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Sector Report

Oil and Gas in Africa

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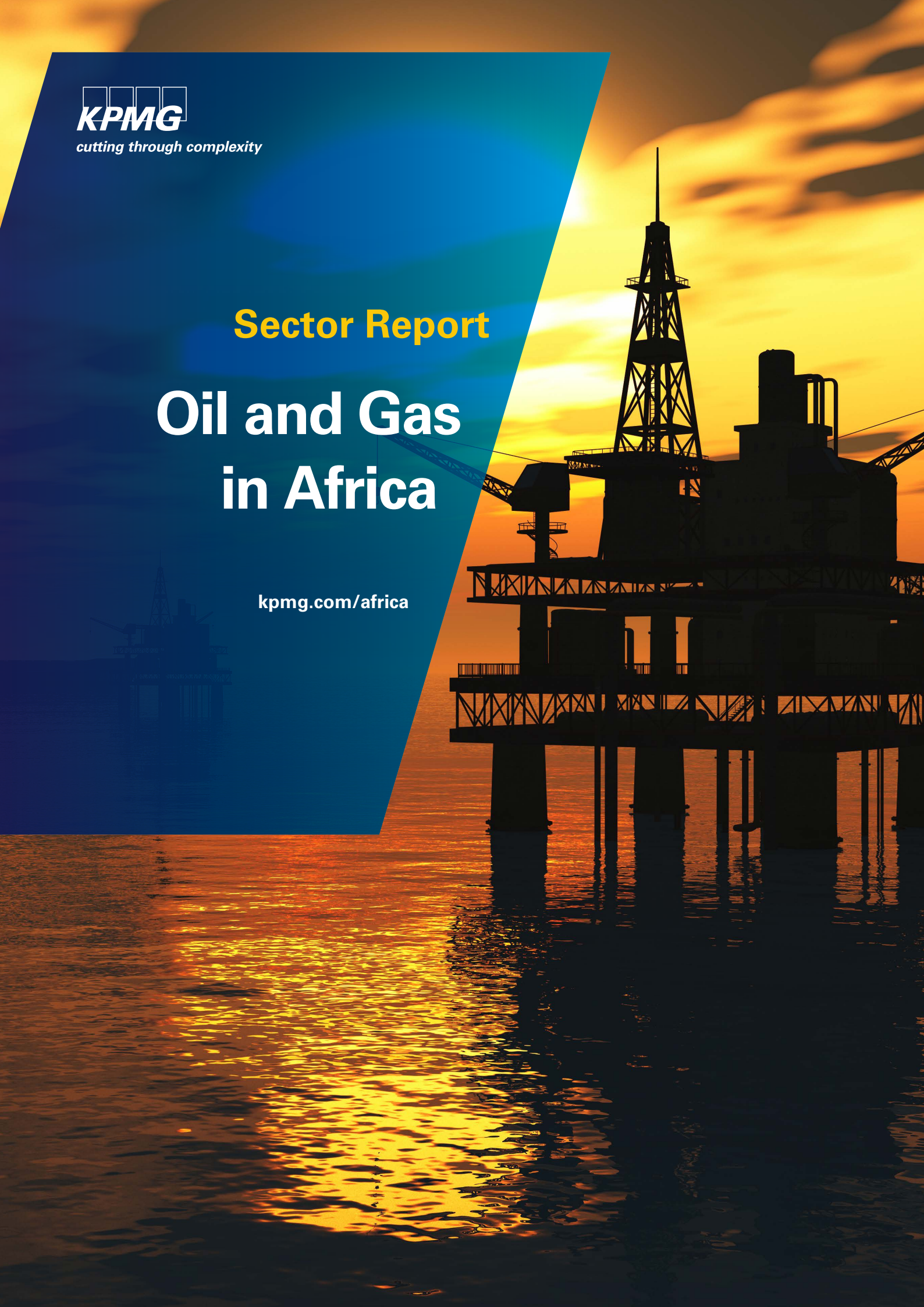

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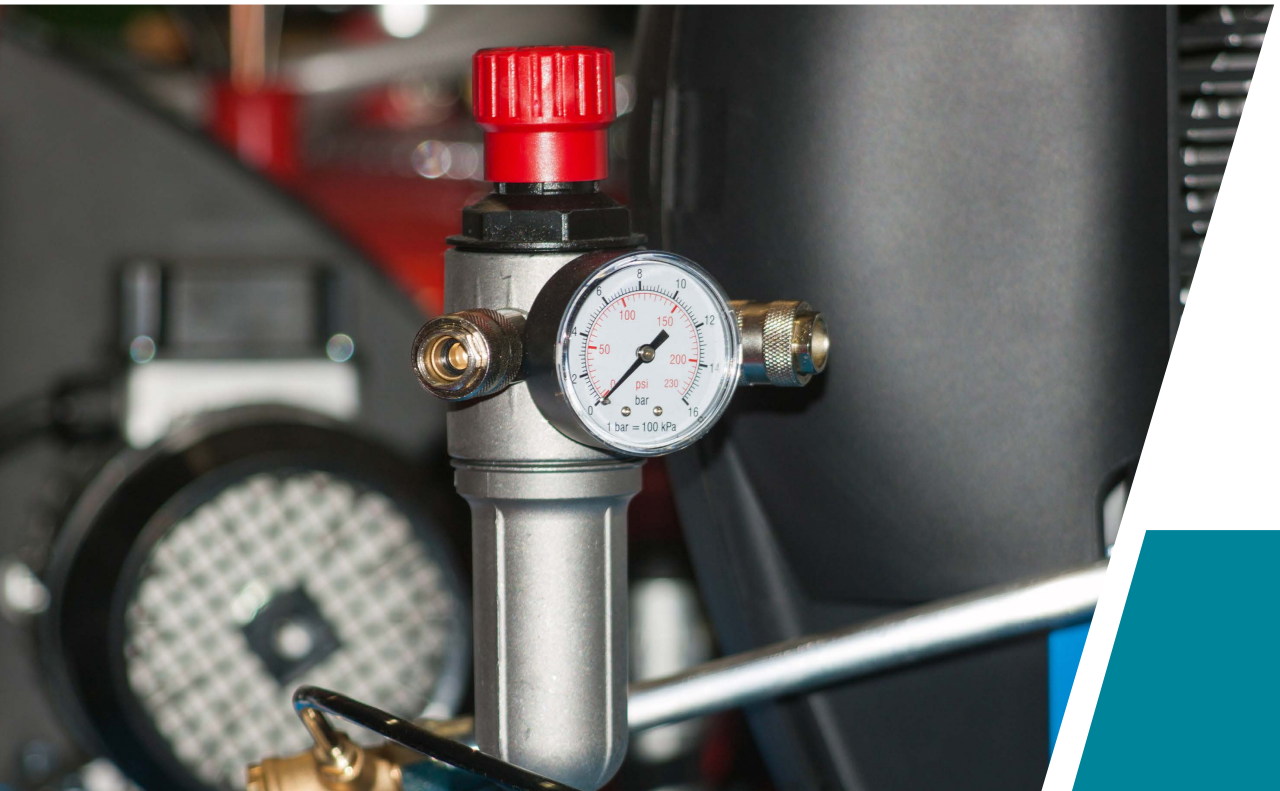

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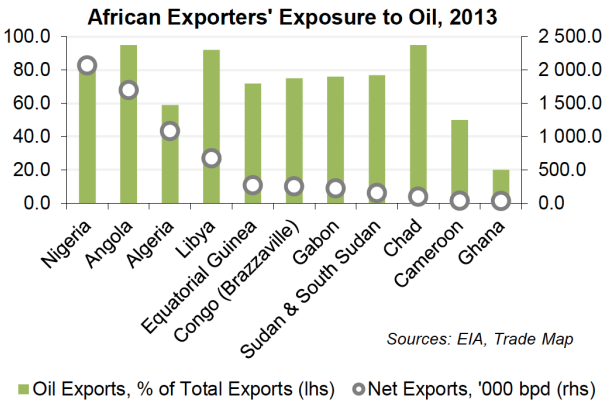
Overview

Oil and gas is of critical importance to the African economy. In fact, it is estimated that 57% of Africa's export earnings are derived from hydrocarbons. Within the continent, North and West Africa are host to the most renowned producers; some of the countries in those regions are also among the most dependent on oil and gas revenues in the world. In recent years, East Africa has also emerged as an exciting prospect for international oil companies. The sharp drop in international oil prices since mid-2014 will have varying effects on African economies: a group of about nine countries will be severely negatively affected; many others will however benefit from the drop in oil prices, as it will provide a boost to consumers' purchasing power and will reduce fuel subsidy costs for those governments that still provide subsidies. The drop in oil prices will also lead to a decrease in capital spending by energy companies, which could weaken the medium-term prospects for prospective oil and gas producers.

