

Fuel for thought

Africa oil & gas review 2019

Current developments and a look into the future



November 2019

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Executive summary



The global energy market is in an exciting phase of transition and disruption.

Breakthrough technologies are unlocking significant new reserves, processing, transportation and downstream uses that were previously unviable, unknown or inaccessible. Decarbonisation driven by the environmental sustainability agenda is shifting the energy mix at an accelerating pace, which is particularly evident across North America, Asia and Europe. This seems likely to position gas ahead of coal by 2030 to become the world's number two fuel.

Natural gas prices are decoupling from oil prices and US LNG exports are introducing increased flexibility into global energy marketing and trading. The number and type of market participants has dramatically increased as lower prices make imports more affordable. Uncertainty created through US trade negotiations with China and Europe, and the UK's Brexit conundrum, are two of many drivers of globally shifting trade patterns. Vulnerability to domestic and international security challenges are real as illustrated through the recent attack on Saudi Arabia's refineries and an escalation of violent incidents in the natural gas rich province of Cabo Delgado in Northern Mozambique.

The impact of the oil price crash of 2014–2016 was a wake-up call for the industry with Brent crude prices declining by over 70% to a low of around US\$30/bbl. Capital expenditure, as an indicator of the industry's health, declined globally because of the oil price crash, but then improved in line with the 2017 oil price recovery. However, capital expenditure in Africa showed a significant decline, which continued into 2018.

Globally, 2018 was a successful year in oil & gas exploration with discoveries approximately doubling those made in 2017. Notwithstanding Africa's endowment in vast natural resources, including substantial oil and gas reserves, West Africa had the only African discovery to make it onto the 2017 and 2018 top 10 list for new discoveries. This result is not unexpected as the exploration spend in Africa dwindled for another consecutive year. While exploration provides the pipeline for future developments, the focus in Africa in the near term will be on the successful development of known resources.

One of the most dramatic finds over the past decade is Mozambique's natural gas, estimated at over 180 tcf, which has already unlocked the first three large-scale LNG projects. These projects, together with project expansion phases and additional exploration, have the potential to position Mozambique as the third largest global LNG producer after Qatar and Australia by 2030.

Nothing breeds success like success and successful development in the new Mozambique projects could be a catalyst for the continent to finally capitalise on its potential.

Hydrocarbon resources provide significant opportunities for growth in countries that can capitalise on their potential. Maximising the benefits from these endowments provides direct income to governments, employees, suppliers and shareholders of megaprojects. Of equal if not higher importance, is the significant developmental potential through the associated infrastructure, industrialisation, socio-economic and capability uplift at country level.

For emerging countries, there are many potential pitfalls in reaching ultimate success and reaping the resulting economic benefits that these projects promise. In this report we have attempted to shine a light on this aspect by sharing insights and lessons learned by Nigeria, which has a mature industry, compared to the opportunities and risks facing Mozambique as a recent entrant.

The stage is set for a dynamic future for Africa's hydrocarbon-rich and import-dependent countries, investors, NOCs and IOCs. Understandably many players are reviewing their strategies, portfolios and ambitions in line with this changing context. Finding balance between risk, return, affordability and developmental impact in the near term and outer horizons will be defining for many.



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Acronyms used in this publication

bbbl	Barrels	GVA	Gross value added
bbbl/d	Barrels per day	IEA	International Energy Agency
bcf	Billions of standard cubic feet	IOC	International oil company
boe	Barrels of oil equivalent	JV	Joint venture
btu	British thermal unit	kbpd	Thousand barrels per day
CAGR	Compound annual growth rate	LNG	Liquefied natural gas
EIA	US Energy Information Administration	M&A	Mergers and acquisitions
EPCC	Engineering, procurement, construction and commissioning	mmscfd	Million standard cubic feet per day
FID	Final investment decision	MTO	Methanol to olefins
FLNG	Floating liquefied natural gas	mtpa	Million tonnes per annum
GDP	Gross domestic product	NOC	National oil company
GTF	Gas to fertiliser	O&G	Oil and gas
GTM	Gas to methanol	OPEC	Organisation of the Petroleum Exporting Countries
GTP	Gas to power	tcf	Trillion cubic feet

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Growth and development

Oil

Africa's **proven reserves at 125.3 billion bbl**, down 1% from prior year, which amounts to 7.2% of the world's proven reserves

Production increased marginally to **8.2 million bbl/d** from prior year, amounting to 8.6% of global production

Consumption at 4.0 million bbl/d saw no changes since prior year, making up a total of 4.0% of global consumption

Exports from Africa increased to **7.1 million bbl/d**, 9.9% of global exports



Discoveries

Global oil & gas discoveries were on a remarkable recovery track in 2018 with approximately **9.4 billion boe**, reversing the declining trend during the 2015–2017 period

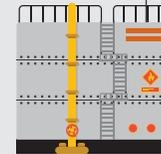
Africa had one major gas discovery that made the 2018 top 10 global discovery list totalling **538.6 million boe**



Refineries

Refinery throughput at 2.0 million bbl/d which is similar to last year and amounts to 2.5% of global, same as in prior year

Refinery upgrades or new builds considered in Algeria, Angola, Cote d'Ivoire, Egypt, Ghana, Kenya, Nigeria, Republic of Congo, Senegal, South Africa, South Sudan, Sudan, Uganda and Zambia



Gas

Africa's **proven reserves at 509.6 tcf**, up 4.5% from prior year, which amounts to 7.3% of the world's proven reserves

Production increased by 5.7% from prior year to **8.4 tcf**, amounting to 6.1% of global production

Consumption at 5.3 tcf saw an increase of 6.0% since prior year, making up a total of 3.9% of global consumption

Pipeline exports from Africa at **1.4 tcf**, decreased by 12.5%, making up 4.1% of global exports, down 2% compared to last year



Bidding rounds 2019

Angola, Cameroon, Democratic Republic of Congo, Equatorial Guinea, Ghana, Mozambique, Nigeria, Republic of the Congo, Senegal, Sierra Leone, Somalia, South Sudan and Uganda

Africa is offering over 220 000 square kilometres of acreage primarily located in offshore territories

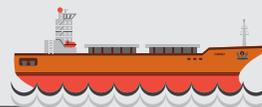


LNG

Operating capacity utilisation at 61% compared to 85% globally

Liquefaction capacity increased to **70.7 mtpa**, 18% of global

LNG exports decreased by 3.2% to **39.7 mtpa** with **35.7 mtpa** from Nigeria, Algeria, Angola and Egypt



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Reserves and production



Although Africa's oil production increased slightly, the continent was unable to keep up with global output, resulting in a 0.1% drop in share. Proven oil reserves on the continent are estimated at 7.2% of global, a 1% decrease from 2017 totals. This result is not surprising as African exploration activity waned for another consecutive year.

Both OPEC and non-OPEC producers agreed to cut oil production severely from mid-2017 until early 2018. OPEC and Russia then extended these production cuts to end-2018. Of the African OPEC member countries, Algeria, Angola, Equatorial Guinea and Gabon saw declines in oil production. Only the Republic of Congo, Libya and Nigeria saw increased production even though the latter two had output caps at 2017 levels.

