit new projects at lower oil prices.
Opportunities	• Scope for output rise, subject to the Organization of the Petroleum Exporting Countries' policy. • Large areas of unexplored acreage. • Sanctioning of major offshore projects. • Project optimisation to lower costs.
Threats	• Uncertain political and security situation. • Extensive state involvement and intervention. • No improvement to low-margin fiscal regime/cost structure. • Union strikes at key facilities.

Company Overview

ExxonMobil operations in Nigeria are carried out by Mobil Production Nigeria Unlimited and Esso Exploration and Production Nigier who together currently hold 0.8mn acres of offshore area which fell substantially in 2018 from 1.1mn acres. In addition, Exxonmobil own and operated midstream assets as gas liquids facilities.

Several fields are in production with net 2018 output at over 300,000b/d of crude. The Bonga North and Bosi fields are approaching FID which discussions underway regarding the development plan. Development planning and evaluation are also currently underway for Erha Northeast, OML 138 Ukot SS and Ukot SW via tie-backs to existing facilities. The Pegi field discovered in 2010 is awaiting spare production capacity. The discovery of the Owowo field also presents a significant upside opportunity.

ExxonMobil has ongoing litigation regarding the Erha Block (OML 133) with the NNPC regarding the share of entitlement due based on ExxonMobil's 56.25% share.

EXXONMOBIL KEY GROWTH FIELDS		
	Field Type	Peak Production (boe)
Bosi	Oil	140,000
Owowo West	Oil	180,000
Satellite Field Development Phase 2	Oil	30,000
Usan Future Phases	Oil	50,000

Source: Fitch Solutions

EXXONMOBIL KEY FINANCIAL DATA (USDBN)				
	2016	2017	2018	2019e
Revenue, Adj	200.6	237.2	279.3	291.6
EDITDA, Adj	26.7	33.5	40	46.9
Capital Expenditure (bn)	16.2	15.4	19.6	25.7

e = Bloomberg estimate. Source: Bloomberg, Fitch Solutions

Regional Overview

SSA Oil & Gas Overview

***Key View**: Recovering oil prices are offering some relief to SSA, which was among the regions worst hit by the recent global commodities slump. Over the next quarters, we expect international oil and gas companies to show renewed interest in frontier plays, translating into exploration picking up as stronger balance sheets and marginally higher prices feed into increased spending and drilling activity in under-explored areas. However, substantial new investment will be needed to offset substantial oil production decline rates throughout the region. The outlook on gas is markedly brighter, with production set for strong gains over the next 10 years, supported by the development of major gas resources discovered both in East and West Africa. The downstream market remains unattractive due to underwhelming demand growth combined with a host of financial, regulatory and infrastructure barriers to investment.*

To highlight the key themes that inform our SSA oil and gas forecasts, we have compared countries on the basis of the following key indicators:

- Oil production
- Oil consumption
- Refining capacity
- Gas production
- Gas consumption

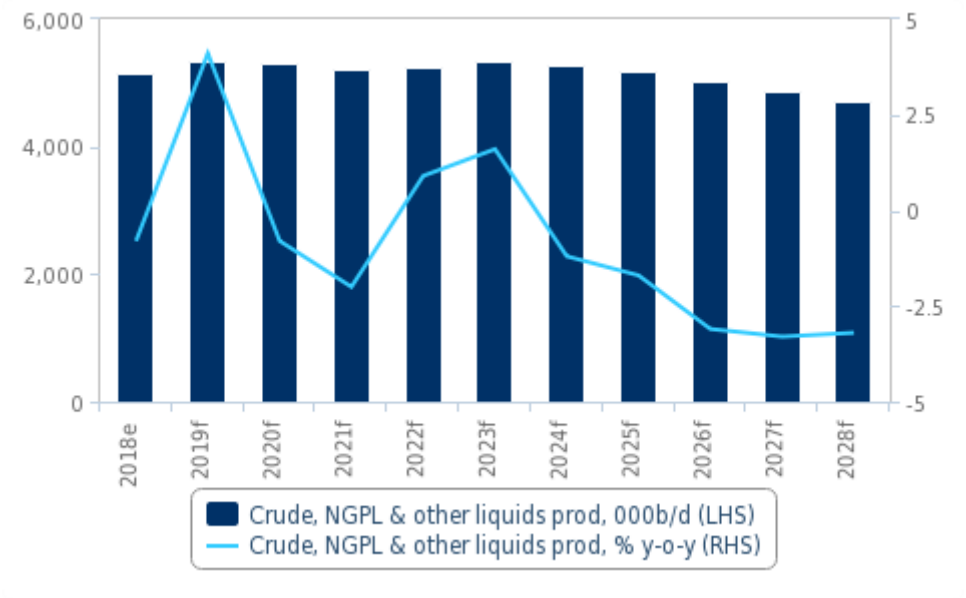
Our SSA coverage includes Angola, Cameroon, Chad, Congo-Brazzaville, Côte d'Ivoire, the Democratic Republic of Congo, Equatorial Guinea, Ethiopia, Gabon, Ghana, Kenya, Mauritania, Mozambique, Niger, Nigeria, South Africa, Sudan, South Sudan, Tanzania and Uganda.

Oil Production: New Investment Needed To Offset Decline

Our crude oil and condensates production outlook for SSA remains bearish over the duration of our 10-year forecast period to 2028, with an average y-o-y growth rate of -0.9%. For 2019, our data shows a positive y-o-y growth rate of 4.1% for the region. However, as the existing project pipeline starts dwindling from the early 2020s, heavy decline rates on legacy producing assets will pull growth back into the red. While the oil and gas sector is still globally recovering with investment ticking up, the project selection process remains highly competitive and many projects in SSA are struggling to compete. Nevertheless, a revival of interest in offshore exploration holds some promise in the longer term (*see 'West Africa Set For A Pick-Up In Exploration', December 18 2018*).