This is especially a concern for East Africa, since billions of dollars' worth of investment will be needed over the next decade to commercialise the region's hydrocarbon resources. As onshore oil production costs in West Africa are generally low, oil companies are expected to continue to invest significantly in the region.

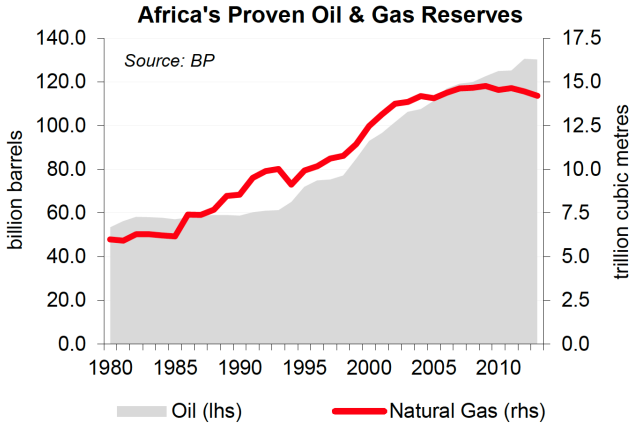


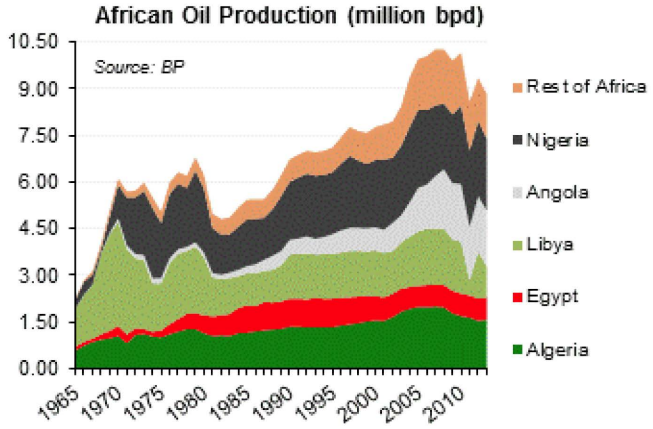
Oil

Africa is one of the foremost net exporters of oil; in fact, only the Middle East's net exports are greater than that of Africa. The continent accounted for over 11% of global oil production over the past decade, but as incomes are still very weak, oil consumption in most countries is low. As such, Africa's oil consumption accounts for only 4 of global consumption, leaving a large amount of oil to be exported. In 2013, Africa's net oil exports declined to 5.2 million bpd, down from an average of almost 6.3 million bpd over the previous five years. This decline in 2013 was mainly due to a sharp drop in Libyan output, although lower production in Nigeria, Algeria and the Sudans also contributed.

According to the BP Statistical Review of Energy, Africa's proven oil reserves have grown by almost 150% since 1980 – increasing from 53.4 billion barrels at that stage to 130.3 billion barrels at the end of 2013. Oil reserves have grown particularly quickly since the mid-1990s as improved political environments have made it more attractive for foreign oil companies to explore. This also resulted in Africa's share in global reserves rising from 5.9% in 1993 to as high as 8.6% in 2006, although this ratio has declined to 7.7% since then. Despite the increase in reserves, there is still massive scope for further exploration. According to some estimates, there are at least 100 billion barrels of oil offshore Africa still waiting to be discovered.

Africa's proven oil reserves are concentrated in the four members of the Organisation of the Petroleum Exporting Countries (OPEC). These are Libya (which has 48.5 billion barrels worth of reserves), Nigeria (37.1 billion barrels), Angola (12.7 billion barrels) and Algeria (12.2 billion barrels). In fact, these four countries held 84.8% of Africa's reserves at the end of 2013. Other countries with notable proven oil resources are Egypt (3.9 billion barrels), South Sudan (3.5 billion barrels) and the franc zone countries of Gabon, Equatorial Guinea, Republic of Congo, and Chad. A number of other countries are however emerging, with some of the most exciting prospects being Ghana, Uganda and Kenya. According to data from the US Energy Information Administration (EIA), 12 African countries had proven oil reserves of more than 500 million barrels at the start of 2014.



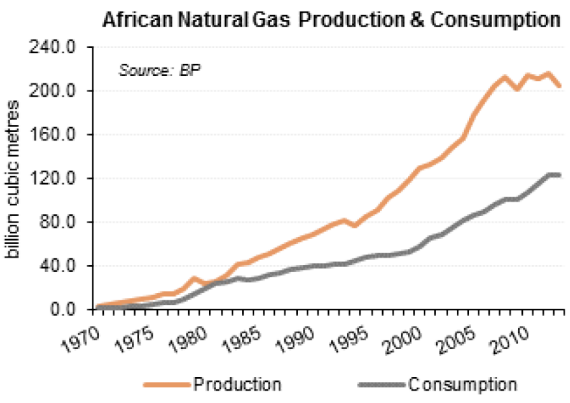


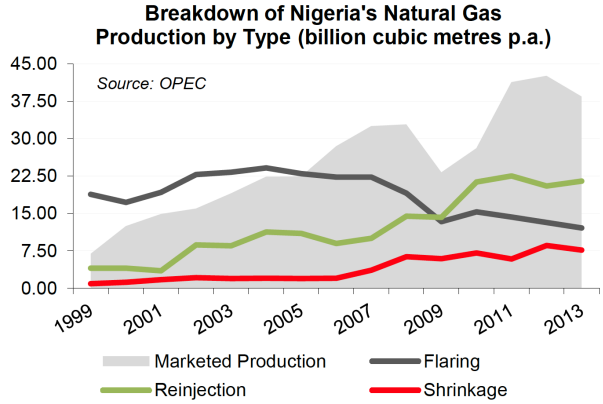
Natural Gas

Africa's proven natural gas reserves expanded markedly from the mid-1980s up to the early-2000s, owing mainly to a strong increase in Nigeria's reserves. The West African country accounted for nearly half of the increase over that period, while the North African trio of Algeria, Libya and Egypt accounted for most of the rest. The continent's reserves increased at a much slower pace from 2003 to 2009, and have actually decreased since 2010. As a share of global reserves, Africa's reserves reached a peak of 9.1% in 2006-07, but a decline in Egypt's proven reserves and a stagnation elsewhere has caused the continent's contribution to global reserves to fall to a near three-decade low of 7.6% in 2013. As at the start of 2014, five countries accounted for 94.4% of Africa's total natural gas reserves. These are Nigeria (5.1 trillion m^3), the North African trio mentioned earlier (combined 8.1 trillion m^3) and Mozambique, whose proven gas reserves increased from 126 billion m^3 in 2013 to 2.8 trillion m^3 in 2014.

Africa's main gas producers are Algeria, Egypt, and Nigeria, with these three countries accounting for nearly 90% of Africa's total. **Algeria's** gas production peaked at 88.2 billion m^3 in 2005, but declined to a 12-year low of 78.6 billion m^3 in 2013. This decline was partly due to declining production at maturing gas fields, and partly due to a terror attack at the In Amenas gas facility, which led to an estimated 3.7 billion m^3 decrease in Algeria's gas production on its own. Since then, production at the In Amenas gas plant has resumed, which is likely to have led to a rebound in Algeria's total gas production in 2014. Although natural gas production is forecast to rise slightly over the 2015-17 period, this will be more than offset by rising consumption; therefore, Algeria's gas exports are forecast to decline. Some gas projects are currently underway and have the potential to boost exports by 2018. However, this is contingent on the country attracting sufficient investment in these projects. **Egypt** has been Africa's second-largest gas producer since surpassing Libya in the early-1980s. The country saw its natural gas production almost double between 2004 and 2009 after the completion of the Arab Gas Pipeline linking Egypt to Jordan as well as a new liquefied natural gas (LNG) plant in Damietta. In 2009, natural gas production reached 62.7 billion m^3. However, output has declined by 2.8% p.a. since then, to reach 56.1 billion m^3 in 2013.

