



Africa Oil and Gas Review 2020

Energising a new tomorrow

November 2020



www.pwc.co.za/oil-gas-review



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Acronyms used in this report

°C	Degrees Celsius	IRENA	International Renewable Energy Agency
ANPG	Agência Nacional de Petróleo, Gás e Biocombustíveis (Angola)	LNG	Liquefied natural gas
bbl	Barrels	M&A	Mergers and acquisitions
Bbo	Billion barrels of oil	m	Thousand
bbl/d	Barrels per day	mm	Million
bcm	Billion cubic metres	mbbl	Thousand barrels
BOE	Barrels of oil equivalent	mbbl/d	Thousand barrels per day
BtCO ₂	Billion metric tons of carbon dioxide	mmbbl	Million barrels
Btu	British thermal units	mmbbl/d	Million barrels per day
CAPEX	Capital expenditure	MMBtu	Million British thermal units
CO ₂	Carbon dioxide	mtpa	Million tonnes per annum
EIA	Energy Information Administration (USA)	MW	Megawatt
EV	Electric vehicle	NEA	Northeast Asia
EU	European Union	NOC	National oil company
FDI	Foreign direct investment	OPEC	Organisation of the Petroleum Exporting Countries
FID	Final investment decision	PPA	Power purchase agreement
FLNG	Floating liquified natural gas	PV	Photovoltaic
FPSO	Floating production, storage and offloading	SDGs	Sustainable Development Goals
GDP	Gross domestic product	tcf	Trillion cubic feet
GTA	Greater Tortue Ahmeyim	TTF	Title Transfer Facility
GW	Gigawatt	UN	United Nations
IOC	International oil company	VAT	Value-added tax
IMF	International Monetary Fund	WTI	West Texas Intermediate

Executive summary

PwC's Africa Oil and Gas Review looks at activity and developments in the oil and gas industry and analyses potential future scenarios.

Introduction

The decade of the 2020s will be recorded in history as a pivotal period for the planet, the global economy and the energy and power landscape. Spurred on by the COVID-19 global pandemic, the world is finally galvanising its commitment to move towards a green and sustainable future and the global energy transition is the cornerstone of this new world. The global transition to renewable energy will accelerate rapidly throughout the coming decade causing exponential disruption to the tried and tested energy market models that have stood the test of time for over 100 years.

The historically insatiable investment in fossil fuel exploration and extraction required to feed global energy demand has built global organisations, generating megaprofits for investors and governments. Replacing this inherently inflationary process with free renewable feedstock, largely in the form of solar and wind is rapidly shifting the balance of power and profits, and potentially leaving trillions of dollars' worth of stranded fossil fuel assets globally.

This tenth edition of PwC's Africa Oil and Gas Review continues to build on annual insights into the African oil and gas sector, but expands the focus to include the unprecedented disruption caused by the COVID-19 global pandemic as well as the biggest global theme for this decade: the renewable energy transition.

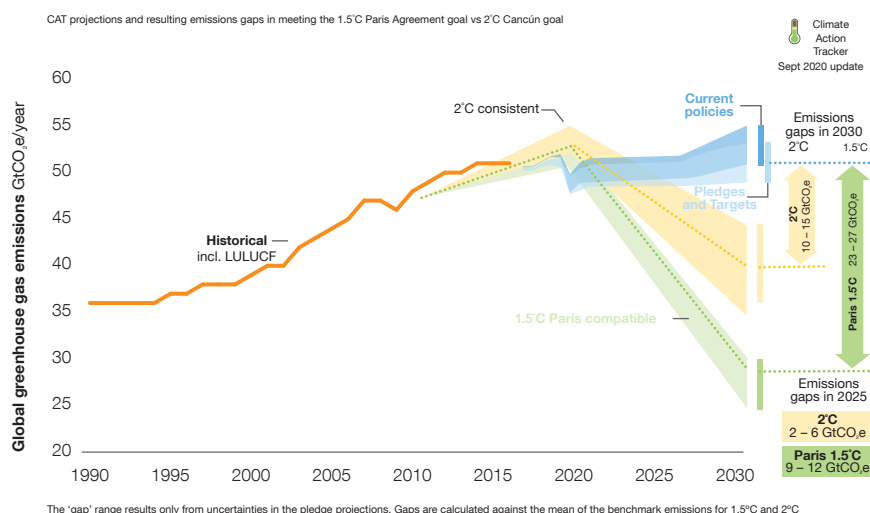
Initiated by climate change, but driven by commercial value