Temporary Uplift Unsustainable

SSA Oil Production Forecast



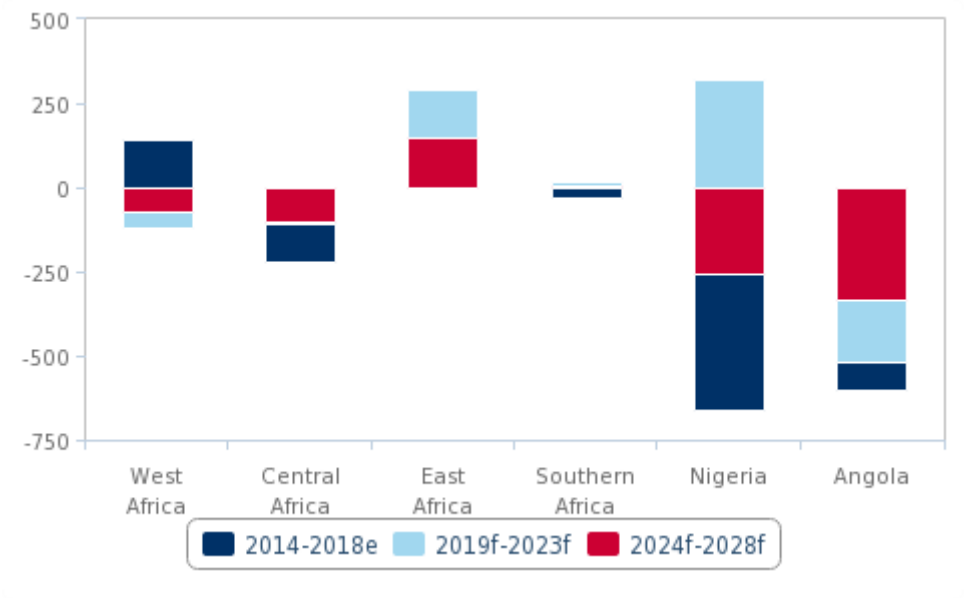
e/f = Fitch Solutions estimate/forecast. Source: EIA, JODI, national sources, Fitch Solutions

Regional production has disappointed over recent years, dragged down by underperformance in Nigeria and Angola. While the July 2018 start-up of the **Total**-operated 230,000b/d Kaombo deep offshore field is offering temporary respite, low spending levels and heavy decline rates will see Angola drag heavily on the region's output over the coming decade. Without major new investment, we forecast Angolan oil production to slide to 1.15mn b/d by 2028, a decline of over 520,000b/d compared to 2018 levels.

Nigerian production will be reinforced with output from Total's Egina field contributing 200,000b/d when it reaches peak production in 2019, but the country continues to struggle with a fragile security environment as the threat of attacks on infrastructure in the Niger Delta have left investment low and output volatile. Major downside risks to the completion of projects stem from a challenging business environment, illustrated by the rejection of the Petroleum Industry Government Bill (PIGB) by President Muhammadu Buhari in late August 2018. We foresee a bleak outlook for reform momentum in the country as, in our view, the PIGB was the less controversial part of the Petroleum Industry Bill that has been trying to pass through parliament for over a decade. Other more contentious parts – such as fiscal regulations – are likely to prove more contentious and be rejected as well, leaving little hope for enhanced operational clarity in the country. We see this as a significant limit to the momentum for project FIDs in the short term, threatening Nigeria's crude oil production profile in the long term.

Regional Output Buckling Under Pressure

SSA - Cumulative Net Change In Oil Production, '000b/d

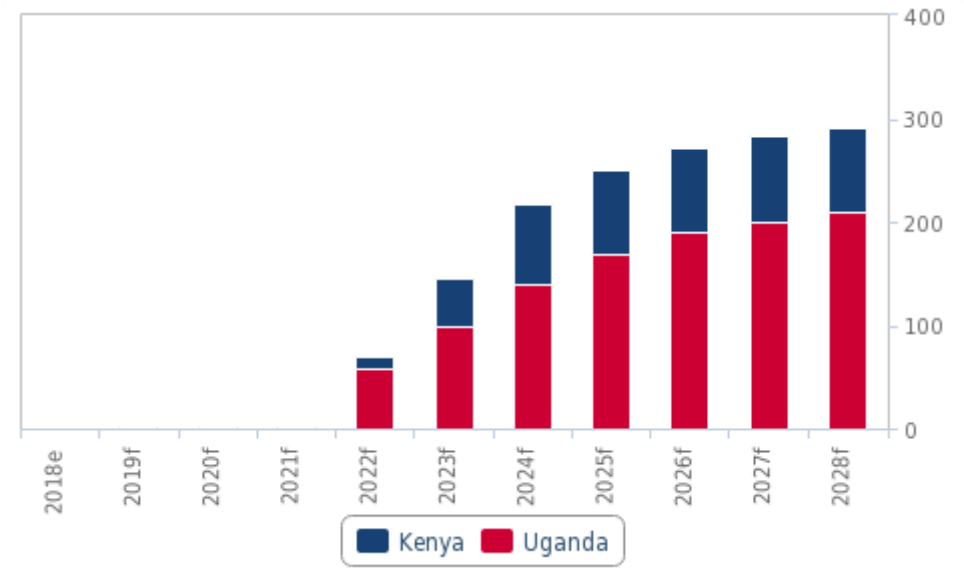


e/f = Fitch Solutions estimate/forecast. Source: EIA, JODI, national sources, Fitch Solutions

Longer-term growth will be led by East Africa, due to renewed momentum behind the development of the region's large discovered resource base. We forecast first oil in both Kenya and Uganda in the early 2020s, adding more than 250,000b/d of production to SSA's total. However, developments in both markets are subject to a significant risk of time and cost overruns, due to political and bureaucratic headwinds to progress, a lack of infrastructure in place and large upfront capital requirements. Further delays in the construction of the East Africa Crude Oil Pipeline notably poses substantial risk to the timeframe for start-up of oil production in Uganda.

East Africa's Time To Shine

Kenya & Uganda - Crude, Condensate & NGL Production Forecast, '000b/d



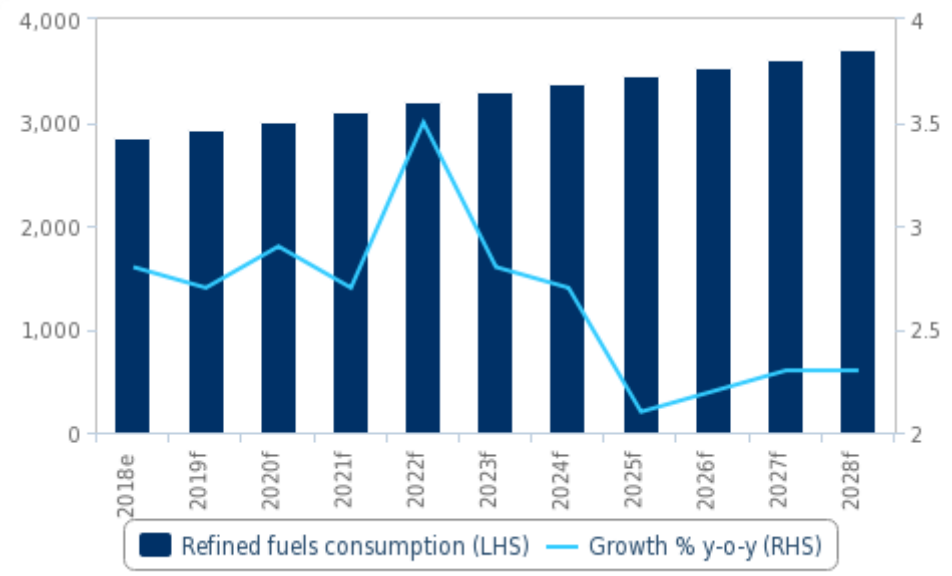
e/f = Fitch Solutions estimate/forecast. Source: Company data, Fitch Solutions