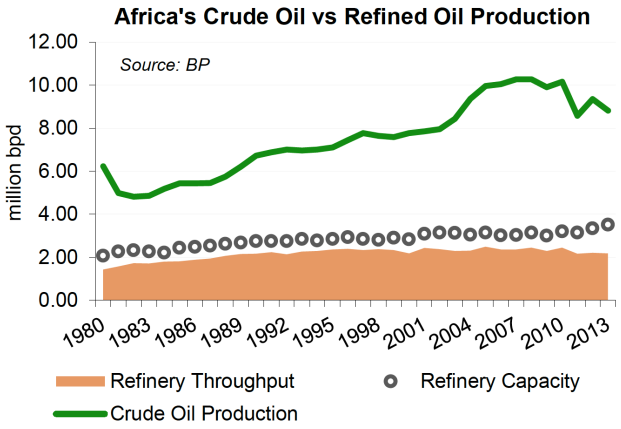
Although **Nigeria** holds the most reserves in Africa, it is still well behind Algeria and Egypt in terms of output, since it has limited infrastructure in place to take advantage of this massive resource. Notably, all of Nigeria's current gas reserves were found while searching for oil, according to the petroleum ministry. The government wants to create incentives for energy companies to explore specifically for gas, and in this regard, that gas will start to 'decouple' from oil in terms of investment. Industry experts have said that Nigeria's proven gas reserves could potentially be as high as 16.8 trillion m^3 if deliberate steps are taken to explore for gas as opposed to coincidental discovery during oil exploration. The majority of the country's proven natural gas reserves are located in the Niger Delta and the sector is also impacted by the security and regulatory issues affecting the oil industry. Nigeria's marketable natural gas production has risen strongly over the past 15 years, reaching a high of 43.3 billion m^3 in 2012, although it fell back to 36.1 billion m^3 in 2013. The country's production potential is however significantly higher, as less than half of its gross gas output is marketable. According to OPEC figures, Nigeria's gross output averaged 82.8 billion m^3 p.a. between 2011 and 2013, of which only 40.8 billion m^3 p.a. was marketable. Another 21.5 billion m^3 was reinjected into oil wells, 13.2 billion m^3 was flared, and 7.4 billion m^3 was lost during the removal of natural gas liquids (shrinkage). On the upside, the amount of flaring has decreased notably over the past decade, and the development of regional pipelines, the expansion of LNG infrastructure, and policies to ban gas flaring are expected to accelerate growth in the sector, both for export and for domestic use in electricity generation.



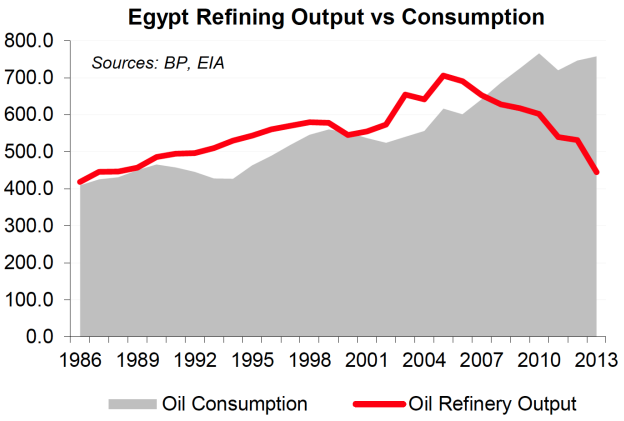


Oil Refining

Despite Africa's substantial oil resources, refining capacity on the continent remains limited. As such, countries like Angola and Nigeria export crude oil, only to import refined oil at an additional cost. As shown in the graph, refining capacity has always been much lower than crude output, but this gap widened significantly in recent decades, especially up to 2010. During that year, Africa produced 10.2 million bpd of crude oil, but only had refining capacity of 3.2 million bpd. Between 2011 and 2013, however, crude production declined to 8.8 million bpd, while refining capacity rose to 3.5 million bpd. Even so, the gap between the two remains substantial. To make matters worse, existing refineries are not even operating at full capacity; in fact, refinery throughput was less than 2.2 million bpd in 2013, which is more than 6.6 million bpd below crude output. On average over the 2010-13 period, the gap between crude output and refinery output was seven million bpd. In Angola and Nigeria, in particular, the gap is very wide. Between 2010 and 2013, Nigeria and Angola produced 2.4 million bpd and 1.8 million bpd, respectively, while refinery throughput averaged only 89,750 bpd and 42,500 bpd, respectively.



This points towards a big opportunity for investors to build refineries in countries like Angola and Nigeria, buying crude oil domestically and selling it either locally or internationally. Unfortunately, though, there are many challenges that limit the incentive to invest in refineries on the continent. Such challenges include corruption, poor maintenance, theft, and other operational problems. There is also the risk that governments with poor finances will be unable to meet payments for refined oil and build up arrears. In some countries, conflicts have at times also interrupted the flow of crude into the refineries and forced them to shut down. Subsidies have also contributed to low capacity utilisation at refineries. In Nigeria, for example, current subsidy schemes lead producers to sell crude overseas rather than to local refineries and therefore add to increasing volumes of refined product imports, which present a large cost to the economy. There have also been a number of media reports about private companies stepping in to build and operate their own refineries and private interest in constructing new refineries continues to this date. However, previous efforts to build new refineries have often been delayed or cancelled, partly due to uncertainties around the government's plans to deregulate the downstream sector. Successive administrations have promised to revive the four state-owned refineries and improve their capacity utilisation, but none has succeeded to date. Most recently, the owner of Dangote Group, Aliko Dangote, stated that his company plans to construct a 650,000 bpd refinery and petrochemical & fertiliser plant, as well as a natural gas power plant in Nigeria at a cost of US$9bn. Dangote Group is investing in oil and gas blocks to secure feedstock for the refinery. The company plans to utilise two underwater pipelines and large vessels to deliver crude to the facility. Dangote Group received a license for the refinery earlier this year, and will export refined fuel to the rest of sub-Saharan Africa as well as sell it locally, according to the company. In March this year, Bloomberg reported that the refinery is slated to be completed by the third quarter of 2017.



According to the EIA, 19 African countries produced refined petroleum in 2010, of which seven countries produced more than 100,000 bpd. At 726,250 bpd, Egypt has the highest refinery capacity in Africa. However, according to OPEC, Egypt's actual refined oil output has gradually declined to only 445,000 bpd by 2013, while oil consumption has continually increased, reaching 757,000 bpd in 2013. Therefore, the country has had to import a significant amount of refined oil in recent years. The government had plans to increase refining capacity by over 600,000 bpd by 2016; however, these plans will not be realised. According to the EIA, a refinery project that has realistic chances of being completed over the short term is a 96,000 bpd refinery project of Qalaa Holdings and the State oil company. Daily News Egypt reported in January 2015 that another US$2.7bn worth of investment is needed during 2015-16 to complete the refinery project.

Following the slump in Egypt's refinery throughput in recent years, Algeria surpassed it as the biggest refined oil producer on the continent. According to OPEC, Algeria had a total refinery capacity of 650,800 bpd in 2013, while output of petroleum products was 506,000 bpd. With the country consuming 386,000 bpd of oil in 2013, it had net refined oil exports of 120,000 bpd.

Challenges and Opportunities for Africa's Gas Industry

Overall, Africa's net gas exports have been in decline in recent years. After peaking at 111.4 billion m^3 in 2008, net exports declined to 80.9 billion m^3 in 2013. This decline is mainly due to declining gas production and rising gas consumption in North Africa. In **Algeria's** case, unfavourable fiscal terms, a challenging business environment and security risk has caused a lack of investment in the hydrocarbon sector. As a result, not enough new gas production has come on-stream to offset the natural decline in mature gas fields. In **Egypt**, although substantial discoveries have been made (mostly in the deep offshore Mediterranean), the deposits are undeveloped as the government is unwilling to pay companies a high enough price for the gas to make it commercially viable. Fiscal challenges have also meant that the government has accumulated billions of dollars in arrears to oil and gas companies, which has further hampered investment. As a result, its production has also declined; meanwhile, the country's gas consumption continued to grow by nearly 5% p.a., which has caused net exports to plummet – from as high as 20.2 billion m^3 in 2009 to 4.6 billion m^3 in 2013. As most of Egypt mostly uses gas for its power plants, the drop in production has contributed to severe electricity shortages in recent years. In addition, as the government directed more and more gas to the domestic market rather than to the export market, energy companies have also been impacted. In fact, early in 2014, the UK's BG Group (which accounts for 40% of Egypt's natural gas production) declared force majeure in Egypt as ongoing diversions of gas to the domestic market made it impossible for the company to honour its exporting contracts. In turn, in **Libya**, civil war has often led to damage to oil and gas infrastructure and blockages at production facilities and export terminals. The Greenstream pipeline transporting gas from Libya to Italy was shut down for most of 2011, but has been operational since then, although gas production remains below potential due to constant unrest.

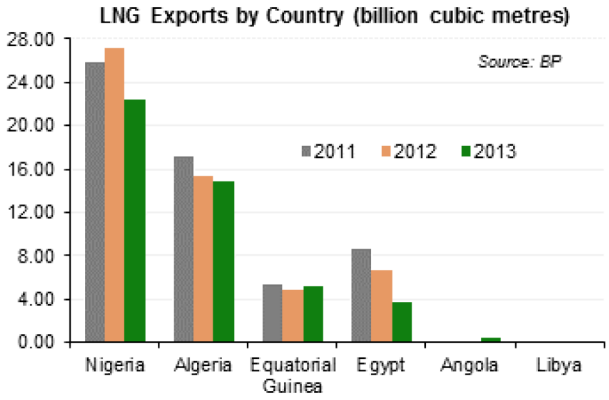
In **Nigeria**, all of the country's current gas reserves were found while searching for oil. There has been little incentive for energy companies to explore specifically for gas due to a lack of fiscal incentives and the high set-up costs and time needed to develop LNG facilities in order to export gas. On top of this, the risk of attacks (mainly vandalism and banditry) on onshore gas infrastructure would also reduce the incentive to invest, while Nigeria's challenging business environment can also make investment a daunting task for many companies.