After a century of global growth and development driven by fossil fuels, the world is falling well short of the Paris Agreement commitment to decarbonise the planet and stay under 1.5°C global warming. Despite its many negative consequences, COVID-19 has had a positive impact on these climate change scenarios, and according to IEA and DNV research, COVID-19 has reduced global energy-related emissions in 2020 by 8%, giving many citizens clean air for the first time in a decade of smog. To stay within the 1.5°C scenario, however, the world needs to realise the same level of energy-related emissions reduction every year to 2050. The pandemic-induced step change in behaviour, consumer demand and green policy response is now shaping a global 'new normal', but will this be enough and how will developing economies navigate this global transition?

19%

an estimated decrease
in oil production for
the top five African
producers for 2020

Figure 1: Projections and emissions gaps in meeting the 1.5°C Paris Agreement vs 2°C Cancún goal



Source: Climate Action Tracker (climateactiontracker.org)

As the world galvanises around this vision of a sustainable and clean environment, 'carbon neutral' and 'net zero' are no longer scientific or activists' concepts, but rather real targets, increasingly embedded in national policies, legislation and corporate plans across the globe.

Meanwhile, COVID-19 has delivered a significant blow to global economies with the oil and gas industry shown to be particularly vulnerable. In the 2019 edition of this report, many African oil and gas industry trend lines were heading towards positive territory for the first time in many years. The exciting liquefied natural gas (LNG) developments in Mozambique were showcased in our 2019 report as the industry flagship, destined to rival the growth and wealth of Qatar. As we approach the end of 2020 and review the estimated pandemic-induced damage, we see significant investment and project delays across Africa, including Mozambique; an estimated decrease in oil production of 19% for the top five African producers for 2020 and a depressed market outlook in general.

COVID-19 has not only caused the biggest global oil demand slump in history, at nearly 40 times worse than the global financial crisis of 2007, but has in fact accelerated the global energy transition by as much as five years as the developed world uses the renewable energy transition to anchor economic stimulus packages and new economic diversification. With global oil demand now estimated to never again exceed 2019 demand levels, the global energy markets have truly reached a tipping point.

In addition to COVID-19 induced market disruptions, African countries, many of which are very reliant on oil and gas revenues, have had to divert fiscal resources to supporting healthcare and welfare responses to the pandemic, creating even greater economic distress for economies to navigate the rapidly increasing volatility and long-term market challenges.

As we introduce the accelerating renewable energy transition, it is perhaps valuable to briefly refresh some key statistics on renewable energy progress globally to show that the market tipping point has been reached and that the only real question remaining is how quickly the transition will happen.

Renewable energy was characterised in the early to mid-90s by pilot projects and subsidies. The following two decades, however, saw unprecedented levels of technology innovation and efficiency improvements driving commercial scale up and cost curves down by factors of more than 10 times. By 2015, it was largely accepted that renewable energy had crossed average global grid parity, making it the cheapest form of new energy and commercially viable without subsidies. Since 2016, renewable energy has consistently made up more than 50% of new annual global power capacity and by the end of 2018 represented over one-third of installed global power capacity. According to recent global research by Lazard, on average it is cheaper to build and run a new thin-film utility photovoltaic plant than to operate an existing coal-fired power station, making renewable energy, particularly wind and solar the cheapest forms of commercial energy globally.

As these innovation and cost trends continue, they accelerate newer technologies such as storage and hydrogen as well as expand adoption innovation such as deeper grid penetration and the first 'baseload' renewable energy power purchase agreement (PPA) being signed in India in 2020 (hybrid technologies with storage).

Europe and the UK are the most progressive climate change leaders but with China and India committing to carbon neutrality, they are leading the global race for renewable energy installation. There is no turning back the global energy transition. The commercial and technical benefits are overwhelming and global policies are not only pushing ahead with greening incentives, but adding punitive measures for use of fossil fuels.

This market disruption is, however, taking place against the backdrop of increasingly fragile African economies many of whom are dependent on the global oil and gas market for foreign revenue. So where does this leave Africa's oil and gas industry and the urgent need to reinvigorate African economic growth and investment?