Oil Consumption: Demand Picking Up

We expect SSA to see continued resurgence in its oil demand growth, as regional economies recover from the global commodities price slump. We are currently forecasting an annual average growth rate of 2.4% over our 10-year forecast period to 2028. East Africa is set to be the main driver of that growth, reflecting a bright economic outlook, rising vehicles ownership and a supportive demographic profile. In addition to that, we see political risks in the Horn of Africa receding and political and diplomatic ties improving, which should aid greater economic cooperation and trade within the sub-region. The uptick is set to be relatively broad-based across the area, with Kenya, Ethiopia and Tanzania dominating in volume terms.

High Growth, But Higher Potential

SSA - Refined Fuels Consumption Forecast, '000b/d

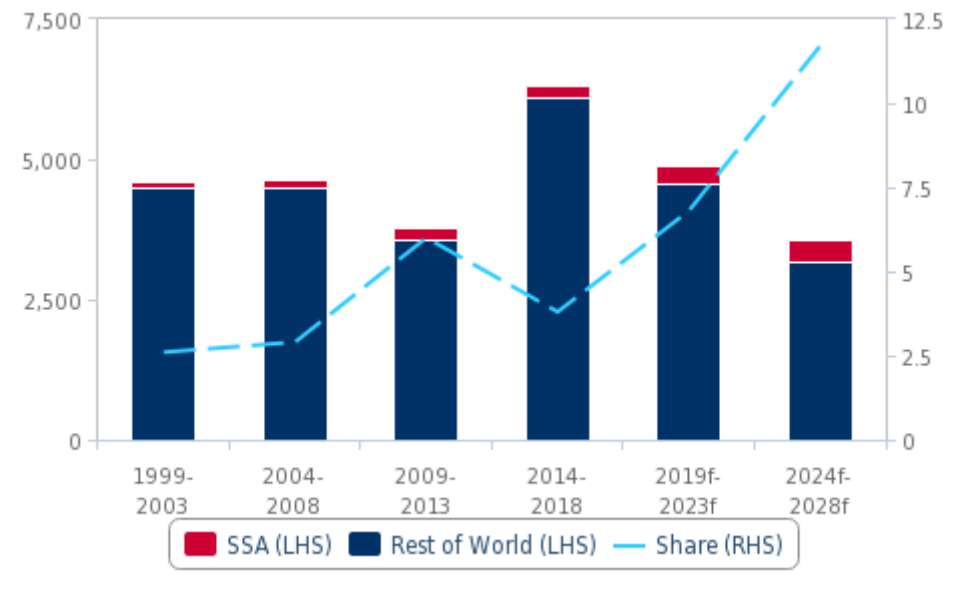


e/f = Fitch Solutions estimate/forecast. Source: EIA, JODI, National Sources, Fitch Solutions

However, while our outlook on growth is broadly bullish, we believe SSA will continue to underperform its potential, as the high cost and low availability of liquid fuels, a large rural population, low per capita GDP and structural drags on major economies will keep on posing barriers to higher demand growth. The SSA fuels market will remain small in global terms. Although a decline in refining capacity across the region provides a potential window for investors, a generally poor investment climate is likely to continue to mute interest in SSA.

SSA Making A Global Mark

Net Change In Refined Fuels Consumption, '000b/d; SSA Consumption Growth As Share Of Global Total, %



f = Fitch Solutions forecast. Source: EIA, JODI, national sources, Fitch Solutions

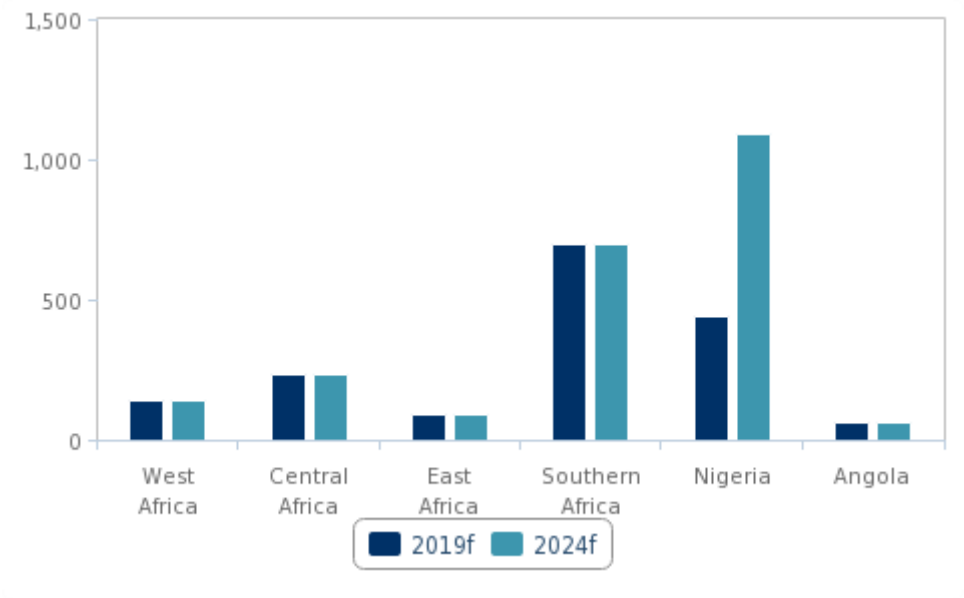
Refining Capacity: Downstream Sector In A Slump

Refining capacity and complexity in the region remains poor, driving a heavy fuel import burden. We forecast capacity growth in only one market, Nigeria, with the 650,000b/d Dangote refinery expected to start up in 2022. However, a substantial refining capacity deficit will remain, across our forecast period.

Refiners face various headwinds including small and fragmented markets, the pervasive use of fuel subsidies, financing constraints and the unreliability of crude feeds, which undercut overall profitability. Investments in the upgrade or expansion of existing facilities are possible, but we do not expect to see any major new capital commitments made to the region's downstream sector over the coming years.