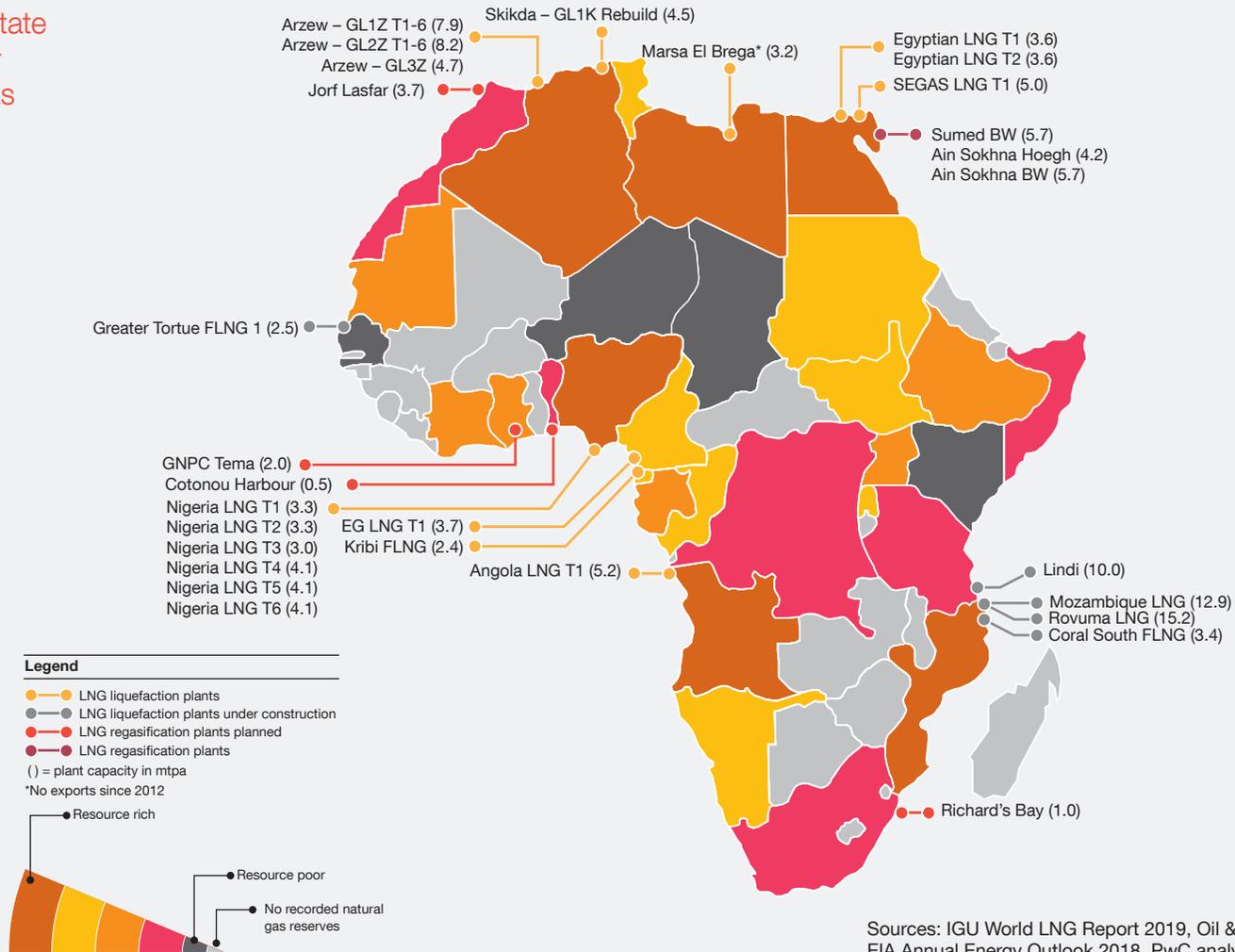
At the end of 2018, Africa is reported to have had proven natural gas reserves of 509.6 tcf. This marks a substantial increase of 4.5% from the prior year and sees an increased global share amounting to 7.3%. Senegal's gas discovery of just over 3.0 tcf was the only African discovery that made the global top 10 discovery list for 2018. Nearly 91% of African gas production continues to come from Algeria, Angola, Egypt, Libya and Nigeria, and saw an overall increase of 4.8% from last year.

Energy transition is continuing its momentum, with low-carbon developments on the agenda for most players. Globally, international oil companies have actively been investing in alternative energies and low-carbon solutions as part of this transition. With gas being discovered in abundance around the continent, national oil companies (NOCs) in Africa have the opportunity to focus on gas as a relatively lean bridging fuel to move to a 'cleaner' energy source.

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The state of LNG in Africa

This map illustrates the current state of Africa's LNG projects together with the distribution of natural gas reserves, 2018



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Mergers and acquisitions



Investment in the frontier region of Africa has seen signs of renewed interest driven by somewhat stable prices and increased investor appetite. This has given exploration and production companies an opportunity to pursue the potentially highly-prospective frontiers and under-explored areas.

Similar to the mining industry, oil & gas has offered little to no equity returns for shareholders over the last decade, leading to increased pressure on companies to preserve value and follow stringent capital allocation models.

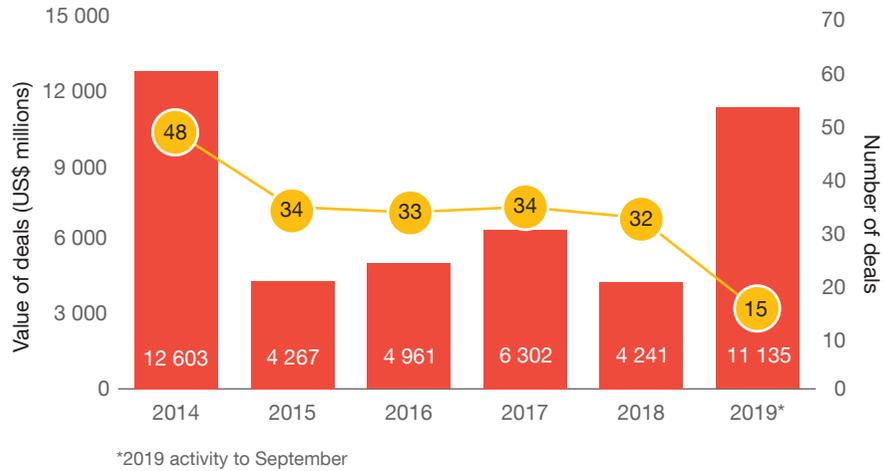
Merger and acquisition (M&A) activity tends to track volatility and market sentiment, and as the global oil market starts to stabilise, we will continue to see further opportunities for M&A.

Companies continue to be careful and selective in their approach to M&A, guided by capital allocation discipline and shareholder expectations. Value discussions will largely follow the pursuit of new growth sources and synergy opportunities.

Two of the largest global oil & gas M&A transactions of all time have happened in the most recent period, both with a significant Middle East and African exposure: Saudi Aramco's 70% acquisition of Saudi Basic Industries Corporation (SABIC) for US\$69.1bn and the US\$55bn acquisition of Anadarko Petroleum by Occidental Petroleum. This transaction led to the pre-emptive acquisition of Anadarko's African assets by Total for ~US\$8.8bn. Excluding the Total/Occidental transaction, M&A activity remains somewhat muted in 2019, with deal value amounting to ~US\$2.3bn announced as at 30 September 2019.

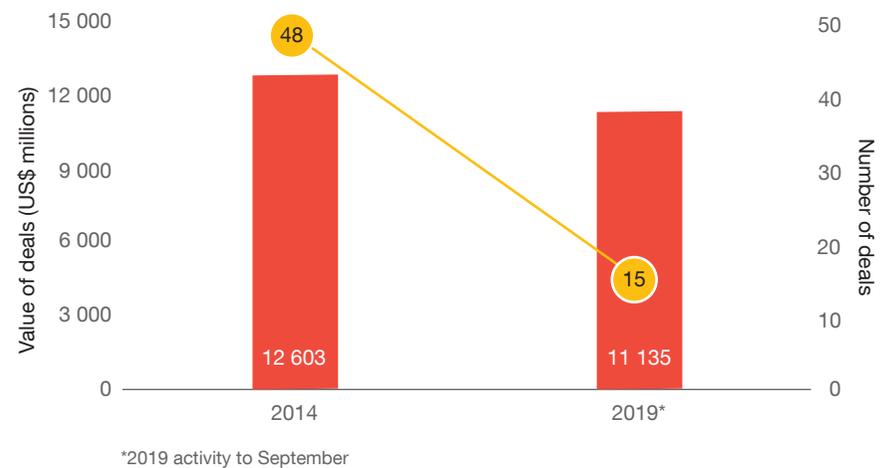
Note that the information represented in the following graphs is based on deal announcement dates and includes deals for which no transaction value has been disclosed.