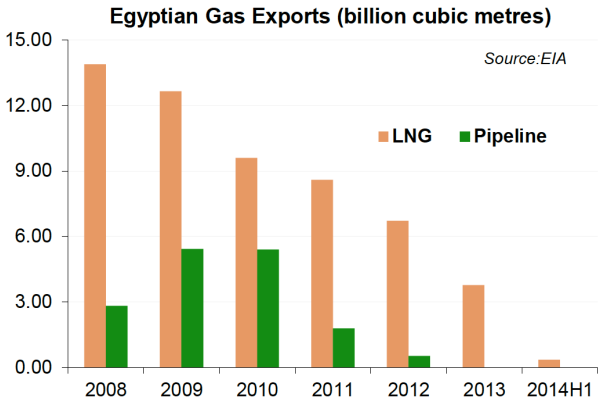
The government has taken some positive steps to develop gas including the Gas Master Plan rolled out in 2008 along with partial privatisation of the Power sector over the last 2-3 years. This has led to a significant increase in the price for gas to power to around US$2.50/MCF with further increases requested by producers. Some companies are making significant strategic investments in gas pipelines and production to power Independent Power Plants (IPPs) and industrial customers and it is estimated that about 1,000 MW of IPP capacity is presently idle due to a lack of gas delivery. As the market moves towards the concept of "willing buyer, willing seller" and the government continues to make the investment environment more attractive, the country has massive prospects. Indeed, industry experts have said that Nigeria's gas reserves could potentially be as high as 16.8 trillion m^3 (compared to the current proven level of 5.2 trillion m^3) if deliberate steps are taken to explore for gas as opposed to coincidental discovery during oil exploration. Some research however suggests that the price of gas may have to approach US$4/MCF before the industry can breakeven on onshore developments and closer to US$9/MCF before shallow water gas developments would be attractive (source: Woodmac).

LNG vs. Pipeline Exports by Africa

Around 55% of Africa's gas exports are in the form of LNG, while the other 45% is exported via pipeline, mostly to Europe. Algeria was the first country in the world to export **LNG** following the construction of the Arzew LNG plant in 1964. Seven years later, Libya became the third country in the world to export LNG. In 2013, Angola joined the ranks of African LNG exporters, becoming the fifth one to do so. Nigeria is comfortably the largest LNG exporter in Africa, with 22.4 billion m^3 of exports in 2013. This placed Nigeria in fifth position globally. Algeria ranked second in Africa and seventh globally with 14.9 billion m^3, while Equatorial Guinea and Egypt were 14th and 17th largest, respectively. As noted earlier, Egypt's gas exports are in decline. In fact, according to the EIA, one of Egypt's two LNG plants has not been in operation for well over a year due to a lack of gas supplies. In 2013, Egypt exported 3.8 billion m^3 of LNG, all of which came from the Idku LNG plant. This plant is also running well below capacity. The situation has become so serious that Egypt is set to start importing LNG in the very near future after the government finally signed a deal (after long delays) with Norway's Hoegh LNG for a Floating Storage and Regasification Unit (FSRU), which is needed to convert imported LNG back into gas before offloading it into the country. The delays were presumably due to an inability to pay for the unit. As Egypt's power stations are mostly gas-fired, the importation of LNG will help to reduce electricity shortages.

Angola exported only 431 million m^3 of LNG in 2013 and is not expected to export much until late-2015 once the Soyo plant is restored. Meanwhile, two East African countries – Mozambique and Tanzania – have high hopes of starting LNG exports over the next decade.





In terms of **pipeline exports**, Algeria is by far the biggest gas exporter in Africa, exporting 28 billion m^3 in 2013. This figure is however down from 34.2 billion m^3 in 2012, partly as a result of the In Amenas terror attack. Algeria was the eighth largest gas exporter in the world by pipeline in 2013, with most going to Italy and Spain. Libya is the second largest exporter in Africa via pipeline, while Mozambique and Nigeria also export some gas via pipeline. Egypt exported notable amounts of gas to Jordan and Israel via the Arab Gas Pipeline up to 2012, but has been unable to maintain these exports due to falling production and rising domestic demand. In fact, Israel could start to export gas to Egypt via the Arab Gas Pipeline in the near future. Haaretz reported in November that the joint-venture partners in Israel's offshore Tamar field are negotiating the sale of at least five billion m^3 p.a. over a period of three years to private customers in Egypt, including Union Fenosa Gas, which operates a LNG plant in Egypt. This LNG would then be exported again from Egypt. There are however plans to export gas for use directly by Egyptian consumers, which should help to reduce the country's electricity shortages.

Apart from Africa's major gas producers, two other African countries – Angola and Cameroon – have proven gas reserves of more than 100 billion m^3, although both produce only small amounts. **Angola's** gas reserves rose from 56 billion m^3 in 2007 to 362 billion m^3 at the start of 2013, meaning that the country now holds significant gas potential. However, the vast majority of its gas is not commercialised and is either re-injected into oilfields to help recovery or flared. In 2012, only 7% of Angola's gas production was marketable dry natural gas. However, the long-awaited completion of the $10bn LNG plant at Soyo in mid-2013 has significantly boosted the country's prospects as a gas exporter. However, production from the plant has been minimal as it has fallen foul of a number of incidents ranging from compressor and pipeline leaks to fires due to electrical problems. The facility has subsequently been offline since April 2014. In October 2014, Reuters reported that the LNG plant needs major reconstruction to fix design flaws and corrosion and that the restart of the plant is only scheduled for late-2015. **Once the repairs are completed, LNG exports will however give a boost for export revenues, and help to offset the decline in oil exports due to the sharp fall in global oil prices.** According to the EIA, Angola also hopes to commercialise more of its gas resources, but this would involve the construction of expensive infrastructure such as pipelines and LNG plants.

Meanwhile, in **Cameroon**, gas production was negligible until 2009 but grew more than 10-fold to 210 million m^3 in 2010, before dipping to 150 million m^3 in 2011, according to the EIA. All of this output is used domestically. The further development of the natural gas sector could provide a boost to the economy as it struggles with electricity shortages. Cameroon could also start exporting gas to **Equatorial Guinea** in the medium term, where it will be liquefied. Although Equatorial Guinea has only 36.8 billion m^3 of gas reserves (which is less than Nigeria, Algeria and Egypt's annual production), it is the fifth largest gas producer on the continent. The country has one LNG facility and exported 5.1 billion m^3 of LNG in 2013. According to the EIA, there are plans to build another LNG train; however, there have been delays due to concerns over the availability of feedgas. The issue may be resolved by buying gas from Nigeria and Cameroon, as these countries' gas production outweighs their LNG processing capacity.