Nigeria Supporting The Region

SSA - Refining Capacity Forecast, '000b/d



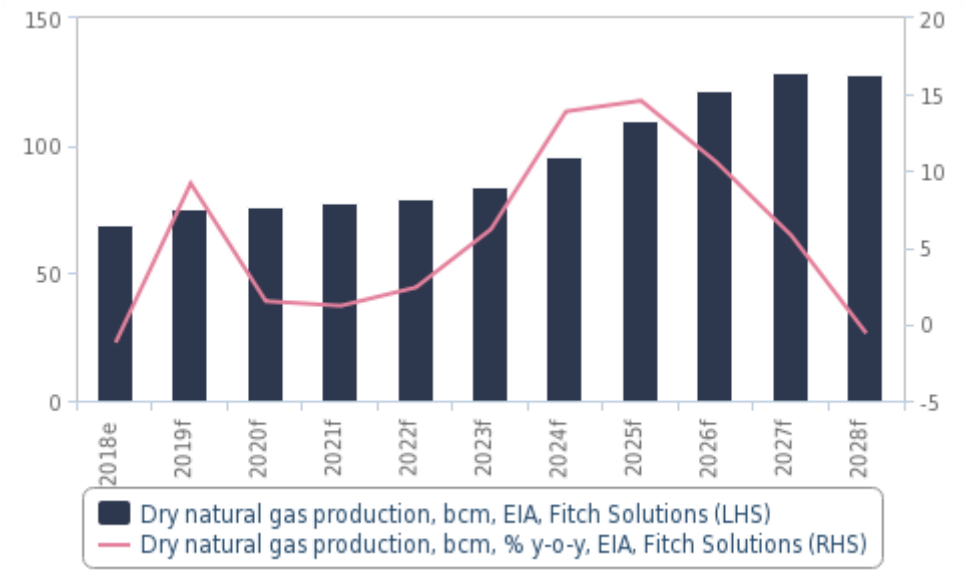
e/f = Fitch Solutions estimate/forecast. Source: EIA, JODI, national sources, Fitch Solutions

Gas Production: Steady Growth Ahead

In contrast to oil, we forecast regional natural gas production to grow strongly across our 10-year forecast period, registering a steady 6.5% y-o-y average growth rate. Up to 2022, growth will be broad-based, driven by incremental gains in markets across the region and feeding a mix of growing domestic demand and expanding exports of LNG. In volume terms, Nigeria will remain dominant, although its market share will be sharply eroded across the duration of our forecast period, falling from 69.4% in 2019 to 48.5% in 2028.

Gas Production Growth Outshining That Of Oil

SSA Natural Gas Production Forecast, bcm; % y-o-y



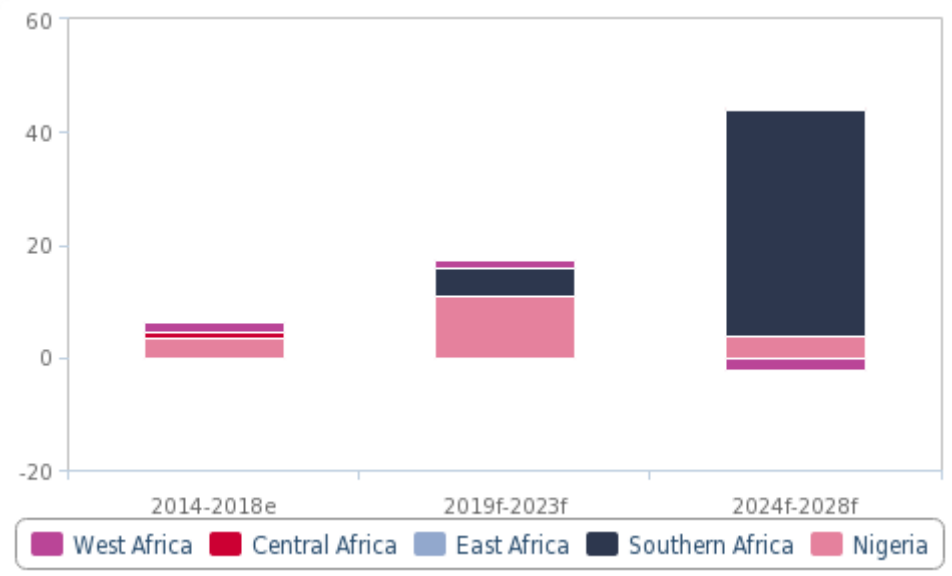
e/f = Fitch Solutions estimate/forecast. Source: EIA, Fitch Solutions

Longer-term growth will be heavily concentrated in southern and eastern Africa, with Mozambique emerging as a key gas producer, developing its vast resources offshore (*see 'SSA Capex To Grow On The Back Of Mozambican LNG', March 28 2019*). The country will boost production to over 50.4bcm by 2028 compared to 5.6bcm in 2017. Similarly, transformative gas resources have been discovered in neighbouring Tanzania. However, delays to taking a final investment decision for a proposed onshore LNG facility have pushed production growth outside of our forecast window.

In West Africa, Cameroon has become a net LNG exporter in 2018, with the start-up of the Kribi fields and the Hilli Episeyo floating LNG facility (*see '2018 Transformational Year For Cameroonian Gas', December 17 2018*). The FLNG vessel used by Anglo-French company **Perenco** is the first of its kind to be built and brought into production in the region.

Mozambican Gas To Provide Major Uplift

SSA - Cumulative Net Change In Dry Natural Gas Production, bcm



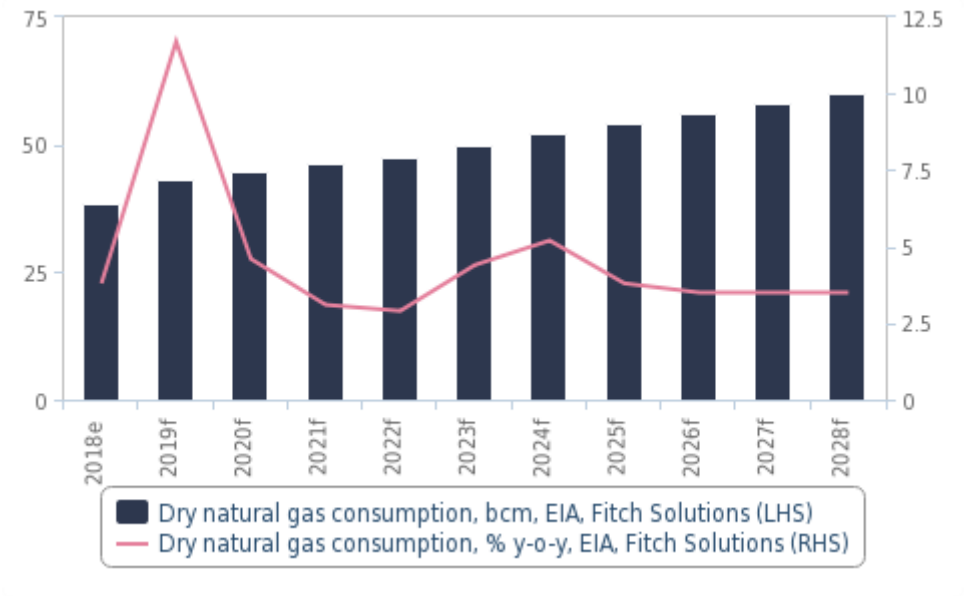
e/f = Fitch Solutions estimate/forecast. Source: EIA, JODI, national sources, Fitch Solutions

Gas Consumption: Strong Gains From A Low Base

We forecast regional gas consumption to expand significantly across the next decade, rising at an annual average rate of 4.6% y-o-y from 2019. However, this is coming from a fairly low base. Nigeria and South Africa will remain the largest consumers in the region across our 10-year forecast period, but large growth in markets such as Ghana, Angola, Côte d'Ivoire and Mozambique will progressively dilute others' share in the mix throughout 2028.