Figure 6.1: African upstream M&A activity, 2014–2019



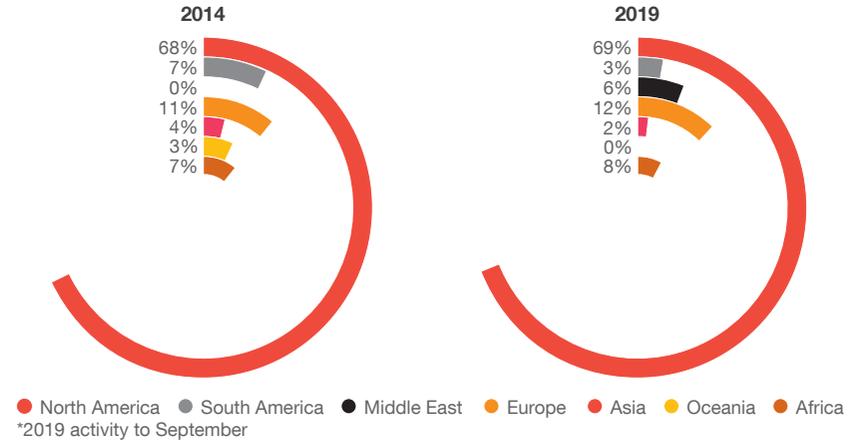
Source: Acuris and Capital IQ

Figure 6.2 African upstream M&A activity, 2014–2019



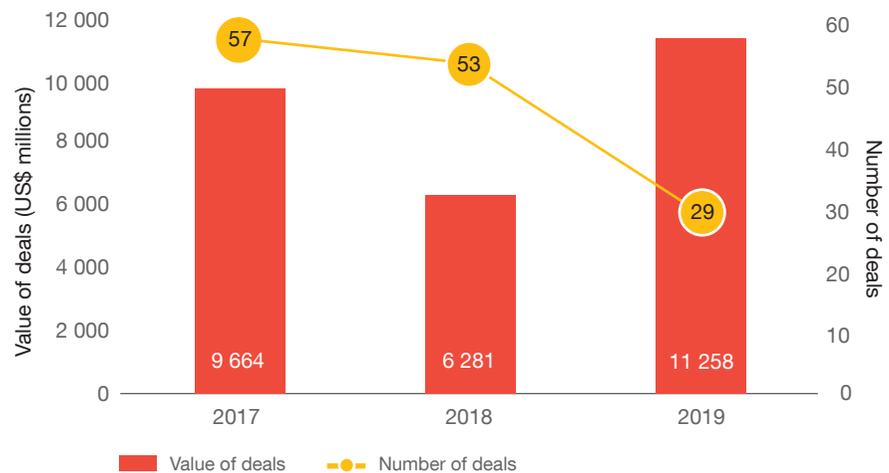
Source: Acuris and Capital IQ

Figure 6.3: Africa's share of global upstream M&A deals by value



Source Acuris and Capital IQ

Figure 6.4: African M&A activity across the value chain, 2017–2019



Source: Acuris and Capital IQ

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Oil & gas discoveries in 2018



It was a successful year in oil & gas exploration with discoveries approximately doubling those made in 2017.

In Saudi Arabia vast onshore shale gas resources have been identified and estimated at just under 3.0 billion boe.

The year's largest conventional discovery was made in Northern Russia by operator Novatek. The resource is estimated to hold close to 950 million boe. Other major resources have been found in North America, Cyprus, Oman and Guyana.

In both 2017 and 2018 the only top-10 major discoveries on the continent were made in West Africa. This contrasts with previous years in which substantial resources were found across the African continent — 2016: Senegal and Angola; 2015: Egypt, Mauritania, Angola and Congo; 2014: Angola, Senegal, Congo, Gabon and Tanzania; and 2013: Mozambique, Angola, Nigeria, Congo, Tanzania and Egypt.

Top 10 global oil & gas discoveries in 2018

Asset	Country	Region	Operator	Principal resource	Location	Estimated resources (Million bbl)	Liquids	Gas
Jafurah shale gas (Al Hasa)	Saudi Arabia	Middle East	Saudi Aramco	Gas	Onshore	2 934		100%
North Obskoye	Russia	Russia	Novatek	Gas	Offshore	944	20%	80%
Austin Chalk	US	North America	Amelia Resources	Liquids	Onshore	788	90%	10%
Mabrouk North East	Oman	Middle East	Shell	Gas	Onshore	731	14%	86%
Calypso	Cyprus	Southern Europe	Eni	Gas	Offshore	678	4%	96%
Hammerhead	Guyana	South America	ExxonMobil	Liquids	Offshore	639	94%	6%
Ballymore	US	North America	Chevron	Liquids	Offshore	546	100%	
Teranga	Senegal	West Africa	BP	Gas	Offshore	539	2%	98%
Duvernay East Shale Basin	Canada	North America	Crescent Point Energy	Liquids	Onshore	521	93%	7%
Longtail	Guyana	South America	ExxonMobil	Liquids	Offshore	509	96%	4%

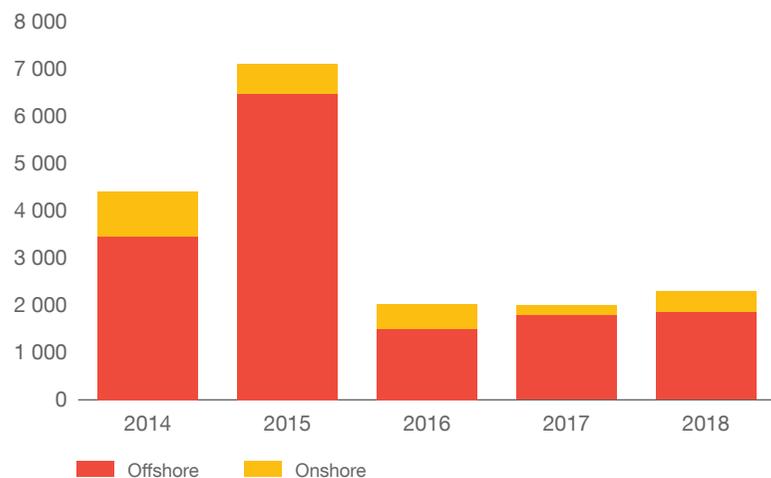
Source: Rystad Energy, PwC analysis



After 2015's huge discoveries in Africa, 2018 discoveries remain at a lower stable volume comparable to 2016 and 2017

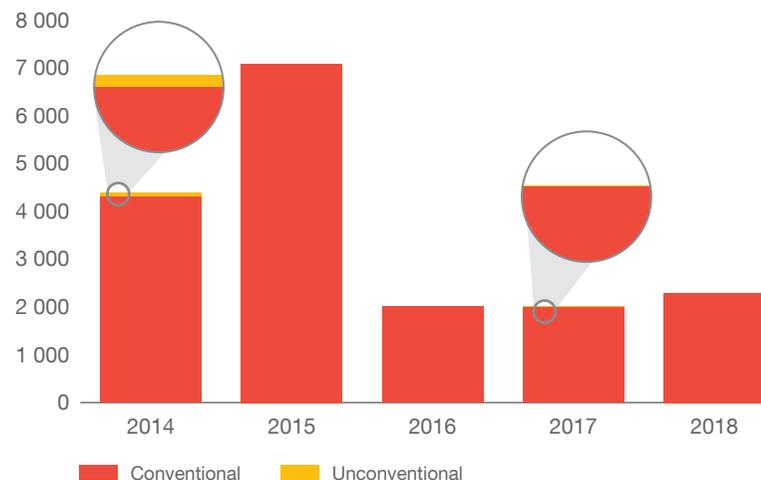
Africa discoveries by type, 2014–2018

Figure 7.1: Onshore vs offshore discoveries (million bbl)



Source: Rystad Energy, PwC analysis

Figure 7.2: Conventional vs unconventional discoveries (million bbl)

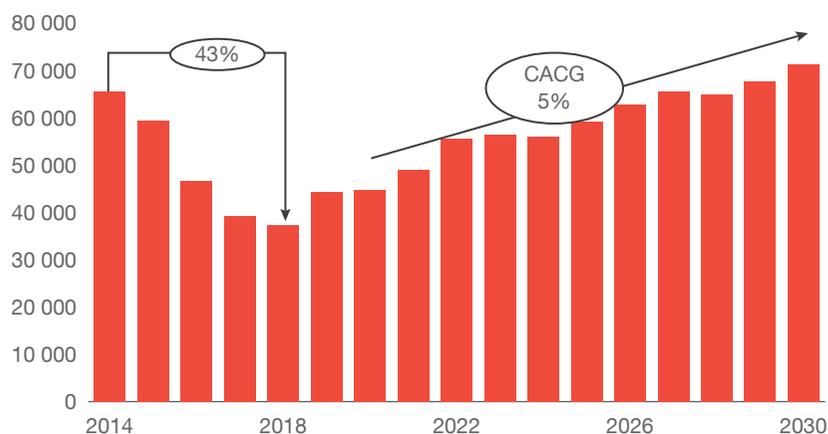


Source: Rystad Energy, PwC analysis

Sector investment upstream is recovering slowly, despite a significant decline after the oil price crash

In line with the oil price crash of 2014 to 2016, capital expenditure spent on production in Africa showed a significant decline, which continued into 2018 with a total drop in capital expenditure spend of 43% for the period 2014–2018. From 2020 Capital expenditure spend is expected to increase at an annual compound growth rate (CAGR) of 5% to more than US\$70bn in 2030.