Regional Comparison

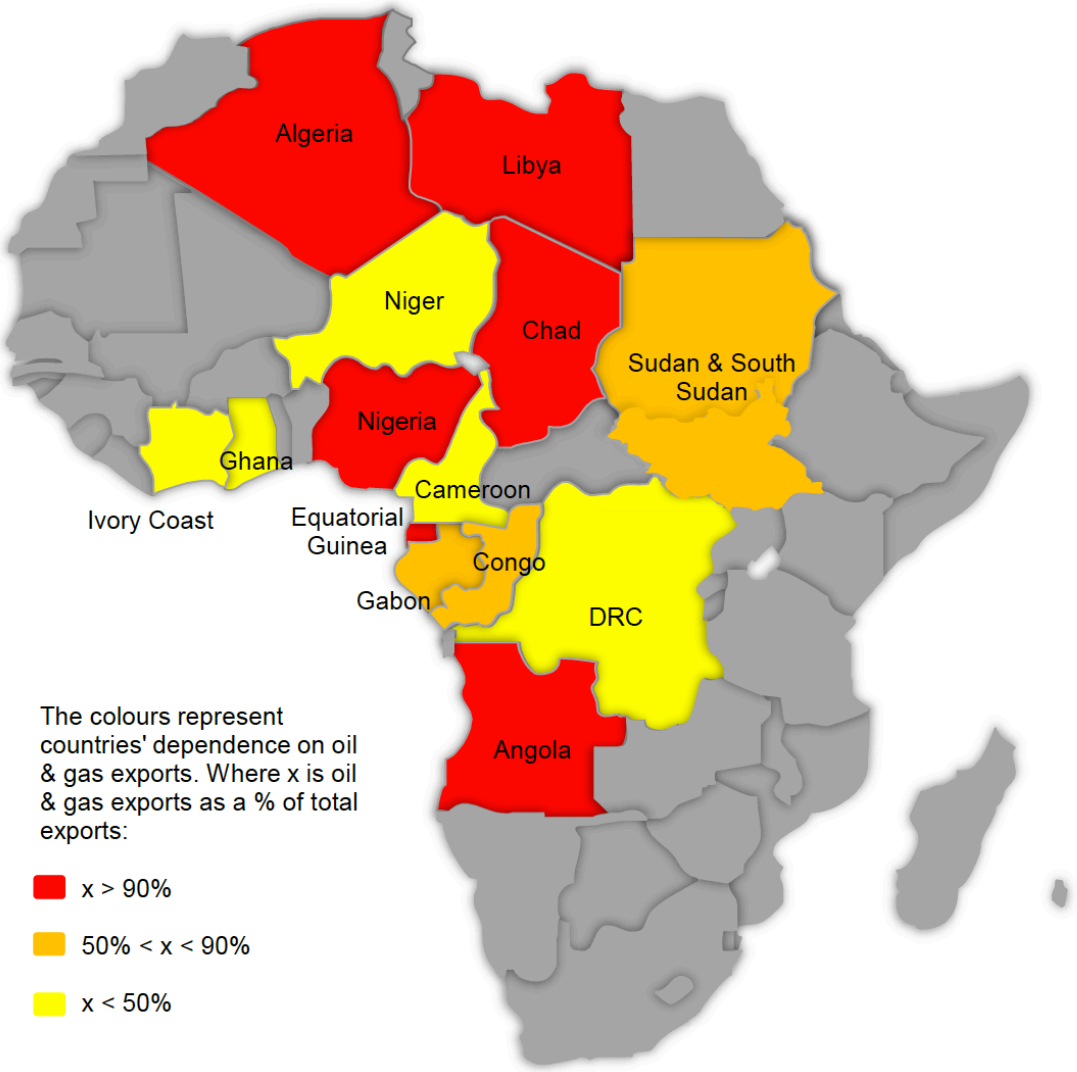
Although **North Africa** holds the largest oil and gas reserves on the continent, political upheaval and uncertainty about political and economic policy changes make the region relatively unattractive for investors at present. Though **West Africa** also has many challenges, it provides better prospects than North Africa. Currently, exploration in deep offshore blocks off the coast of Angola and offshore projects in Ghana seem to be the most noteworthy, although some deep offshore projects could become unprofitable at current low oil prices. In the longer term, Nigeria has substantial prospects; however, serious challenges such as the signing of the Petroleum Industry Bill (PIB) and oil theft need to be resolved. Some of the most exciting prospects on the continent are to be found in **East Africa** – a region that has, up to now, been almost unknown in the oil and gas industry. From Mozambique in the south to South Sudan in the north, exciting discoveries have been made in recent years and could transform the region, which is still one of the poorest in the world. According to some estimates, Mozambique could become the third-largest natural gas exporter in the world if the current gas projects are successful. However, some East African projects could be at risk if oil prices remain low for an extended period of time, largely due to the high initial cost of investing in infrastructure to commercialise these region's hydrocarbon resources. As a result, West Africa is arguably the region in Africa that is most likely to continue to receive large-scale investment if oil prices remain low.

Africa in a Low Oil Price World

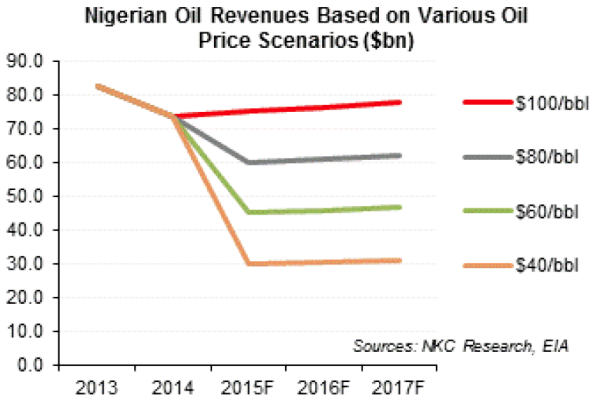
International oil prices have plummeted by almost 50% since its peak of around US$115/bbl in mid-June 2014. On aggregate, this will have a negative impact on African GDP growth and current account balances due to the region's position as net exporter. In fact, in January 2015, the International Monetary Fund (IMF) downgraded its outlook for real GDP growth in sub-Saharan Africa (SSA) from 5.8% to 4.9%, adding that "lower oil and commodity prices also explain the weaker growth forecast for SSA". However, oil exports and imports differ significantly by region, with North and West Africa being home to some notable oil-exporting countries, while Southern and East Africa import most of its oil. The sharp drop in oil prices in recent months will therefore also have significantly different effects between regions; even within regions, the effects will vary significantly. In the next section, we analyse the expected impact of lower oil prices on African economies.

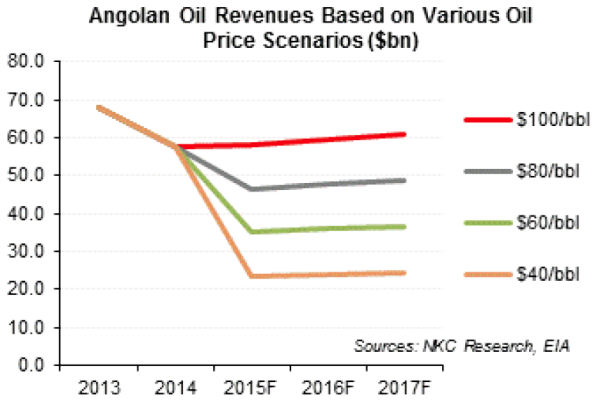
Oil Exporters

Map of African Net Oil Exporters



The drop in oil prices will have a significant impact on oil-exporting countries' external positions. The exact impact willdepend crucially on how reliant each specific economy is on oil exports. Some countries, such as Algeria, Libya, Angola, and Nigeria depend on hydrocarbons for as much as 95% of exports. Therefore, if oil prices are below US$50/bbl, these countries' export revenues could half in 2015 relative to 2014. In the following two graphs, we consider the examples of Angola and Nigeria, Africa's two foremost oil exporters. Based on our assumptions for these countries' oil export volumes,the graphs show the projected revenues earned from oil exports. It shows that relative to an oil price of $100/bbl (roughly the level where most analysts expected oil prices to remain throughout 2015-16), Nigeria would lose over US$45bn in oil revenues per year in 2015-16 if oil prices average US$40/bbl; in turn, if oil prices average US$60/bbl in these two years, Nigeria would lose just over US$30bn p.a. As Angola exports less oil, its losses would be somewhat less in absolute terms: just over US$35bn p.a. on average at an oil price of US$40/bbl, and over US$23bn p.a. at an oil price of US$60/bbl.





In the following table, we express these above-mentioned losses as a percentage of GDP in order to get an idea of the impact on various African oil-exporting economies. As an example, the US$45bn lost by Nigeria in 2015 at an oil price of US$40/bbl is equivalent to 8.1% of GDP. Therefore, an oil price of US$40/bbl (instead of one of US$100/bbl) would result in exports being 8.1% of GDP lower. Assuming there are no policy actions to curb imports, this low oil price would also imply that the current account balance would be 8.1% of GDP worse-off. Further below we consider what policy responses the authorities will consider to mitigate the impact on the current account, and on other macroeconomic indicators.

Table 1: Export Revenues Lost Relative to an Oil Price of US$100/bbl (Expressed as % of GDP)

Country	Year	Oil Price Assumption for 2015-16 ($/bbl)			
		80	60	40	NKC**
Nigeria	**2015**	2.7	5.4	8.1	5.5
	2016	2.5	5.1	7.6	3.8
Angola	**2015**	7.1	14.1	21.2	14.8
	2016	6.5	13.0	19.5	9.8
Algeria	**2015**	3.3	6.6	10.0	6.8
	2016	3.1	6.2	9.2	4.6
Libya	**2015**	5.0	10.0	15.0	9.4
	2016	7.7	15.3	23.0	11.5
Equatorial Guinea	**2015**	12.3	24.6	36.9	25.2
	2016	11.6	23.3	34.9	17.5
Republic of Congo	**2015**	12.1	24.2	36.2	24.8
	2016	11.3	22.7	34.0	17.0
Gabon	**2015**	7.7	15.4	23.2	15.8
	2016	6.9	13.8	20.7	10.4
Chad	**2015**	4.5	9.0	13.5	9.2
	2016	4.5	9.0	13.5	6.7
Cameroon	**2015**	1.0	2.1	3.1	2.1
	2016	1.1	2.1	3.2	1.6
Ghana	**2015**	0.8	1.7	2.5	1.7
	2016	1.1	2.2	3.4	1.7

Sources: NKC Research, IMF, EIA

*** NKC Baseline Scenario: 2015 = US$59/bbl; 2016 = US$70/bbl*

The countries whose current account balances will be affected the most are Equatorial Guinea, the Republic of Congo, Gabon and Angola. All these countries could potentially see their current account balances deteriorate by the equivalent of 20% of GDP or more relative to expectations a few months ago. To put these figures into perspective, the table below shows the effect of a low oil price on these countries' current account balances in 2015-16. The first and third columns of the table show the IMF's WEO forecasts in October 2014 (at that time, the IMF was predicting an oil price of roughly US$100/bbl). The second and fourth columns show the current account balances after taking the figures in the table above into account for an oil price of US$40/bbl in 2015-16. So, for example, in October, Angola was expected to have a current account surplus of 2% of GDP in 2015 and a deficit of 0.1% of GDP in 2016. However, assuming nothing else changes except that the oil price falls to US$40/bbl, Angola will have a current account deficit of 19.2% of GDP in 2015 and 19.6% of GDP in 2016.