Gas Demand Boosted By Increasing Production

SSA - Dry Natural Gas Demand Forecast, bcm

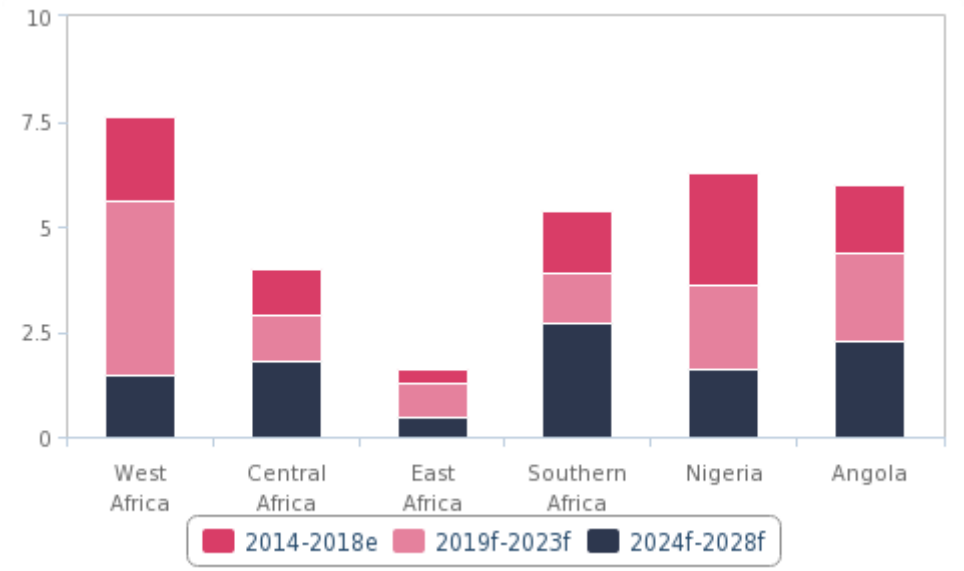


e/f = Fitch Solutions estimate/forecast. Source: EIA, JODI, national sources, Fitch Solutions

The volume of gas demand regionally will continue to be constrained by limited domestic production in most markets and a lack of pipeline infrastructure, both nationally and regionally. In most countries, a small domestic demand pool and lack of an anchor off-taker has been a key barrier to building out import and midstream gas infrastructure in SSA.

Natural Gas Consumption On The Rise

SSA - Cumulative Net Change In Dry Natural Gas Demand, bcm



e/f = Fitch Solutions estimate/forecast. Source: EIA, JODI, national sources, Fitch Solutions

Oil & Gas Glossary

Term	Description
AOR	additional oil recovery
APA	awards for predefined areas
API	American Petroleum Institute
bbl	barrel
bcm	billion cubic metres
b/d	barrels per day
boe	barrels of oil equivalent
BTU	British thermal unit
capex	capital expenditure
CBM	coal bed methane
CEE	Central and Eastern Europe
CSG	coal seam gas
DoE	US Department of Energy
DM	developed markets
EBRD	European Bank for Reconstruction & Development
EEZ	exclusive economic zone
EIA	US Energy Information Administration
EM	emerging markets
EOR	enhanced oil recovery
E&P	exploration and production
EPSA	exploration and production sharing agreement
EV	electric vehicle(s)
FID	final investment decision
FDI	foreign direct investment
FEED	front end engineering and design
FLNG	floating liquefied natural gas
FPSO	floating production, storage and offloading
FSRU	floating storage and regasification unit
FTA	free trade agreement
FTZ	free trade zone
GCC	Gulf Cooperation Council
G&G	geological and geophysical
GS	geological survey
GTL	gas to liquids
GWh	gigawatt hours
IOC	international oil company
IPO	initial public offering
JOC	joint operating company
JODI	joint organisations data initiative
JPDA	joint petroleum development area
LAB	linear alkyl benzene
LDPE	low density polypropylene
LNG	liquefied natural gas
LPG	liquefied petroleum gas
mcm	million cubic metres
MENA	Middle East and North Africa
MoU	memorandum of understanding
mt	metric tonne
mtpa	million tons per annum
NGL	natural gas liquids
NGV	natural gas vehicle(s)
NOC	national oil company
opex	operating expenditure
PE	polyethylene
PP	polypropylene
PSA	production sharing agreement
PSC	production sharing contract
R&D	research and development
R/P	reserves/production
RPR	reserves to production ratio
SGI	strategic gas initiative
SoI	statement of intent
SPA	sale and purchase agreement
SPR	strategic petroleum reserve
SSA	Sub-Saharan Africa
tcm	trillion cubic metres
t/d	tonnes per day
toe	tonnes of oil equivalent
tpa	tonnes per annum
TRIPS	Trade-Related Aspects of Intellectual Property Rights

Term	Description
HDPE	high density polyethylene
HoA	heads of agreement
IEA	International Energy Agency
IGCC	integrated gasification combined cycle

Term	Description
TWh	terawatt hours
USGS	US Geological Survey
WIPO	World Intellectual Property Organization
WTI	West Texas Intermediate

Oil & Gas Methodology

Industry Forecast Methodology

Our industry forecasts are generated using the best-practice techniques of time-series modelling and causal/econometric modelling. The precise form of model we use varies from industry to industry, in each case being determined, as per standard practice, by the prevailing features of the industry data being examined.

Common to our analysis of every industry is the use of vector autoregressions. Vector autoregressions allow us to forecast a variable using more than the variable's own history as explanatory information. For example, when forecasting oil prices, we can include information about oil consumption, supply and capacity.

When forecasting for some of our industry sub-component variables, however, using a variable's own history is often the most desirable method of analysis. Such single-variable analysis is called univariate modelling. We use the most common and versatile form of univariate models: the autoregressive moving average model (ARMA).