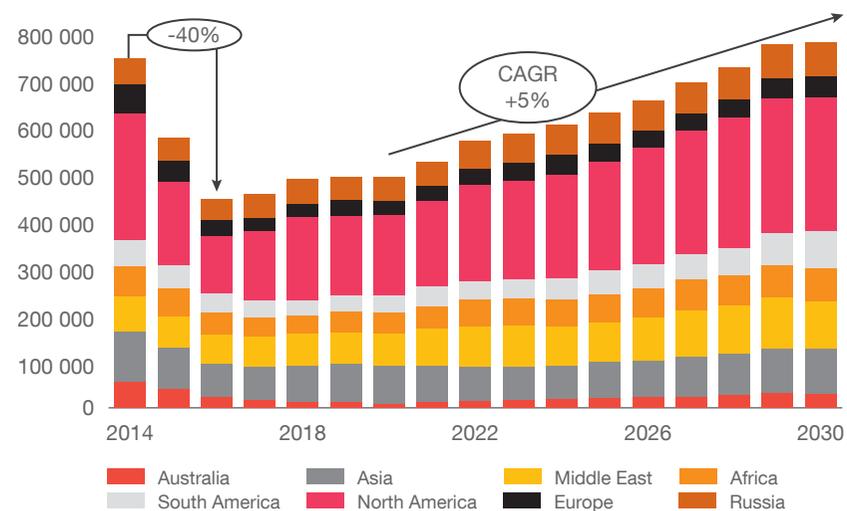
Figure 7.3: Africa oil & gas capital expenditure, 2014–2030 (US\$ millions)



Sources: Rystad Energy, Strategy&, PwC analysis

On a global level, capital expenditure spend recovered in line with the oil price recovery in mid-2016. Moving forward, a growth rate similar to Africa can be expected to 2030, with North America taking the lead.

Figure 7.4: Global oil & gas capital expenditure, 2014–2030 (US\$ millions)

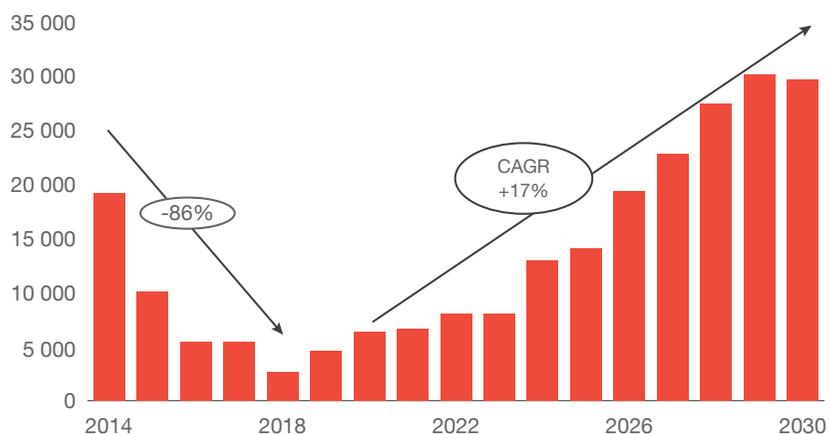


Source: Rystad Energy, Strategy&

Exploration spend declined more dramatically, but is forecast to recover over the medium term

Projections for exploration spend in Africa are looking up. The continent experienced a massive drop in exploration spend of 86% between 2014 and 2018. However, a slow and then robust recovery with an average 17% year-on-year growth rate over the next decade is projected.

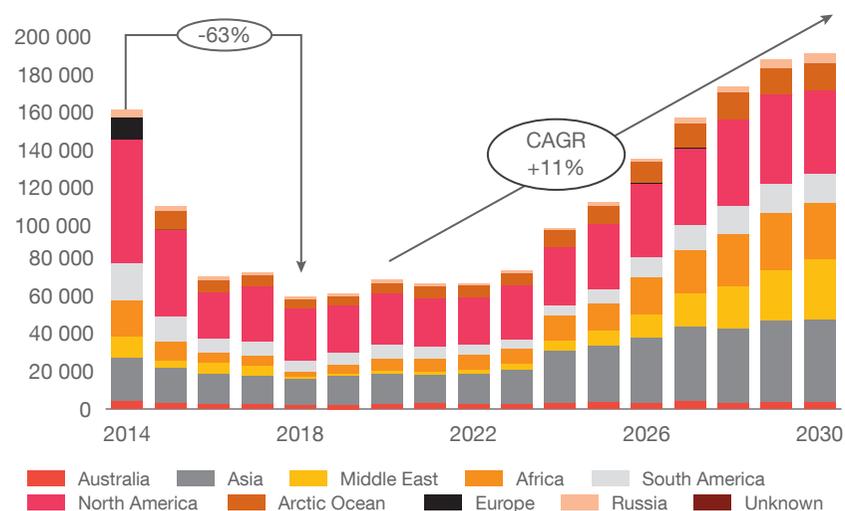
Figure 7.5: Africa oil & gas exploration spend, 2014–2030 (US\$ millions)



Sources: Rystad Energy, Strategy&, PwC analysis

Globally, the decline in spend during 2014 and 2018 amounted to 63%, with a more gradual recovery of around 11% growth expected over the next decade. Again, the largest injection of capital will be in North America.

Figure 7.6: Global oil & gas exploration expenditure, 2014–2030 (US\$ millions)



Source: Rystad Energy, Strategy&

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The oil price



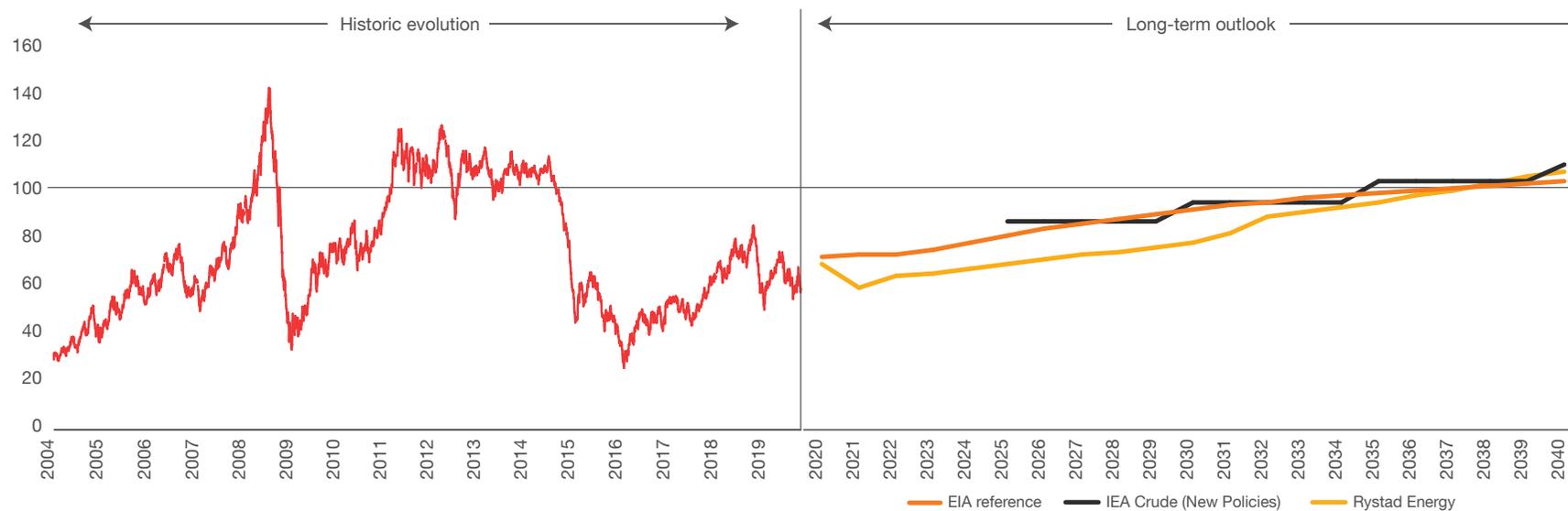
The oil price saw a notable increase throughout much of 2018, to a point where it hit a four-and-a-half-year high in October and the idea of 'lower for longer' became a faint memory of the recent past.

However, the fourth quarter saw the oil price slump by a staggering 42%. This slip towards an 18-month low could largely be attributed to supply glut fears as the world's largest producer of petroleum, the United States, flooded the market with record level production.

Fortunately, the oil industry remains optimistic, and African exploration spend is forecast to recover robustly over the medium term, most likely in anticipation of an upturn in the oil price.

Medium- to long-term oil price forecasts consistently estimate a sustained increase in prices

Figure 8.1: Brent crude price, 2004–2040 (US\$/bbl)



Sources: EIA, IEA, Rystad Energy, Strategy&, PwC analysis

Growth in world oil supply & demand

Overall fundamentals suggest the market will remain in a position of oversupply with more production coming on-stream while prospects for demand growth are weakening. The benchmark Brent crude spot price is trading in the high US\$50/bbl and low US\$60/bbl. However, as the attack on Saudi Arabia illustrated, prices remain highly volatile. In the first day of trading after the attack oil prices spiked at US\$71/bbl and then quickly retreated.

Poor economic growth (as illustrated by a slowdown in several major consuming regions and countries, such as Europe, India, Japan, Korea and the US), compounded by the ongoing trade war between the US and China, are weighing down on global oil consumption.