As is clear from the table, all the African oil-exporters will record large current account deficits if the oil price remains at current levels. Nigeria and Cameroon are the only two countries in the sample where the deficit will remain in single digits – this is largely because their oil exports to GDP ratios are much smaller than the other countries in the sample.

Table 2: Impact of Low Oil Price on Current Account Balances, Ceteris Paribus (all figures expressed in % of GDP)

Country	2015		2016	
	Forecast in WEO October 2014	Forecast Assuming $40/bbl Oil Price	Forecast in WEO October 2014	Forecast Assuming $40/bbl Oil Price
Nigeria	2.2	-5.8	1.7	-5.9
Angola	2.0	-19.2	-0.1	-19.6
Algeria	-2.9	-12.9	-3.6	-12.9
Libya	-20.9	-35.8	-7.5	-30.5
Equatorial Guinea	-10.3	-47.2	-7.8	-42.7
Republic of Congo	-3.2	-39.4	0.3	-33.7
Gabon	6.0	-17.2	3.9	-16.8
Chad	-7.1	-20.6	-5.9	-19.3
Cameroon	-3.4	-6.6	-3.3	-6.5
Ghana	-8.5	-11.0	-7.2	-10.6

Sources: NKC Research, IMF

Note: These figures are approximate and are only meant to provide an idea of the magnitude of the challenge faced by African oil-exporters

Table 3: Impact of Low Oil Price on Current Account Balances, Ceteris Paribus (all figures expressed in % of GDP)

Country	2015		2016	
	Forecast in WEO October 2014	Forecast Assuming $60/bbl Oil Price	Forecast in WEO October 2014	Forecast Assuming $60/bbl Oil Price
Nigeria	2.2	-3.1	1.7	-3.4
Angola	2.0	-12.1	-0.1	-13.1
Algeria	-2.9	-9.6	-3.6	-9.8
Libya	-20.9	-30.9	-7.5	-22.8
Equatorial Guinea	-10.3	-34.9	-7.8	-31.1
Republic of Congo	-3.2	-27.4	0.3	-22.3
Gabon	6.0	-9.5	3.9	-9.9
Chad	-7.1	-16.1	-5.9	-14.8
Cameroon	-3.4	-5.5	-3.3	-5.4
Ghana	-8.5	-10.2	-7.2	-9.4

Sources: NKC Research, IMF

Note: These figures are approximate and are only meant to provide an idea of the magnitude of the challenge faced by African oil-exporters

Can These Countries Cope with Large Shocks?

The two North African countries in this sample – Algeria and Libya – have very high levels of foreign exchange reserves. In fact, both countries have enough reserves to cover their goods and services imports for roughly three years. Even these countries will have challenges to deal with. Libya, in particular, is in the midst of a political crisis and oil production might take years to recover to its full potential. Meanwhile, Algeria was expected to record twin deficits even before the plunge in global oil prices, so even if the oil price recovers, the country will need to make structural changes in order to move the economy towards a more sustainable long-term path. It is also important to note that Algeria (and to a lesser extent also Libya) gets a substantial amount of export revenues from natural gas. So, although gas prices might not fall to the same extent as oil, they are still likely to decline as they are correlated with oil prices, thereby leading to a more pronounced drop in export revenues than shown in the tables above.

Table 4: Months of Import Cover

Country	2013	2014E
Libya	39.2	37.5
Algeria	36.7	34.3
Equatorial Guinea	8.3	8.6
Angola	8.3	7.3
Republic of Congo	7.0	7.0
Gabon	5.1	5.1
Nigeria	6.4	5.0
Cameroon	4.9	4.6
Ghana	3.0	3.4
Chad	2.5	2.0

Sources: NKC Research, IMF

Equatorial Guinea, Angola and the Republic of Congo also have high levels of import cover. However, this can change quickly since these three countries are among the most dependent on oil revenues. As an example, we consider Angola and assume the following: 1) the oil price averages US$40/bbl as in the previous table, implying that the current account deficit is between 19% of GDP of 20% of GDP in 2015-16; 2) FDI/GDP is just over 1% of GDP (although it could be even lower if oil companies put their oil sector projects on hold); and 3) net external debt increases by around 3% of GDP. This would mean that import cover would decline to below two months by the end of 2015 and that reserves would be depleted early in 2016. If, instead oil prices average US$60/bbl and the other assumptions remain unchanged, then import cover would fall to 4.3 months at the end of 2015 and 0.6 months at the end of 2016.

Nigeria, Gabon and Cameroon all had import cover in the region of five months at the end of 2014. As was shown in tables 2 - 3, Gabon could have a very large current account deficit if oil prices remain low; therefore, its reserves could also decline significantly over the next few years. We do however project that the country will receive FDI equal to 4% of GDP, which will help to finance a part of the deficit. Given these assumptions, import cover should therefore not decline as rapidly as in Angola. Moving on to Nigeria, as we showed in tables 2 - 3, the effect on the country's current account balance will not be as dramatic as for most other oil exporters. A deficit of any magnitude could however prove problematic for Nigeria. This is largely because the country is plagued with oil theft and corruption, which act as a drain on foreign exchange reserves. As an indication of the magnitude of these undeclared outflows, Nigeria's net errors & omissions in the balance of payments amounted to US$26.6bn in 2013, up significantly from US$8bn in 2012. Another risk for the country is that the tightening in US Federal Reserve monetary policy and a weakening in investor sentiment towards Nigeria (partly due to the effects of low oil prices) could cause a reversal in portfolio investment flows. In this regard, Nigeria received US$26.4bn worth of net portfolio inflows in 2012-13; in 2014 H1, this figure declined to US$1.1bn, and with oil prices plummeting since then, there is a strong possibility that portfolio flows have declined further since then. There is also the risk that Nigeria will be removed from the widely-followed JP Morgan Government Bond Index (GBIEM), which would lead to large capital outflows. Assuming net FDI of nearly US$6bn p.a. in 2015-16, net portfolio investment of zero, net external debt inflows of US$1.5bn p.a., and errors & omissions & other capital outflows of US$10bn, foreign exchange reserves would be depleted by late-2015 at an oil price of US$40/bbl and by 2016 Q3 at an oil price of US$60/bbl. So, either the country would have to significantly reduce its imports, or it will have to significantly increase its debt levels in order to maintain its reserve stock at a safe level.

Due to the deterioration in these oil-exporting countries' external positions, there has been significant pressure on their exchange rates. Some of these currencies are however tightly managed by their respective central banks, which has led to speculation that their currencies will be devalued. Nigeria is a case in point, with the Central Bank of Nigeria (CBN) devaluing the naira twice since November 2014 due to severe pressure on the currency. Despite this, pressure on the currency remains high and the possibility of further devaluations in the near future cannot be discounted. The weakening local unit will make imports more expensive and help exporters by making their products more competitive. Therefore, the depreciation of the currency will help to offset a small part of the effect of lower oil exports.

Policy Response

Earlier this year, Algeria's energy minister was quoted in the media as saying that his country would attempt to increase oil production and even to fast-track the development of the shale industry in order to boost export earnings. However, in reality, it will be very difficult for Algeria – as for most other African countries – to increase its oil production significantly over the next few years. In Algeria's case, the country has attracted too little investment over the past decade to develop its oil resources and, even if investment were to increase (which is unlikely given the drop in oil prices), it would take years before new fields come on-stream. Similarly, in Nigeria, although the country has vast resources, oil companies have kept their investments on hold until after the signing of the Petroleum Industry Bill, implying that oil production is unlikely to increase much over the next few years. In the whole African continent, perhaps only Libya has a realistic chance of significantly increasing its oil exports over the next three years – and this is only because its current output levels are well below capacity; and it is by no means certain that the political environment will facilitate a return to normal production levels. Policy makers will therefore have to devise other methods of dealing with the challenges posed by low oil prices. In essence, all these methods involve the constraining of domestic demand in an effort to reduce imports.