In some cases, ARMA techniques are inappropriate because there is insufficient historic data or data quality is poor. In such cases, we use either traditional decomposition methods or smoothing methods as a basis for analysis and forecasting.

We mainly use OLS estimators and in order to avoid relying on subjective views and encourage the use of objective views, we use a 'general-to-specific' method. We mainly use a linear model, but simple non-linear models, such as the log-linear model, are used when necessary. During periods of 'industry shock', for example poor weather conditions impeding agricultural output, dummy variables are used to determine the level of impact.

Effective forecasting depends on appropriately selected regression models. We select the best model according to various different criteria and tests, including but not exclusive to:

- R2 tests explanatory power; adjusted R2 takes degree of freedom into account;
- Testing the directional movement and magnitude of coefficients;
- Hypothesis testing to ensure coefficients are significant (normally t-test and/or P-value);
- All results are assessed to alleviate issues related to auto-correlation and multi-collinearity.

We use the selected best model to perform forecasting.

Human intervention plays a necessary and desirable role in all our industry forecasting. Experience, expertise and knowledge of industry data and trends ensure that analysts spot structural breaks, anomalous data, turning points and seasonal features where a purely mechanical forecasting process would not.

Sector-Specific Methodology

There are a number of principal criteria that drive our forecasts for each energy indicator.

Energy Supply

This covers the supply of crude oil, natural gas, refined oil products and electrical power, which is determined largely by investment levels, available capacity, plant utilisation rates and national policy. We therefore examine:

- National energy policy, stated output goals and investment levels;
- Company-specific capacity data, output targets and capital expenditures, using national, regional and multinational company sources;
- International quotas, guidelines and projections from organisations such as OPEC, the International Energy Agency (IEA), and the US Energy Information Administration (EIA).

Energy Consumption

A mixture of methods is used to generate demand forecasts, applied as appropriate to each individual country:

- Underlying economic (GDP) growth for individual countries/regions, sourced from our published estimates;
- Historic relationships between GDP growth and energy demand growth in an individual country are analysed and used as the basis for predicting levels of consumption;
- Government projections for oil, gas and electricity demand;
- Third-party agency projections for regional demand, from organisations such as the IEA, EIA and OPEC;

Extrapolation of capacity expansion forecasts based on company- or state-specific investment levels.

Cross Checks

Whenever possible, we compare government and/or third-party agency projections with the declared spending and capacity expansion plans of the companies operating in each individual country. Where there are discrepancies, we use company-specific data as physical spending patterns to determine capacity and supply capability. Similarly, we compare capacity expansion plans and demand projections to check the energy balance of each country. Where the data suggest imports or exports, we check that necessary capacity exists or that the required investment in infrastructure is taking place.

Source

Sources include those international bodies mentioned above, such as OPEC, IEA, and EIA, as well as local energy ministries, official company information, and international and national news, plus international and national news agencies.

Upstream Oil & Gas Risk/Reward Index Methodology

Our Upstream Oil & Gas Risk/Reward Index (RRI) quantifies and ranks a country's attractiveness within the context of the oil industry, based on the balance between the **risks** and **rewards** of entering and operating in different countries.

We combine industry-specific characteristics with broader economic, political and operational market characteristics. We weight these inputs in terms of their importance to investor decision making in a given industry. The result is a nuanced and accurate reflection of the realities facing investors in terms of: 1) the balance between opportunities and risk; and 2) between sector-specific and broader market traits. This enables users of the index to assess a market's attractiveness in a regional and global context.

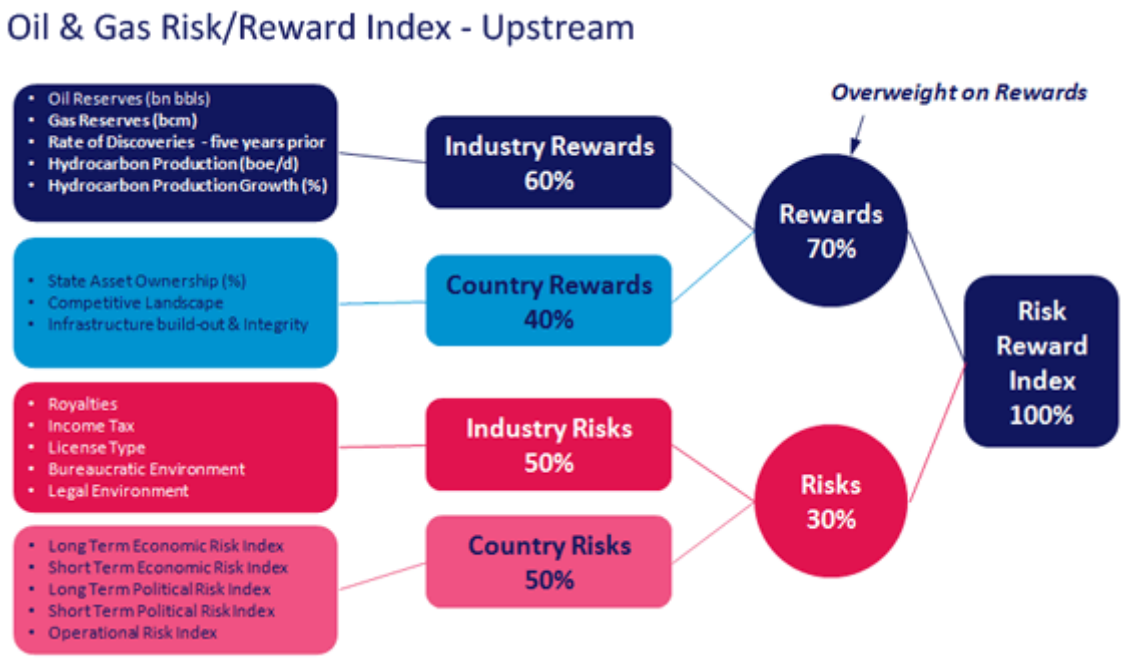
The index combines our proprietary forecasts and analyst assessment of the regulatory regime. As regulations and forecasts change, so the index scores change providing a highly dynamic and forward-looking result.

The Upstream Oil & Gas Risk Reward Index comprises **68 countries**.