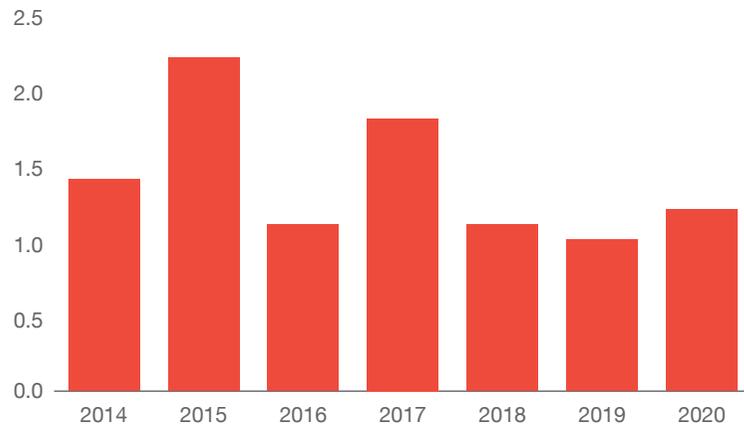
According to the IEA, the 2020 oil demand growth outlook has been revised back to 1.2m bbl/d.

The supply side of oil markets remain well provisioned. This is in spite of the large-scale supply disruption triggered by the attacks on Saudi Arabia which temporarily affected about 5.7m bbl/d of crude production capacity. It is worth noting Saudi Aramco's achievement in restoring operations and maintaining customer confidence.

There is also a prospect of a wave of new oil production coming onstream. For example, Norway's major Johan Sverdrup project is online and will reach 440k bbl/d by mid-2020.

OPEC+, an alliance of OPEC members and other major producers including Russia, will face increasing pressure to extend the current supply cut if demand remains weak. Since January 2019 OPEC+ implemented a deal to cut output by 1.2m bbl/d to support the market. The pact expires in March 2020.

Figure 8.2: Growth in world oil supply & demand, 2014–2018



Source: IEA Oil Market Report 2019, Strategy&, PwC analysis



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Gas and LNG supply and demand

Globally, the natural gas market will continue to see growth and will likely overtake coal by 2030 to become the world's second leading fuel.¹

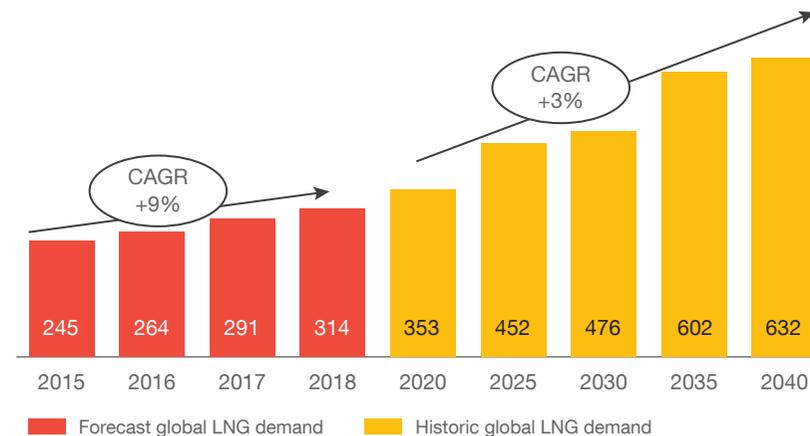
Natural gas accounts for just under a quarter of global energy demand, of which 9.6% was supplied as LNG in 2018. Natural gas prices are decoupling from oil prices and US LNG exports are introducing new flexibility into global LNG marketing and trading. The number and type of LNG market participants has dramatically increased as lower prices make imports more affordable.

Floating storage and regasification units are also opening new markets. Short-term and spot LNG transactions now comprise a greater portion of global LNG trade. Current LNG oversupply, coupled with a low oil-price environment is putting downward pressure on global LNG prices, a trend which is likely to continue over the next decade or two. In this era of increased uncertainty, reduced margins, tighter cash flows and changing risk profiles we see a highly competitive market for securing long-term sales agreements.

The increasing regulatory drive to decarbonise will reduce the share of coal in the global energy mix and drive demand for natural gas for energy generation and other uses. While not carbon neutral, natural gas is 'cleaner' than coal and acts as a 'bridge fuel'. This enables countries to reduce coal dependence cost effectively and with less disruption, while other sources of renewable energy are being developed.

¹ World Energy Outlook 2017

Figure 9.1: Global LNG demand forecast (mtpa)



Source: GIIGNL annual report 2019 and 11 independent analyst views collated by Standard Bank

The demand for LNG is projected to have a 3% CAGR from 2020 to 2040, with China remaining the biggest growth market for LNG by more than doubling its current demand. This translates to an increase from 314 to 632 mtpa between 2018 and 2040, according to data collated by Standard Bank based on 11 independent analyst views.

LNG has matured as a globally-traded commodity and currently represents 80% of global long-distance gas trade and 30% of total global gas trade.² The global LNG market has experienced strong growth over the past four years (9% CAGR³) and global trade of LNG surpassed 314 mtpa⁴ in 2018, the largest volume of annual LNG trade on record. The increase in trade was supported by an increases in Australian and US LNG projects.

LNG's market share growth has slowed since 2010, as indigenous production and pipeline supply have competed for growing global gas markets. Despite this weak market share growth, large additions of LNG supply expected towards 2020 likely means lower prices and faster growth in LNG's share of the market.

Africa's utilisation of LNG production capacity is 61% (Globally it is 85%). Africa's LNG exports were equal to 39.7 mtpa⁵ in 2018, mainly coming from Nigeria, Algeria, Angola and Egypt.

² GIIGNL annual report 2019

³ BP energy outlook, stats review 2018

⁴ GIIGNL annual report 2019

⁵ IGU World LNG Report 2019

LNG supply and exports set to grow in coming decades

Historically, Japan has been the largest driver of global demand for LNG. Looking forward, demand is still expected to be driven by Asian buyers, particularly China, who have taken strong policy decisions to regulate air quality and emissions, and on the back of strong economic growth.

The 2000s saw strong trade growth, with more buyers and sellers entering the market. The 2008 global financial crisis led to an excess supply over the past few years. Global LNG exports over the next two decades are expected to be dominated by the US and Qatar (>50% of global expected supply). Increased exports are projected from Australia, Russia and West Africa. Additional sources of supply are also coming on stream, including East African resources from recent discoveries in Mozambique and Tanzania.⁶

The presence of LNG hubs and the increase in available natural gas supplies have attracted new buyers from the Middle East and North Africa — among these countries are Jordan, Pakistan and Egypt. This evolution in global trading is producing price transparency, longer-term forward contracts and gas-on-gas competition, which ultimately reduces contractual risk and facilitates hedging.⁷

The global LNG oversupply will likely exacerbate commoditisation, as the global LNG market is about to become inundated with new suppliers. Excess supply is forecast to continue, and oversupply will force sellers to seek alternative markets and share more risk with traders hoping to exploit arbitrage opportunities. Some LNG producers will likely cut prices to defend market share against imports,⁸ keeping global LNG prices lower for longer. This may be offset should the construction periods of the many new LNG projects not materialise in line with schedules or produce at designed capacity.

⁶ BP energy outlook, stats review 2018

⁷ PwC, 2018. More change expected in a struggling global natural gas market.

⁸ PwC, 2018. More change expected in a struggling global natural gas market.



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Nigeria's oil & gas sector: Lessons to be learned



Nigeria is one of the oldest oil-producing countries in Africa. Oil was first discovered in Nigeria in 1956 and production began in 1958.

The oil price boom of the 1970s spelled good fortune for the country transforming it from an agrarian economy to an oil-dependent economy. Since then, the Nigerian petroleum industry has evolved and this evolution provides useful lessons for other countries with oil & gas to learn from.

Focus on oil at the expense of gas

The most dominant natural resource in Nigeria is natural gas. With proven reserves of 193 tcf, the nation has the ninth-largest gas reserves in the world. Nigeria has over 900 times more gas reserves than oil reserves. As of 2016, the reserves-to-production ratios for the country's oil & gas resources stood at 49 years and 117 years respectively.

At the time Nigeria started exploiting oil reserves, crude oil was the order of the day. Most of the activities and structures that defined the Nigerian petroleum sector were mostly oil-centric. The traditional joint venture contracts in the sector mostly covered oil alone without natural gas.

Until recently, the policy and infrastructure development thrust of the industry was also more focused on developing and exploiting the country's oil resources and less on gas. As a result, most of the gas produced in Nigerian oilfields was either flared or reinjected to boost oil recovery.

As of 2018, Nigeria was one of the top 10 gas flaring countries in the world. Though the percentage of gas flared has been reducing since 2002, the EIA estimated that over 7.4 bcf of gas was flared in the country in 2018.