Can Africa benefit from early adoption of the energy transition, using oil and gas revenues to accelerate the benefits and growth of green economics?

Value destruction of the oil market as a result of COVID-19: Impact on sub-Saharan Africa

Oil revenue: US\$1tn
downgrade in estimated revenue projections over 20 years

GDP impact: US\$243bn
estimated direct loss to GDP as a result of COVID-19



Key country update

Africa comprises 54 countries with vast differences in geographic size, populations, culture, language, mineral wealth and economic robustness. Fourteen of these countries produced over 8.0 mmbbl/d of oil in the last five years. This review focuses on 20 countries, all of which have a link to the oil and gas sector.

Countries analysed in this review

Regions	Countries	Oil	Oil	Gas	Gas
		Exports above 100mmbbl/d	Domestic market use	Exports	Domestic market use
West Africa	Nigeria	Yes	Yes	Yes	Yes
	Ghana	Yes	No	No	Yes
	Cameroon	No	Yes	Yes	Yes
	Senegal	Yes	No	Yes	No
	Côte d'Ivoire	Yes	No	Yes	Yes
North Africa	Algeria	Yes	Yes	Yes	Yes
	Libya	Yes	Yes	Yes	No
	Sudan	Yes	No	No	No
	Egypt	Yes	Yes	Yes	Yes
	Morocco	No	No	No	No
East Africa	Tanzania	No	No	No	No
	Uganda	No	No	No	No
	Kenya	No	No	No	No
Central Africa	Chad	Yes	No	No	No
	Equatorial Guinea	Yes	Yes	Yes	Yes
	Gabon	Yes	No	No	No
	Angola	Yes	Yes	Yes	Yes
Southern Africa	Mozambique	No	No	Yes	Yes
	Congo	Yes	No	No	No
	South Africa	Yes	No	No	Yes

Source: PwC analysis

Africa's oil and gas inventories: A snapshot 2019/2020

After a fairly robust 2018, it was anticipated that 2019 would be a year for further recovery and strengthening of the sector with a sustainable upward market trajectory.

However, several challenges did manifest in 2019 for the oil and gas sector — the ongoing rise in shale production, a slowing global economy and talk of a potential global recession; the prospect of a deepening trade war, structural oversupply of LNG production and concerns over security of supply with increased attacks on oil production sites.