One of the best – but politically difficult – ways would be to cut **fuel subsidies**. Not only are fuel subsidies a big drain on fiscal resources, they also boost domestic fuel demand to unsustainably high levels, thereby increasing imports. In a report in 2014, the IMF noted that Angola is among the countries with the cheapest fuel. Government spending on fuel subsidies amounts to 4% of GDP and limits the resources available for health, education, and social safety nets. With the drop in the oil price and lower-than-expected domestic oil production having put pressure on Angola's fiscal finances, the government decided to cut fuel subsidies at the start of October and again in December. This led to the price of petrol increasing by a cumulative 50% to Kz90/litre (US$0.86/litre) over the past few months, while diesel prices rose by 50% to Kz60/litre (US$0.58/litre). This will weigh on consumers' purchasing power (especially richer people who benefited most from low oil prices) while also pushing up input costs for industrial companies. Notably, most of Angola's electricity is generated with diesel generators, so the diesel price increase will push up the cost of generating electricity. Apart from subsidy cuts, the Angolan government also passed a revised budget, which cut spending by 25%, including a freeze on public sector hiring.

Nigeria and Ghana significantly reduced energy subsidies in 2012 and 2013, respectively. The Nigerian government also used the opportunity of falling global oil prices to reduce its fuel subsidies further by not passing on the full amount of the fall in oil prices to consumers. Instead, in January 2015, domestic petrol prices were reduced from N97/litre (US$0.51/litre) to N87/litre (US$0.46/litre). This represents a decrease of around 10%, which is much less than the decrease in global fuel prices. Despite subsidy cuts, Nigeria still has among the lowest petrol prices in the world and therefore has a fairly sizable subsidy bill. As such, the drop in oil prices will help to reduce the subsidy bill this year.

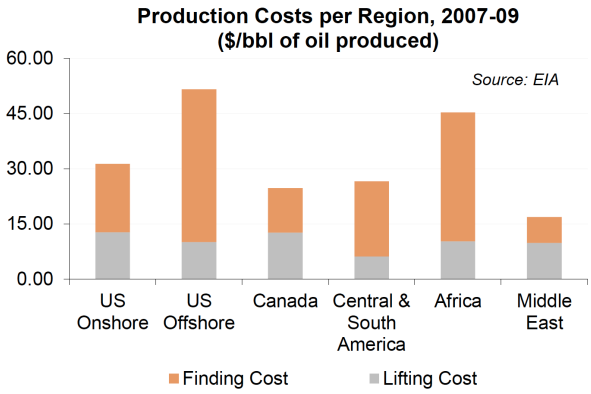
Oil-exporting governments will also consider **trade policy** measures such as import bans or tariff increases. These will either prevent the importation of certain goods or make it more expensive to import it. A policy instated by the Algerian government after the oil price slump in 2008/09 was to ban consumer loans, also in an attempt to suppress domestic demand and reduce imports. This policy is still in effect, except that the government now allows consumer loans used to purchase domestically-produced products. By increasing the incentive to buy local goods, this policy will further reduce the demand for imported goods. **Monetary policy** can also be used to reduce domestic demand; most notably, central banks can increase interest rates in order to increase the cost of borrowing. Another tool available to the central bank is to hold foreign exchange auctions and to then ration the amount of foreign exchange it sells to the market. In this way, the authorities can (to a certain degree) decide the type and amount of imports it will allow. The central bank can also make use of capital controls to prevent an outflow of portfolio investment. In this regard, the CBN reduced the net open foreign exchange trading positions that banks can hold at the end of business to 0.1% of shareholder funds and banks are forced to use foreign exchange purchased on the interbank market within 72 hours. Meanwhile, *Moneyweb* reported in late-January 2015 that the Angolan government had *"ordered the Ministry of Finance to temporarily suspend payments abroad for public contracts"*. The honorary CEO of the South Africa - Angola Chamber of Commerce, Roger Ballard Tremeer, told the news agency that there are more than 100 South African firms that are invested in Angola that will be hit by this development as they will be unable to *"repatriate profits or dividends and no South African supplier can expect to be paid for goods or services supplied"*.

Prospective Oil & Gas Producers

An oil price boom since the early 2000s has provided oil companies with added incentive to explore for oil across the world, including in Africa, where large amounts of unexploited oil reserves are known to exist. Historically, North and West Africa have attracted the most investment. In particular, in West Africa, the continent's two foremost oil producers, Angola and Nigeria, attract large amounts of investment for offshore oil projects, while the Ghanaian oil industry is also emerging. In recent years, East Africa has also emerged as an exciting prospect for oil companies. Not only have oil discoveries been made in Kenya and Uganda, but Mozambique and Tanzania have also been the focus of significant interest owing to their natural gas potential.

Apart from conventional oil and gas resources, Africa also has large deposits of shale oil and gas. A 2013 report studying shale oil and gas resources in 41 countries around the world, the EIA found that there are large deposits in South Africa and across North Africa. Algeria's shale gas potential is enormous: the EIA estimates that the country has almost 20 trillion m3 of 'technically recoverable shale gas resources'. This is more than four times the country's proven conventional gas reserves. The study also shows that Algeria's potential shale gas resources are the third highest in the world after China and Argentina, and slightly more than the US. The commercial viability of these reserves is yet to be determined, however, and hundreds of test wells will have to be drilled in order to determine the viability of these wells. The state oil company, Sonatrach, which was the 18th largest oil and gas company in the world in 2013, has extensive investment plans to develop the sector. Meanwhile, Libya and Egypt hold an estimated 3.4 trillion m3 and 2.8 trillion m3 of technically recoverable shale gas resources, respectively, with smaller amounts having also been found in Tunisia, Morocco and Western Sahara. Furthermore, Libya is estimated to hold the fifth most shale oil in the world, with the EIA estimating its technically recoverable shale oil resources at 26.1 billion barrels. Both Algeria and Egypt also have notable shale oil resources. South Africa is the major known holder of shale gas in SSA: the EIA report estimates that South Africa has 10.9 trillion m3, which is the eighth highest in the world.

Effect of lower oil prices - The sharp drop in global oil prices and the resulting decrease in medium-term oil price projections have reduced the incentive for international oil companies to explore for oil. While some projects will undoubtedly still be profitable at current oil prices, others will not. Many international oil companies have already announced that they would reduce capital expenditure in 2015. Bloomberg also noted that according to the Baker Hughes Rig Count, the number of rigs in Africa dropped from a peak of 154 in February 2014 to 125 by March 2015.

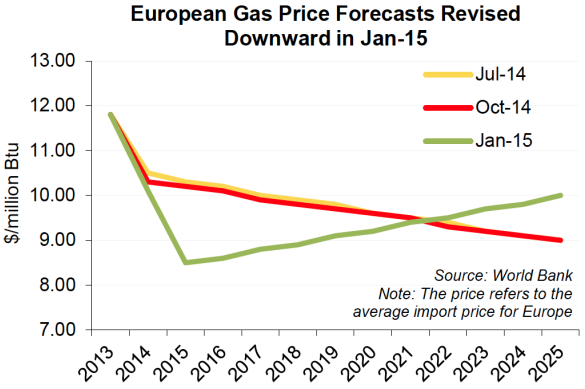


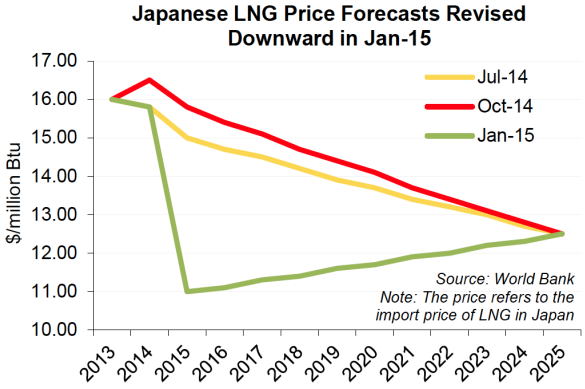
Furthermore, even if revenues (per barrel of oil sold) exceed production costs (per barrel produced), oil companies still have massive capital expenses before production comes on-stream. In some cases, additional infrastructure such as pipelines and natural gas liquefaction plants need to be built in order to commercialise oil and gas resources. These costs are extremely high when it involves offshore exploration – for example, the EIA estimates that the finding costs (which are "the costs of exploring for and developing reserves of oil and gas and the costs to purchase properties or acquire leases that might contain oil and gas reserves") in US offshore fields averaged US$41.51/bbl in 2007-09, compared to onshore costs of US$18.65/bbl. As shown in the graph, Africa's production costs are, on average, among the highest in the world – not due to their lifting costs being particularly high, but rather due to the high finding costs. It is important to note, though, that there are vast differences in production costs depending on where exactly oilfields are located.