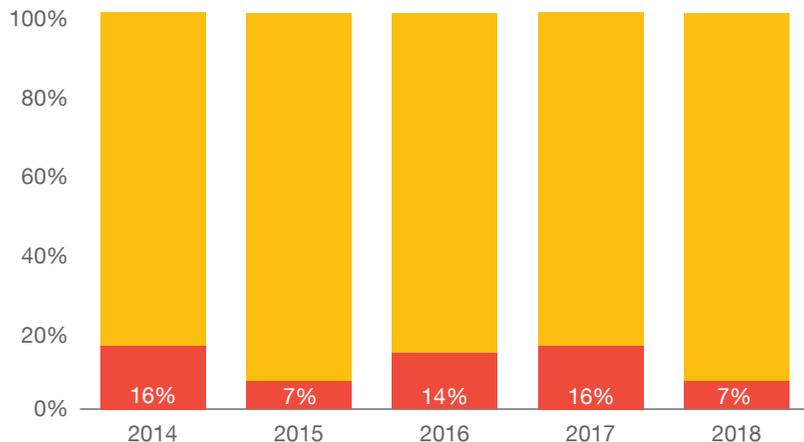
Neglect of the midstream and downstream sectors

Crude oil export accounts for 56% of Nigeria's revenue and about 90% of its foreign exchange earnings. But the country's petroleum industry has not been as value-additive as it had the potential to be.

The petroleum industry accounts for only 7% of economic activity in the country, as reflected by its contribution to the GDP. Most of the value that could be gained from the Nigeria's crude oil through petrochemicals, petroleum products and other derivatives are eroded. Over 75% of the crude produced is exported to earn foreign exchange and, in some cases, in exchange for petroleum products.

The country also loses other value additions like job creation, taxes and other direct, indirect and induced value that could be gained along the oil & gas value chain.

Figure 10.1: Nigeria's oil refinery utilisation



Source: Department of Petroleum Resources; Nigerian Oil and Gas Industry Annual Report 2017

The mid and downstream segments of the oil industry have been poorly developed as revenue generation via exports has been the central theme of Nigeria's oil production.

Between 1965 and 1989 the Nigerian government built four major refineries in the country — Warri, Kaduna and two Port Harcourt refineries — with a total installed capacity of 445 kbpd. These refineries have functioned suboptimally, producing at an average of 12% capacity utilisation over the past five years mainly due to poor maintenance and, in some cases, neglect, among other factors. As a result, over 90% of the finished oil products consumed in the country in 2018 were imported.

Regulatory complexity and uncertainty

The Petroleum Act is the major regulation that governs the Nigerian petroleum industry. However, there is a myriad of other laws that regulate the exploration, production, refining and distribution of oil in the country.

The existence of these laws creates multiple layers of interpretation and has proven to be a bottleneck to the development of the industry. The Petroleum Industry Bill (PIB) has been proposed to make the Nigerian oil & gas industry more transparent and commercially viable, while replacing most of the existing laws with the aim of consolidating and simplifying the governance of the industry.

The signing of the bill into law has, however, been delayed since it was originally introduced in 2008. This delay has resulted in regulatory uncertainty, which has stalled the development of industry. Many industry players and investors are holding back on making high-volume core investments in the sector until a clear regulatory direction for the country is set and implemented.

Contractual frameworks

There are four major fiscal frameworks for crude production in Nigeria — joint ventures (JVs), production sharing contracts (PSCs), service contracts and marginal field farm-outs. Since their introduction in 1986, JVs have accounted for the largest share of Nigeria's crude oil production. Under these contracts, the government and its JV counterpart jointly invest in and share proceeds from oilfields in agreed proportions.

Whenever a project is to be done in a JV field, a cash call is made for all JV partners to make contributions. One of the challenges of the JV framework is the financial burden that it places on government in contributing to the funding of these JVs.

Over the years, investment and production activities under JV contracts have been constrained by the government's inability and/or delay in meeting its cash call obligations. Between 2007 and 2016, production under JVs declined by a compound annual growth rate of 7%, while production under service contracts increased by a compound annual growth rate of 6% within the same period.

The government is now considering the incorporation of its joint venture assets to enable them to operate independently, and enabling them to raise capital and pay dividends to shareholders. An example of a major success in the industry has been the structure and governance of the Nigeria LNG Limited, an incorporated entity that is jointly owned by the Nigerian National Petroleum Corporation, Shell Gas, Total LNG Nigeria and Eni International.



Local content development and community involvement

The Nigerian Content Development and Monitoring Board was established in 2010. The Board has been at the forefront of getting Nigerians involved in the industry. The drive of the Board is to localise as much as possible the technology and expertise required to drive the industry. The Board has been largely successful in its quest.

Though the licence to operate resides with the Federal Government of Nigeria, the involvement of local communities is key to the successful operations of the oil industry in Nigeria.

Over the years, mistakes have been made in managing relations with local communities and earning a 'licence to operate'. Successful oil & gas companies have to creatively engage local communities to ensure that operations are not hindered.

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A key trade and future natural gas hub in Southern Africa

Mozambique has abundant natural resources, including minerals, gas and land, with only 10% of arable agricultural land currently utilised.^{9,10} In addition, due to its geographic position, many landlocked economies are dependent on Mozambique for trade, with the country acting as a gateway to global markets.

⁹ NKC African Economics, Country annual update: Mozambique

¹⁰ World Bank Group, 2019. The World Bank in Mozambique.

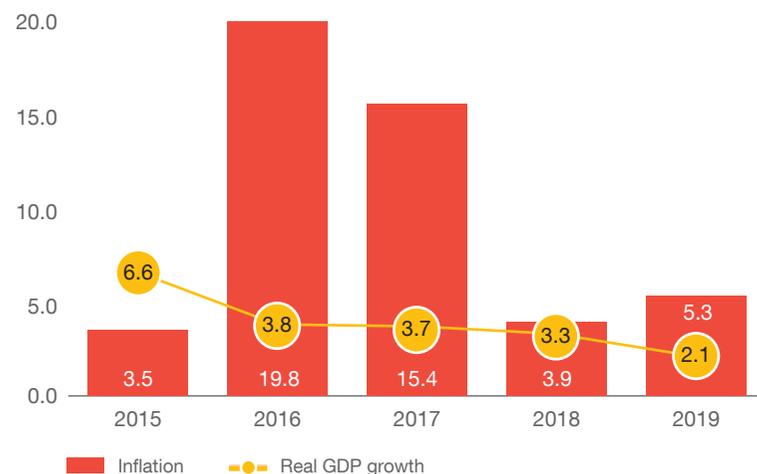


The following analysis focuses on the period 2015–2018, as well as forecasts for 2019.

Economic growth

Mozambique’s economy has been experiencing a continued decline in economic growth since 2015. Real GDP declined from 6.6% in 2015 to 3.8% in 2016 as severe droughts and floods, delayed gas sector investment and lower international coal prices contributed towards the decline. Real GDP growth slowed further to 3.7% in 2017 and 3.3% in 2018. BMI forecasts a decline in real GDP growth to 2.1% in 2019, the lowest in almost 20 years.

Figure 11.1 : Mozambique: Inflation and real GDP growth, 2015–2019



Source: BMI

Economic structure

The four largest economic sectors — as a percentage of gross value added (GVA) — are agriculture, mining, wholesale and retail trade, and manufacturing. These accounted for over 56% of Mozambique’s total GVA in 2018.¹¹

The second largest sector in Mozambique is mining, accounting for 12.3% of the country’s GVA in 2018.¹² Industrial employment — including mining and gas operations — accounted for nearly 8% of employment. Coal extraction forms the largest part of the mining industry, with the country recognised as having the potential of becoming one of the world’s largest coal exporters.¹³

The mining sector has shown continued growth over the period, a result of increased coal and gas extraction. However, various factors have dampened its growth potential, including disappointing international coal prices¹⁴, underdeveloped infrastructure and flooding. Nonetheless, more favourable international coal prices, as well as various renovations and projects, should help the sector continue its growth trend beyond 2019.

The natural gas discoveries in Mozambique since 2010 have the potential to transform the country into one of the world’s largest LNG exporters. However, the 2014–2015 slump in energy prices caused a number of energy giants to delay projects and this gave rise to concerns that Mozambique’s LNG developments could be held back.¹⁵

¹¹ BMI, 2019. Data Tool. <https://www.fitchsolutions.com/>

¹² BMI, 2019. Data Tool. <https://www.fitchsolutions.com/>

¹³ NKC African Economics, 2019. Country annual update: Mozambique. <https://www.africaneconomics.com/>

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¹⁵ PwC, 2018. More change expected in a struggling global natural gas market. <https://www.pwc.co.za/en/press-room/natural-gas-market.html>

Mozambique LNG context

Mozambique's Rovuma Basin is the largest oceanic basin in Southern and East Africa and as such will have a strong influence on regional energy balance. Mozambique's Rovuma Basin has secured three key LNG projects that will determine Mozambique's future as a gas economy and global player:

- **Area 4: Coral FLNG (Eni), first gas expected in 2022**

The start-up of the Eni-operated Coral FLNG project was pushed back after constant delays to the FID, which was eventually reached in June 2017. Start-up of the 3.4 mtpa project is now expected in 2022. Eni has secured offtake agreements for all 3.4 mtpa with BP.