Africa's oil reserves, production, consumption and exports

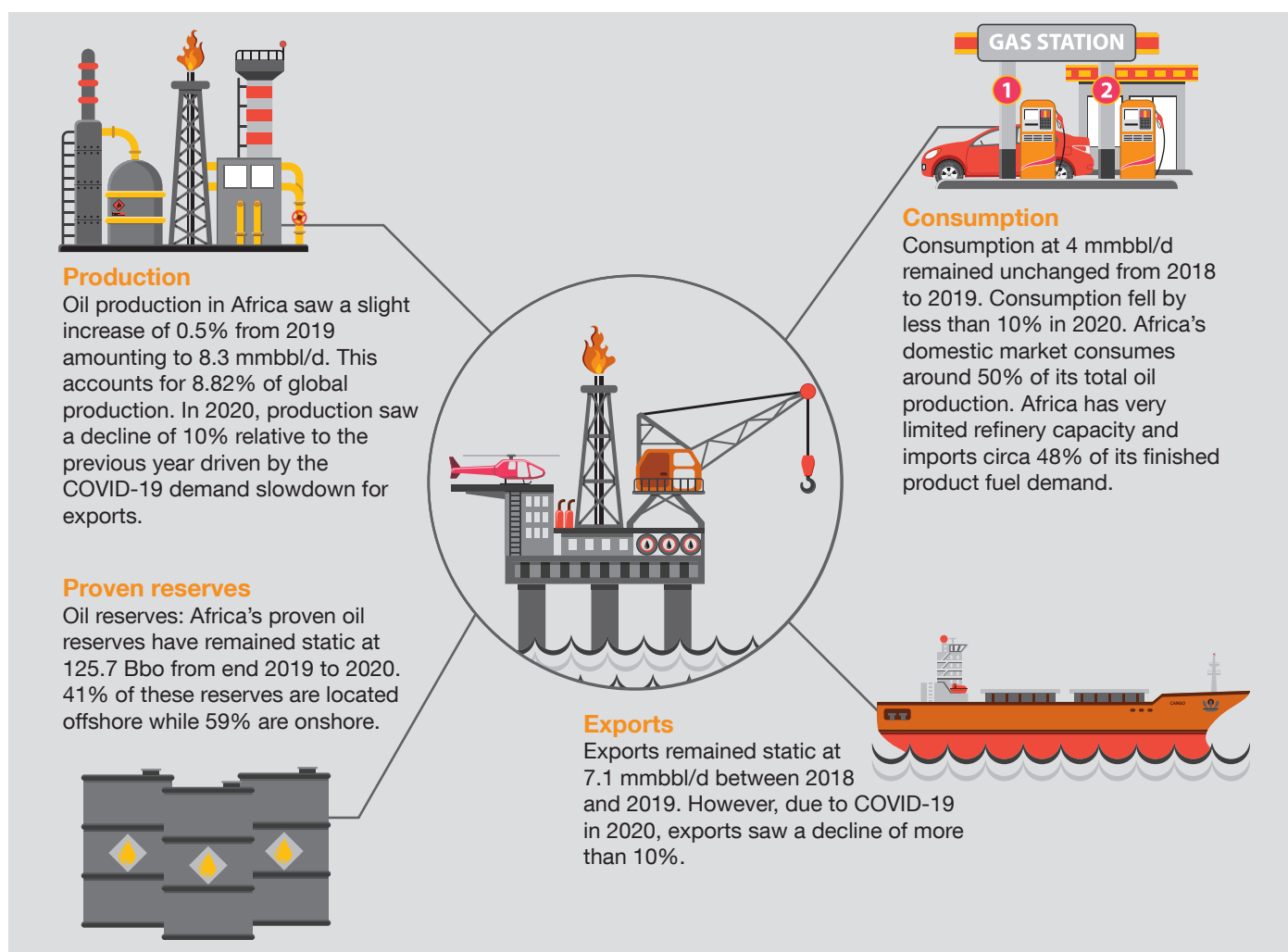
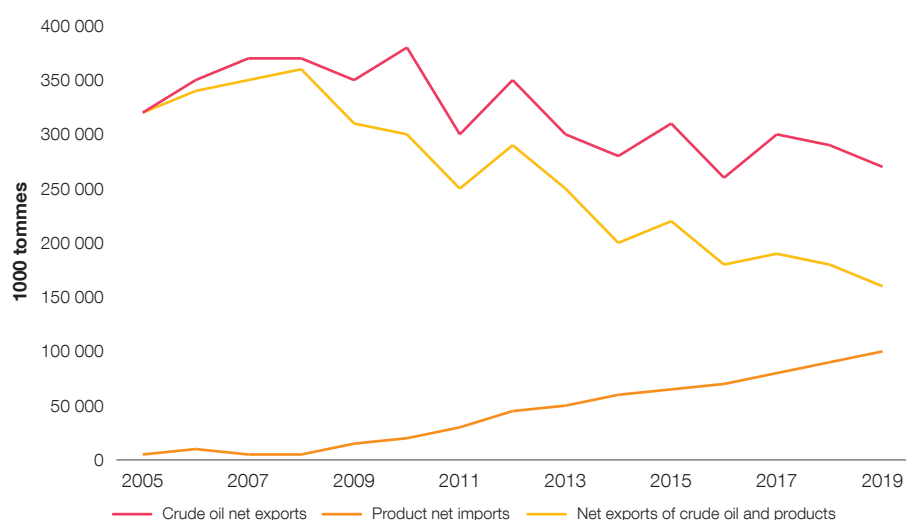




Figure 2 displays the estimated revenue of export sales, the cost of imports and the net value (i.e. net export revenue – net import costs) of oil trade to African countries. It is an estimation calculated by applying annual average prices to the trade volume.