Benefits of using our Upstream Oil & Gas RRI

- **Global Rankings:** A global table, ranking all the countries for upstream oil & gas from least (closest to zero) to most (closest to 100) attractive.
- **Accessibility:** Easily accessible, top down view of the global, regional or sub-regional Risk/Reward profiles.
- **Comparability:** Identical methodology across 87 countries for oil and gas allows users to build lists of countries they wish to compare, beyond the confines of a global or regional grouping.
- **Scoring:** Scores out of 100 with a wide distribution, provide nuanced investment comparisons. The higher the score, the more favourable the country profile.
- **Quantifiable:** Quantifies the rewards and risks of doing business in the upstream sector in different countries around the world and helps identify specific flashpoints in the overall business environment.
- **Comprehensive:** Comprehensive set of indicators, assessing industry-specific risks and rewards alongside political, economic and operating risks.
- **Entry Point:** A starting point to assess the outlook for the upstream oil & gas sector, from which users can access more granular forecasts and analysis to gain a deeper understanding of the market.
- **Balanced:** Multi-indicator structure prevents outliers and extremes from distorting final scores and rankings.
- Methodology is a combination of our proprietary forecasts, analyst insights and globally acceptable benchmark indicators (for example, World Bank's Doing Business Scores, Transparency International's Corruption Perceptions Index).

Weightings Of Categories And Indicators
Upstream Risk Reward Index



Source: Fitch Solutions

The upstream RRI matrix divides into two distinct categories:

Rewards:

Evaluation of an Industry's size and growth potential (**Industry Rewards**), and also macro industry and/or country characteristics that directly impact the size of business opportunities in a specific sector (**Country Rewards**).

Risks:

Evaluation of micro, industry-specific characteristics, crucial for an industry to develop to its potential (**Industry Risks**) and a quantifiable assessment of the country's political, economic and operational profile (**Country Risks**).

Assessing our Weightings:

Our matrix is deliberately overweight on Rewards (70% of the final RRI score for upstream markets) and within that, the Industry Rewards segment (60% of final Rewards score). This is to reflect the fact that when it comes to long term investment potential, industry size and growth potential carry the most weight in indicating opportunities, with other structural factors (demand outlooks and infrastructure integrity) weighing in, but to a slightly lesser extent. In addition, our focus and expertise in Emerging and Frontier Markets has dictated this bias towards industry size and growth to ensure we are able to identify opportunities in countries where regulatory frameworks are not as developed and industry sizes not as big (in USD terms) as in developed markets, but where we know there is a strong desire to invest.

INDICATORS - EXPLANATION AND SOURCES - UPSTREAM RRI		
	Source	**Rationale**
Rewards		
Industry Rewards		
Oil Reserves (bn bbl)	**Our data**	Indicates size of the opportunity for oil developments
Gas Reserves (bcm)	**Our data**	Indicates size of the opportunity for gas developments
Discoveries Rate - last FIVE years	**Our Calculation**	Outlines the prospectivity and potential of the upstream
Hydrocarbon Production (boe)	**Our forecast**	Five-year forward looking indication of production volumes
Hydrocarbon Production Growth (boe, %)	**Our forecast**	Five-year forward looking indication of production growth
Country Rewards		
State Asset Ownership (%)	**Our Calculation**	Demonstrates the potential access and restrictions to resources
Competitive Landscape	**Our Calculation**	Divides resource base by the approximate number of companies operating to indicate the level of competition.
Infrastructure Integrity	**Our Calculation**	Calculates the extent and quality of oil and gas infrastructure, indicating ease of access and level of maintenance investment needed.
Risks		
Industry Risks		
Licence Type	**Our Calculation**	Outlines a country score based on whether oil and gas licenses are offered as concessions, production sharing agreements or service contracts.
Income Tax	**Government Source**	Outlines the relative tax rate incurred by oil and gas companies.
Royalties & Special Taxes	**Government Source**	Indicates further required payments (and supplementary taxes) beyond income tax.
Bureaucratic Environment	**Our Operational Risk**	Outlines the ease of business processes, with a particular emphasis

	Source	Rationale
	Score	on mitigating the risk of delay to project timelines.
Legal Environment Risk	Our Operational Risk Score	A second ease of business indicator, highlighting potential challenges with the transparency and effectiveness of rule of law.
Country Risks		
Long-Term Economic Risk Index	Our Country Risk Index	The LT ERI takes into account the structural characteristics of economic growth, the labour market, price stability, exchange rate stability and the sustainability of the balance of payments, as well as fiscal and external debt outlooks for the coming decade.
Short-Term Economic Risk Index	Our Country Risk Index	The ST ERI seeks to define current vulnerabilities and assess real GDP growth, inflation, unemployment, exchange rate fluctuation, balance of payments dynamics, as well as fiscal and external debt credentials over the coming two years
Long-Term Political Risk Index	Our Country Risk Index	The LT PRI assesses a country's structural political characteristics based on our assumption that liberal, democratic states with no sectarian tensions and broad-based income equality exhibit the strongest characteristics in favour of political stability, over a multiyear timeframe.
Short-term Political Risk Index	Our Country Risk Index	The ST PRI assesses pertinent political risks to investment climate stability over a shorter time frame, up to 24 months forward.
Operational Risk Index	Our Operational Risk Index	The ORI focuses on existing conditions relating to four main risk areas: Labour Market, Trade and Investment, Logistics, and Crime and Security.

Source: Fitch Solutions

Downstream Oil & Gas Risk/Reward Methodology

Our Downstream Oil & Gas Risk/Reward Index (RRI) quantifies and ranks a country's attractiveness within the context of the downstream industry, based on the balance between the **risks** and **rewards** of entering and operating in different countries.

We combine industry-specific characteristics with broader economic, political and operational market characteristics. We weight these inputs in terms of their importance to investor decision making in a given industry. The result is a nuanced and accurate reflection of the realities facing investors in terms of: 1) the balance between opportunities and risk; and 2) between sector-specific and broader market traits. This enables users of the index to assess a market's attractiveness in a regional and global context.

The index combines our proprietary forecasts and analyst assessment of the regulatory regime. As regulations and forecasts change, so the Index scores change providing a highly dynamic and forward-looking result.

The Downstream Oil & Gas Risk/Reward Index comprises **88 countries**.