- **Area 1: Mozambique LNG (Anadarko, but subsequently taken over by Total), first gas expected in 2024**

An Anadarko-led consortium has secured over 11.8 mtpa of LNG offtake agreements, paving the way for the partners to have reached FID as scheduled in 2019. The planned liquefaction and export terminal will include two liquefaction trains with a total capacity of 12.88 mtpa. According to IMF predictions, the processing facilities should cost about US\$7bn, with a total project cost reaching around US\$25bn.

- **Area 4: Rovuma LNG (ExxonMobil), first gas expected 2025**

Eni and ExxonMobil expect to sanction their onshore Rovuma LNG terminal in 2019. Start-up of production in 2025 should see Mozambique's natural gas output ramping up to over 30 mtpa. The Rovuma LNG project aims to monetise the vast gas resources of offshore Area 4, including the large Mamba gas field. ExxonMobil is leading operations related to the LNG facilities, while Eni is heading the development of the upstream. The planned liquefaction and export terminal will include two 7.6 mtpa liquefaction trains for a total LNG production capacity of 15.2 mtpa. An announcement was made in late December 2018 that sufficient offtake commitments had been signed with the partners' affiliated buyer entities, which is a key milestone towards FID. Total project costs are estimated to be around US\$27bn¹⁶. FID is yet to be completed.

Future incremental expansion of existing LNG trains requires significantly lower project capital, which will be in Mozambique's favour when competing in the global LNG market through both the ability to lock in early contracting of any additional market demand and improved project confidence and finance.

It is therefore clear that on-time and on-budget delivery of the first LNG projects up to 2025 is critical, not only to Mozambique's reputation in the global oil & gas market, but also the financial returns and viability of future LNG phases and new production fields.

The long-term contracted market position, as outlined above, is a significant benefit and mitigation of Mozambique's global market risk exposure. Mozambique will still be exposed to any price volatility beyond these contracts through its equity participation represented by ENH, the national oil company, and to the extent that global LNG prices are depressed. This will put pressure on the available margin and ENH's profit share.

Implementation of regulation in a complex environment

With the discovery of natural gas reserves in Mozambique, the Government of Mozambique has had to develop a regulatory framework appropriate for the effective and inclusive production of oil and gas resources. According to the Constitution, natural resources in the soil and subsoil belong to the state¹⁷, resulting in Mozambique following a concessionary approach to oil and gas permission. In such an environment, it is important to understand the overall outcomes that the government seeks to achieve as consideration for the granting of a licence.

Rovuma Basin domestic gas allocations

In 2014 the Mozambican government released the Natural Gas Master Plan (NGMP), with the New Petroleum Law requiring that 25% of all gas produced in Mozambique should be set aside for local consumption. However, the relevant EPCCs for the Rovuma Basin Projects were executed prior to the New Petroleum Law entering into force. It is thus expected that the figure of 25% will be negotiated downwards for the Rovuma Basin Projects, particularly given the importance of the Projects to the Mozambican economy.

The Mozambique Gas Master Plan identifies a number of major anchor projects for domestic gas (domgas) allocation, including:

- Gas to liquids;
- Methanol (GTM) production (as an intermediate step to MTO (methanol to olefins) /Petrochemicals);
- Fertiliser production through gas to ammonia processing (GTF); and
- Electricity generation using gas to power (GTP).

¹⁶ Standard bank Rovuma LNG macroeconomic study, 2019

¹⁷ Article 98 of the Constitution of the Republic of Mozambique.

During the first phase of the Rovuma LNG and Mozambique LNG projects' lifespan, domestic gas allocation of 150 mmscfd (Area 4) and 100 mmscfd (Area 1) have been made. In Phase 2 of the development, these domgas allocations are expected to increase to 500 mmscfd from Area 4 and 400 mmscfd from Area 1, totaling 900 mmscfd or ~ 362 PJ18 from the Rovuma Basin. For the purpose of this report it is assumed that Phase 2 of the Rovuma Basin projects will start in 2030.

To date, three domestic gas anchor projects have reached the feasibility phase and have about 460 mmscfd ~ 185 PJ/a domgas provisionally allocated from the Rovuma Basin projects. They are:

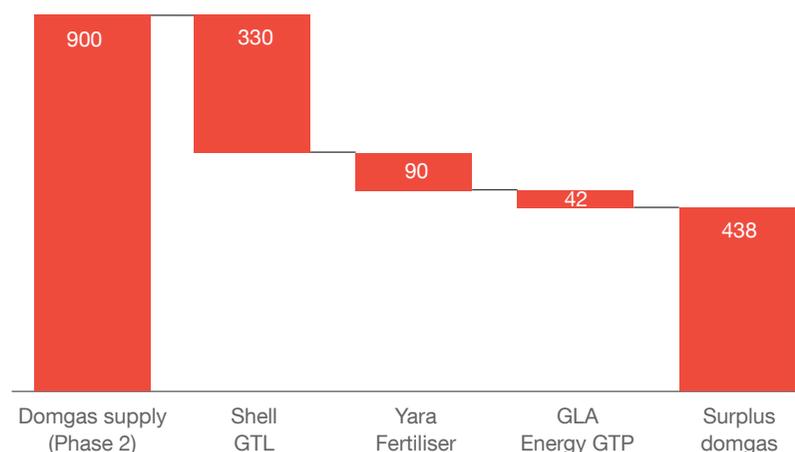
- Shell GTL (gas to liquids) refinery with 38 000 barrels per day capacity;
- Yara 1.3 mtpa Fertiliser plant, and
- GLA Energy GTP 250MW power plant.

No domgas commitment is made by the Coral FLNG project and the Rovuma LNG projects' allocation is expected to compensate for Coral FLNG Area 4 allocations.

If all three domgas projects are secured as outlined above, there will be ~438 mmscfd unassigned natural gas for domestic use. This illustrates that there is substantial domestic gas that needs to be supplied to industry by the aggregator. Domgas projects need to reach FID before further phases will be realised, as it will drive the allocation from upstream operators.

¹⁸ Assumed that 1 PJ ~ 2.48837 mmscfd

Figure 11.2: Domgas allocations from Rovuma Basin, 2030 (mmscfd)



Assumptions: That Phase 2 domgas and all anchor projects will be realised by 2030

Source: USAID Power Africa 2030, PwC analysis

LNG's potential economic contribution to Mozambique's economy

LNG will contribute towards the Mozambique economy through job creation, infrastructure development and taxes. However, expectations about the extent to which the booming oil & gas industry will contribute to the development of Mozambique's citizens may be unrealistic and not consider:

- The country's growing revenue needs;
- The current low base from which the economy is developing; and
- That projects will overlap, creating pressure on current resources.

LNG's economic contribution to Mozambique is made in the form of capital expenditure associated with the development of LNG facilities and through the impact of its day-to-day operations. This would lead to job creation, infrastructure development and taxes. For instance, Total's US\$3.9bn effective acquisition of Anadarko's Mozambique assets resulted in US\$880 million capital gains tax in Mozambique.

At a project level, Area 4 has committed to a US\$3bn local content target and Area 1 has a local content obligation of US\$2.5bn. It is clear that local content planning and regulation is needed, and much work still needs to be done in this area by Mozambican authorities.

To estimate the economic contribution of the LNG industry, we conducted an economic impact assessment of it on the Mozambique economy. With an internationally accepted approach, informed by Global Reporting Initiative (GRI) standards, we quantified the economic value of LNG to the Mozambique economy. The economic impact assessment allows us to evaluate the economic contribution of LNG, through capturing the interdependencies between different sectors of the economy. The contributions are estimated through the impact on national GDP, jobs and public finance.

Economic benefits through capital expenditure

Due to the nature of the capital expenditure associated with an LNG plant, the majority of capital goods need to be imported. Factors affecting a decision to procure locally include:

- Availability and location;
- Adherence to safety standards;
- Long-term strategy for procuring locally; and
- Technical nature of a project
- Pricing (preference will be given to local suppliers if the cost of the goods or services does not exceed 10% more than the price of an equivalent import)

Per local procurement requirements, over the 2019–2024 period, about 15% of capital expenditure is expected to be spent domestically, while the remainder is expected to be imported. The ability to deliver into the required 15% local procurement spend is likely to be a challenge in the initial years. However, it provides significant opportunities for growth in local industries to participate in the supply of goods and services to meet this demand.