Over the past decade, **East Africa** has emerged as an exciting prospect for energy companies. The countries in this region that have made the most headlines are Mozambique and Tanzania – thanks to large natural gas finds in the Rovuma Basin off the south-east African coastline – and Uganda and Kenya owing to onshore oil discoveries. However, low oil prices will put the prospects for the region under some threat. Not only will it put the profitability of these projects in doubt, but oil companies will also have fewer resources to finance large-scale investment projects. So, for instance, Tullow Oil, which is involved in exploration across various African countries (and is an important player in East Africa), stated on 15 January 2015 that it had already taken steps to *"adapt to current market conditions. This work will continue during 2015 to ensure the [company] is in a position to benefit when conditions improve. In late 2014, we materially reduced our 2015 exploration capital expenditure and today announce a further cut to this expenditure to US$200m."* It added: *"We have re-allocated our future capital to focus on delivering high-margin oil production in West Africa which will grow significantly to around 100,000 bpd net to Tullow by the end of 2016 and will generate stable, long-term cash flows for the business.* ***The reduced exploration programme will predominately focus on a number of high-impact, low-cost exploration opportunities in East Africa"*** (emphasis added). Bloomberg also reported that Tullow does not plan on drilling any offshore exploration wells in Africa in 2015, but that it will continue its onshore exploration in East Africa. We expect these activities to be focused on **Kenya**. Onshore exploration costs tend to be lower, and there is generally more certainty about economic policies in Kenya than in most SSA countries. Tullow Oil has also indicated that the US$170m that it has earmarked for the East Africa region will primarily be directed towards Kenya, where exploration and appraisal are ongoing.

For **Uganda**, the discovery of substantial oil reserves since 2006 has sparked hopes among investors and large oil companies that the country could become a lucrative new player on the global oil stage. Estimates of the country's proven oil reserves have also grown to 2.5 billion barrels, up from zero as recently as 2010, while estimates for commercially viable oil reserves are as high as 6.5 billion barrels. Progress towards commercial oil production has however been slow due to bureaucratic obstacles. These included a moratorium on the awarding of new licences until a revised Oil Bill was passed, and a tax dispute between the government and Tullow, with the government going as far as to repossess one of Tullow's oil fields for not applying for a production licence in time. Apart from bureaucracy, infrastructural needs to export Uganda's oil are also substantial, as the country is landlocked and will therefore need a pipeline to transport oil to the Kenyan coast. In 2012, Uganda's amended Oil Bill was passed, and Tullow was allowed to enter a partnership agreement with China's National Offshore Oil Corporation (CNOOC) and France's Total, which was seen as crucial in unlocking $10bn worth of investment in vital infrastructure by the three oil companies. This infrastructure includes a 30,000 bpd oil refinery, as well as pipelines, both for transporting petroleum to Kampala, and for exportation. A further positive development came in February 2014 when the government signed a memorandum of understanding with the three oil companies. The memorandum set out a framework for planned production, as well as details for the amount of crude oil that will be sent to the planned refinery and pipelines. By formally stating the details, the memorandum reduces some uncertainty that investors might have had. Nevertheless, progress has been so slow that Uganda may have missed its opportunity to become an oil producer over the next few years. Because the initial investment costs to commercialise oil are high, the project may well be unprofitable at current oil prices. Indeed, reports suggest that Tullow Oil is currently not involved in any activity in Uganda, and the company does not have any activity planned for 2015. In December 2014, Reuters also reported that the government delayed the announcement of the lead investor in the planned oil refinery after bidders requested incentives for the project, which may have been the first sign that oil-related investment would slow.

Meanwhile, in Mozambique and Tanzania, energy companies need to build LNG plants to commercialise the region's gas resources. In **Mozambique**, Anadarko and Eni plan to build four LNG trains with a combined capacity of 27 billion m3 p.a. by 2020 with another few trains set to be built by the mid-2020s. The IMF estimates that in order to process the natural gas, a forecast US$24bn will be needed by energy companies for site preparation and other infrastructure requirements – of which it is assumed that "US$4bn will be invested during each year between 2014 and 2019, with all contents assumed to be imported." Meanwhile, a report by Standard Bank estimated that total capital expenditure (including drilling and feasibility studies) would amount to US$26.1bn if two trains are built, US$40.6bn if four trains are built, and US$54.6bn if six trains are built. The report also finds that the internal rate of return (IRR) of the project for the concessionaires of the Area 1 project (led by Anadarko) will be 12.2% based on a gas price of US$12/million Btu. It then adds the following: "Looking at the project lifecycle as a whole … the project is not particularly profitable for Area 1 (Anadarko and its partners). A levered IRR of 12.2% for Trains 1 and 2 is only 370 bps higher than the yield upon Mozambique's 2013 bond issue. Whilst IRRs of such levels are projected for LNG projects in Australia, it must be noted that Australia is an "AAA" credit rated jurisdiction whereas Mozambique ranks single "B" (higher risk requires higher return). The project is hugely profitable for Mozambique Inc. (the government and state oil company). On the one hand, it is taking significantly less risk than [the international oil companies] (e.g. by investing later). On the other, the fiscal streams it will receive are of enormous significance." As of writing, there have been no signs that either Anadarko or Eni will delay or abandon its projects. However, given that the IRR is, according to the Standard Bank report, already quite low and that both the current gas prices (which are correlated with oil prices) and the medium-term projections for gas prices have declined since that report was written, there is a risk that the project will be scaled back. As shown in the accompanying graphs, the price forecast for LNG imported by Japan has declined especially significantly. One option for the government would be to reduce the tax rate or contribute more to the investment costs. As noted above, the project is highly profitable for the government, so it should still be profitable even if it reduces its share in the profits. In this regard, the Mozambican Parliament passed an amended petroleum law in August 2014. According to Bloomberg, **the new laws include special tax breaks for the offshore field currently being operated by Anadarko and Eni**. So, although the projects will now be less profitable for the government, it is positive that measures are taken to ensure that the projects continue. The prospects for Mozambique's natural gas industry therefore remain bright. There is however less certainty about Tanzania's gas project: since the Mozambican project has progressed further than its Tanzanian counterpart, it is still unclear whether global demand will justify another LNG project from south-east Africa.





As noted above, Tullow plans to continue investing in **West Africa**. According to the company, "[c]ash operating costs for [its] West Africa[n] operations remain low, averaging around US$13/bbl in 2014. The Jubilee field (in Ghana) operating costs averaged around US$10/bbl in 2014 with potential to drive down costs further in the current market ahead of realising synergies relating to the combined Jubilee and TEN operations." Bloomberg also quoted a spokesperson from CAMAC Energy as saying: "The majority of our current development and near-term exploration drilling is offshore Nigeria, where typically the production costs are a little lower than other exploration areas. In this price environment, we're not going to be expanding exploration drilling. We're sticking to our development programme."

Even though production costs for Nigerian deepwater projects are among the lowest in the world, they still have a breakeven price of approximately US$44/bbl. Therefore, while current operations are expected to continue, there will be little incentive to invest in new fields at the current oil price if one considers the high cost of exploration and infrastructure. An even greater constraint to investment in Nigeria is its operating environment. Apart from oil theft and corruption, Nigeria has also delayed the signing of the Petroleum Industry Bill for seven years. This creates a lot of uncertainty about the fiscal framework and has significantly reduced the incentive to invest in the sector. For this reason, we did not even expect much new investment in Nigeria's oil and gas industry when oil prices were US$100/bbl; under new low oil price assumptions, oil companies are therefore unlikely to expand exploration activity. That said, if the Petroleum Industry Bill is passed and it offers investors favourable fiscal terms, investment is expected to increase sharply. The passing of the Bill might also have been helped by the smooth elections held in March 2015.

Moving down the west coast of Africa, practically all oil resources between Cameroon and Angola are offshore. Since capital costs are higher for offshore exploration, we expect a significant decline in exploration activity in West Africa while oil prices remain low. In particular, the deepwater pre-salt formations off the coast of Angola, the Republic of Congo and Gabon may well be too expensive for oil companies to continue exploring in the current oil price environment. The Angolan state oil company will reportedly also cut spending significantly this year, which is likely to also weigh on exploration.

Finally, in **North Africa**, we do not expect Algeria's substantial shale gas resources to be developed any time soon. Production costs are generally higher for shale gas than for conventional gas due to the cost of hydraulic fracturing and horizontal drilling. Therefore, with international oil prices having slumped, Algeria's investment environment remaining unfavourable, and security risk being fairly high, it should not be a surprise that only one bid was made for a shale exploration licence – out of 17 shale blocks on offer – in a licencing round in September 2014. Furthermore, there is still much controversy about the shale industry due to its potential impact on environment. The Algerian government had plans to step up its investment in shale gas significantly earlier this year, but put these plans on hold due to widespread protest against shale exploration and its potential impact on the environment, water resources and health.

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