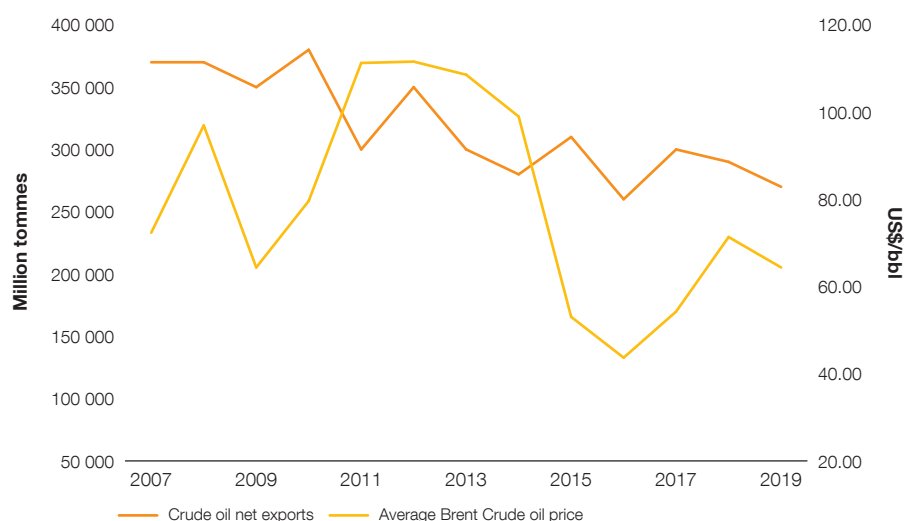
Figures 2 and 3 illustrate the net value of oil trade to Africa over the last 15 years. The calculations are an approximation calculated by applying annual average prices to the trade volumes. Net value peaked in 2008 and then fell as crude production fell before rising again in 2012, after which oil production has levelled off at a lower rate. Since 2018 prices have fallen and there has been increased product import demand leading to net value falling to just over US\$50bn in 2019.

Figure 2: Africa's trade volume in crude oil and petroleum products



Source: Africa Energy Database¹

Figure 3: Crude oil net exports vs average Brent Crude oil price



Source: Africa Energy Database, PwC analysis

¹ Tralac Trade Law Centre, accessed October 20, 2020, <https://www.tralac.org/documents/resources/covid-19/regional/3630-the-impact-of-covid-19-on-african-oil-sector-a-special-report-by-afrec-on-the-implications-on-african-countries-may-2020/file.html>

34%

of Africa's proven gas reserves are situated offshore

Downturn in exports due to COVID-19

Oil discoveries

- **Major discoveries**

Africa's largest discovery in 2019 was made offshore of Mauritania by BP totalling 1.3bn BOE

Gas reserves, production consumption and exports

- **Proven reserves**

Africa's proven reserves have remained at 527 tcf between 2019 and 2020 — 34% of these reserves are situated offshore.

- **Production**

Production saw a slight increase of 0.36% from 2018 to 238 bcm in 2019. However, production declined by 9% in 2020 due to COVID-19.

- **Consumption**

Gas consumption slightly increased by 0.4% from 2018 to 150 bcm in 2019. Gas consumption saw a decline of more than 10% in 2020 relative to the previous year.

- Africa consumes 63% of its total gas production, predominantly for power generation.

- Exports: African gas exporting countries saw a total decline of more than 6% in 2020 from 39.7 mtpa in 2019 to 37.3 mtpa in 2020.