We estimated that the potential economic activity over the five-year period resulting from the local capital expenditure could:

- Potentially add US\$3.5bn to GDP, on average per year
- Create and/or sustain an estimated 15,000 direct and indirect jobs, on average, per year
- Add a potential US\$520 million to total government revenue, through both the collection of direct and indirect taxes

Economic benefits through operations

LNG has the potential to impact the lives of the people of Mozambique. Total production of about 4 200 mmscfd natural gas equivalent in the form of LNG is expected from Area 1 and Area 4 projects in Mozambique by 2030. This is based on the following:

- First gas from the 3.4 mpta Coral FLNG is expected in 2022;
- First gas from Anadarko's 12.9 mpta is expected in 2024; and
- First gas from Rovuma's 15.2 mpta plant is expected in 2025.

Through the production of LNG, expenses incurred in day-to-day operations and the people directly employed, we quantified the beneficial impact on the Mozambique economy as follows:

- Potentially add US\$24.5bn to GDP, on average per year;
- Create and/or sustain an estimated 126 000 direct and indirect jobs, on average per year; and
- Add an estimated US\$6.8bn to total government revenue, through the collection of direct and indirect taxes.

PwC perspective: A spotlight on Mozambique's factors for success

A few lessons for the early stages of resource development

The positive outlook for the global LNG market and long-term growth in natural gas demand is positioning Mozambique to realise sustainable-long term economic growth. Ensuring successful delivery of the initial projects is critical.

Observations to date highlight the following key factors that will have an impact on the success of the projects:

- The first two projects, Coral FLNG and Mozambique LNG have taken FID, with Rovuma LNG expected to take FID in the near future. This has sent a positive global signal as to the confidence of international oil companies in Mozambique. Increasing international investment into the energy sector will buoy investor perceptions and stimulate project development and growth. Ensuring stable fiscal, legal and regulatory frameworks and project environment, with transparent governance, will be key to maintaining investor confidence.
 - Ensuring transparent and effective governance and coordination across the value chain: Mozambique has a poor track record in the area of governance, which has severely damaged the economy and led to an unmanageable debt burden with many donors cutting aid to the country. A new leadership regime, a well capacitated ENH, effective monitoring, regulatory oversight and governance across the key stakeholders is needed to correct the course towards prosperity,
 - The government remains in debt default and at a sub-investment grade rating. Hence there is no capacity to service further borrowing or provide any sovereign guarantees. The national oil company, ENH, will therefore not be able to rely only on fiscal support from government. It is therefore critical that ENH secures and develops leading project financing, contracting and treasury capability to ensure sufficient participation in key revenue streams and catalytic developmental projects across the value chain.
 - Extracting and processing the hydrocarbon resources in a responsible and sustainable manner: The current level of environmental degradation in Mozambique is high and costs the economy the equivalent of 17% of GDP annually. Mozambique also suffers from extreme climate events which most recently included Cyclones Idai and Kenneth which had a devastating impact on people, production, infrastructure and the natural environment. By its nature and given the sensitive marine and onshore environments of the first three LNG production facilities, the environmental impact needs to be minimised and strictly monitored.
- ENH is legally obligated to play critical enabling roles in the development of Mozambique's gas economy, most notably that of national aggregator and provider of enabling midstream infrastructure to ensure seamless delivery of domgas into respective market nodes and opportunities. The contractual rights, risks and obligations of the role of the aggregator must be clearly defined and carefully managed to avoid the many examples of NOCs' financial failures.
 - The acceleration of economic activity will largely only be felt after the first projects have commenced production around the mid 2020s. However, the thoughtful development of policies, laws, planning and concrete actions around local participation in this phase will set the stage for maximising the benefits during construction and into production. Expectations as to what is possible over the next decade should be set at realistic levels.
 - Development of key supporting infrastructure is a pressing risk to the Mozambican economy and potentially to the LNG projects. Careful consideration should be given to planning, design and construction and funding modalities for this infrastructure. The capital expenditure and operational expenditure must be affordable to the country and the infrastructure owners/operators over the lifecycle, be fit for purpose, include the participation of local enterprises, labour, goods and services during construction and operation, and serve a broader purpose for the surrounding communities.
 - Developing skilled Mozambicans with sufficient oil & gas experience who can contribute to projects' initial phases is a pressing issue for the Mozambican economy and potentially to the LNG projects. The role of outbound and inbound secondments, formal training, strategic hires, contracted professionals, cross-border partnering and access to online resources and knowledge will all play a critical role in this capacitation and retention of capability.
 - Any major delays or disruptions to the current LNG projects will quickly erode current confidence levels and will have negative financial consequences for Mozambique. This is pertinent given the oversupply of LNG globally and the impact that contract cancellations and/or seeking new buyers at reduced prices may have on viability. As an equity holder and key representative of government interests in these mega-capital projects, ENH must develop the critical project assurance, oversight and intervention skills to facilitate the achievement of the expected project benefits.

Domestic gas enablement

Ensuring on-time delivery of the LNG projects is not only important to ensure fiscal benefits for Mozambique, but also to ensure domgas enablement in the downstream segment. Domgas in the downstream sector is where the greatest economic impact can be realised through industrial and commercial job creation, supplier development and social upliftment. It is therefore important to maximise the private sector's role by creating a competitive downstream market and ensuring the public sector competes on a level playing field. This is a key developmental mandate for ENH.

Domgas and the allocation thereof is expected to be the catalyst of downstream activity in the Mozambican context. To secure such domgas, it is envisaged that ENH, in the capacity of aggregator, will be required to:

- Agree domgas commercial strategy and documentation with each of the Area 1 and Area 4 projects;
 - Determine the priority and sequencing of domgas allocation across the projects, including their commercial allocation process;
 - Determine the price and commercial terms on which Domgas would be on-sold to individual projects;
 - Carefully considering how Area 1 and Area 4 can develop their initial LNG trains in parallel with the initial provision for domgas.
- Determine and negotiate the contractual arrangements under which gas would be sold by Area 1 and purchased following an assumed single-buyer model, and the political, legislative and regulatory underpinning of this;
 - Determine the domestic gas industry (and physical) structure to oversee how the gas would be sold from the single buyer through the value chain to end users;
 - Determine the location of individual downstream projects and the optimum routing and capacity of gas transportation; and
 - Critically assess the potential for regional gas supply into the region and South Africa through LNG terminals initially, and piped natural gas in the longer term. The latter, providing the potential to create gas-driven economic nodes along the pipeline in Mozambique and South Africa, and cost-effectively dealing with South Africa's need to switch to gas peaking plans for electricity, managing renewables intermittency and decarbonising the transport and industrial sectors.
 - Determine the optimal capital structure for such downstream projects and assist where required in the raising of funding.

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Conclusion



The African oil & gas sector is moving from a cycle of stagnation in exploration, capital expenditure spend and production between 2014 and 2018 in the wake of the oil price crash, to a more exciting growth phase. During the downturn, the industry restructured itself for improved efficiency and performance and is fitter for this new future. Moreover, in the longer term, the energy transition will continue to impact the sector's dynamics with implications for both oil and gas demand. Many are better placed now to take advantage of shifting geopolitics and trade patterns, new resource finds, a transitioning and decarbonising global energy mix, technological improvements, maturing regulatory environments and improved governance in some countries.

However, it is critical that the sector retains and builds on its strategic portfolio management, enterprise risk management, capital project delivery, capital sourcing and allocation discipline, market and customer insights and relationships and adopts digital technologies to improve performance if the hard fought wins in cost savings are to be retained. Progress in addressing corruption and improving corporate governance will also need to be accelerated.

Against this fluid backdrop, African NOCs and their partners, contractors and funders must chart a course through increasingly uncertain waters. Whether it's an emerging producer looking to participate in upstream exploration and production (E&P) activities for the first time, or an established resource custodian wanting to play in the midstream, downstream or enter other geographies, NOCs are facing an array of choices.

Creating policies and plans for maximising the direct fiscal and developmental benefits to a country are critical to avoid the 'resource curse' paradigm. These range from implementing successful local content strategies to deciding what kind of energy company an NOC aspires to be, typically moving from being carbon-intensive to a more balanced future portfolio that includes renewable resources and technologies.

Having a clear strategy and understanding of differentiated capabilities will be key to developing a transformation road map that allows NOCs to transition to a new energy reality. Beyond the policies and planning, the will and capability to implement and regulate will be a key challenge for immature NOCs and host governments with limited capacity and poor governance mechanisms.

The future of oil & gas is exciting, dynamic and challenging and we can look forward to the growing participation of Africa as a global consumer and supplier of energy.

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