Benefits of using our Downstream Oil & Gas RRI

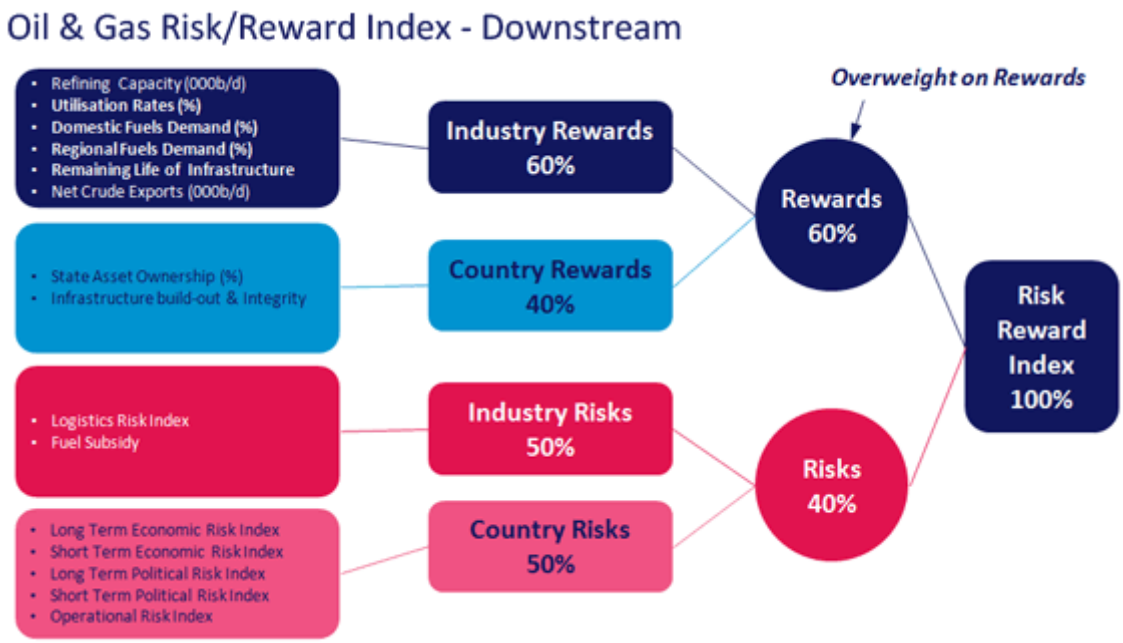
- **Global Rankings:** A global table, ranking all the countries for downstream from least (closest to zero) to most (closest to 100) attractive.
- **Accessibility:** Easily accessible, top down view of the global, regional or sub-regional Risk/Reward profiles.
- **Comparability:** Identical methodology across 87 countries for downstream oil allows users to build lists of countries they wish

to compare, beyond the confines of a global or regional grouping.

- **Scoring:** Scores out of 100 with a wide distribution, provide nuanced investment comparisons. The higher the score, the more favourable the country profile.
- **Quantifiable:** Quantifies the rewards and risks of doing business in the downstream sector in different countries and helps identify specific flashpoints in the overall business environment.
- **Comprehensive:** Comprehensive set of indicators, assessing industry-specific risks and rewards alongside political, economic and operating risks.
- **Entry Point:** A starting point to assess the outlook for the downstream sector, from which users can access more granular forecasts and analysis to gain a deeper understanding of the market.
- **Balanced:** Multi-indicator structure prevents outliers and extremes from distorting final scores and rankings.
- Methodology is a combination of our proprietary forecasts, analyst insights and globally acceptable benchmark indicators (for example, World Bank's Doing Business Scores, Transparency International's Corruption Perceptions Index).

Weightings Of Categories And Indicators

Downstream Risk Reward Index



Source: Fitch Solutions

The downstream RRI matrix divides into two distinct categories:

Rewards:

Evaluation of an industry's size and growth potential (**Industry Rewards**), and also macro industry and/or country characteristics that directly impact the size of business opportunities in a specific sector (**Country Rewards**).

Risks:

Evaluation of micro, industry-specific characteristics, crucial for an industry to develop to its potential (**Industry Risks**) and a quantifiable assessment of the country's political, economic and operational profile (**Country Risks**).

Assessing our Weightings:

Our matrix is deliberately overweight on Rewards (60% of the final RRI score for a market) and within that, the Industry Rewards segment (60% of final Rewards score). This is to reflect the fact that when it comes to long-term investment potential, industry size and growth potential carry the most weight in indicating opportunities, with other structural factors (demographic, labour statistics and infrastructure availability) weighing in, but to a slightly lesser extent. In addition, our focus and expertise in Emerging and Frontier Markets has dictated this bias towards industry size and growth to ensure we are able to identify opportunities in countries where regulatory frameworks are not as developed and industry sizes not as big (in USD terms) as in developed markets, but where we know there is a strong desire to invest.

INDICATORS - EXPLANATION AND SOURCES - DOWNSTREAM RRI

	Source	Rationale
Rewards		
Industry Rewards		
Refining Capacity ('000b/d) - five-year average	**Our Forecast**	Quantifies the current size of the refining sector as a comparison to peer markets
Utilisation Rates (%) - five-year average	**Our Calculation**	Outlines the efficiency of the existing facilities, identifying over or under capacity
Domestic Fuels demand ('000b/d) - five-year average	**Our Forecast**	Shows the size of the domestic market demand as a comparison to peer markets
Fuel Demand (% Growth) - five-year average	**Our Forecast**	Identifies the domestic demand opportunity and trend in consumption patterns
Regional Fuel Demand - five-year average	**Our Forecast**	Shows the regional export market size to represent the opportunity for exports
Life Span of Infrastructure	**Our Calculation**	Approximate calculation of the life span of infrastructure to identify the need remaining operating life
Theoretical Net Crude Exports ('000b/d) - five year average	**Our Calculation**	Identifies spare capacity of domestic oil supply as a potential feedstock
Country Rewards		
State asset ownership (%)	**Our Calculation**	Indicates how much of the given market is open for private investment
Population	**Our Operational Risk Index**	A metric used to proxy the size of the domestic market
Population Growth	**Our Operational Risk Index**	A metric used to proxy the scale and pace of growth in the domestic market
Risks		
Industry Risks		
Logistics Risk Rating	**Our Operational Risk Index**	Offers a comparative indicator on ease of transport for feedstock supply, fuels distribution and import/export flexibility.
Fuel Subsidies	**Our Calculation**	Penalizes a market's score if fuels prices are sold at below market costs.
Country Risks		
Long-Term Economic Risk Index	**Our Country Risk Index**	The LT ERI takes into account the structural characteristics of economic growth, the labour market, price stability, exchange rate stability and the sustainability of the balance of payments, as well as fiscal and external debt outlooks for the coming decade.
Short-Term Economic Risk Index	**Our Country Risk Index**	The ST ERI seeks to define current vulnerabilities and assess real GDP growth, inflation, unemployment, exchange rate fluctuation, balance of payments dynamics, as well as fiscal and external debt credentials over the coming two years
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	Source	Rationale
		timeframe.
Short-Term Political Risk Index	**Our Country Risk Index**	The ST PRI assesses pertinent political risks to investment climate stability over a shorter time frame, up to 24 months forward.
Operational Risk Index	**Our Operational Risk Index**	The ORI focuses on existing conditions relating to four main risk areas: Labour Market, Trade and Investment, Logistics, and Crime and Security.

Source: Fitch Solutions

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ISSN: 1748-412X

Copy Deadline: April 2019