Key indicators in the oil and gas sector in Africa

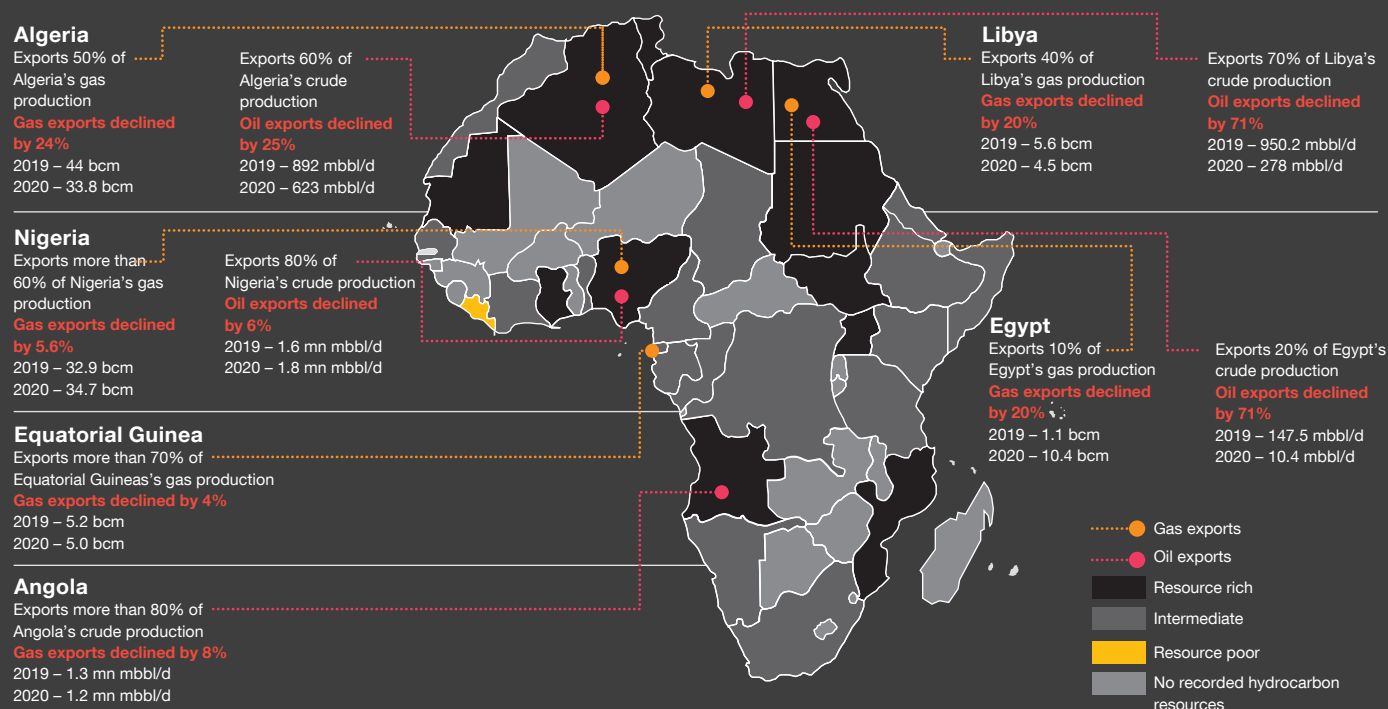
Oil

Africa oil exports remained static at 7.1 mmbbl/d between 2018 and 2019. However, due to COVID-19 in 2020, exports saw a decline of more than 10%. The top five African crude oil exporting countries experienced a total decline of 11% from 5.3 mmbbl in 2019 to 4.2 mmbbl in 2020. With the oil price at approximately US\$40/bbl, oil exporting countries will experience long-term decline in their export revenues as a result of the renewed weakness in global oil prices coupled with the accelerated transition to renewables in key importing countries. Nigeria, Algeria, Angola, Libya and Egypt could each be facing US\$20bn or more in lost export revenue in 2020.

Gas

Despite the estimated 6% decline in gas exports in 2020 across the top five African gas exporting countries, gas demand is expected to quickly recover from 2021 in mature markets and show steady growth in emerging markets. Much of Africa's supply growth will come from Nigeria, but Tanzania, Mauritania and Senegal are also aiming to contribute to rising supply. The post-2021 demand growth will take place in China and India where gas benefits from strong policy support.

COVID-19's impact on oil and gas producing countries



Source: Rystad Energy, PwC analysis (Dec 2019-Sept 2020)

Oil and gas projects across Africa

Africa confirmed itself as a global exploration hotspot in 2019 with key projects primarily from West and East Africa advancing to exploration and development. These megaprojects included:

- BP's final investment decision (FID) on the Greater Tortue Ahmeyim (GTA) development between Mauritania and Senegal
- Preparation for first gas exports in 2022 from the Eni-operated Coral South floating LNG project in Mozambique
- Anadarko's FID announcement on its Area 1 Mozambique LNG onshore export terminal project
- Total's launch of the Egina floating production, storage and offloading (FPSO) vessel in Nigeria
- Shell's Bonga South West offshore field also in Nigeria, which was expected to reach FID in 2019, which still has not closed.

The 2020 COVID-19 disruption has, however, reversed many of the sector gains and seen project delays and cancellations. Many oil and gas majors in Africa (including BP, Shell, Total, Eni and ExxonMobil) have announced that start-up dates of their major projects are expected to be delayed by 1–3 years and smaller projects may be cancelled.

Nigeria, Mozambique, Senegal, Kenya, Mauritania and Uganda are faced with project and FID deferrals, while two of Total's projects in Angola are facing outright cancellation.

Further examples of projects at risk are in Tanzania where, despite having world-class reserves in blocks owned by Equinor and Shell, no major LNG production has yet to be realised. Following COVID-19, both these international oil companies (IOCs) have stated their intentions to diversify further into renewables and move away from hydrocarbons. The financial capability to fund mega-billion-dollar projects has also been called into question with Shell recently reporting major financial losses and announcing a significant reduction in its global workforce.

Oil and gas projects currently facing delay or cancellation

BP

- The Greater Tortue Ahmeyim gas megaproject – Commercial production is re-scheduled for 2023
- FIDS on the Yakaar and GTA Phase 2 satellite fields of the gas project will also likely be postponed until 2023.

Wood Energy

- Sangomar 1 oil field project – oil in the Senegal offshore field might be delayed by 1 to 2 years

Aker Energy

- The Pecan oil field development has been put on hold

Tullow Oil

- Contract for the Maersk Venture drillship will be terminated 19 months earlier

Shell

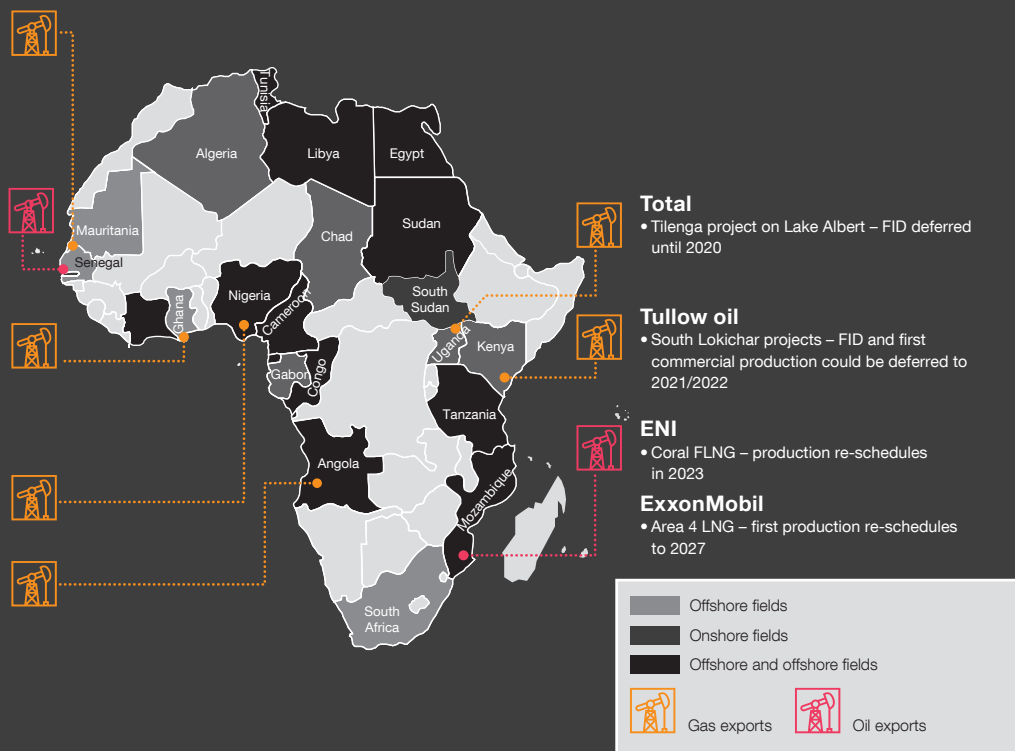
- The Bonga Southwest Aparo – FID could be deferred for 2021/2022

Total

- Zinia Phase 2 project – Development has been suspended

Total and Chevron

- have cancelled rigs contracted with Valaris plc



Source: Rystad Energy, PwC analysis (May 2020 – Oct 2020)

Despite these setbacks, African producers are pushing forward with developments with Uganda, Algeria and Angola announcing that they'll be moving forward with large-scale projects.

Tanzania and Uganda signed an agreement allowing for the construction of a 1,445 km crude oil pipeline that will connect Uganda's oilfields to Tanzania's port of Tanga.

Algeria's Sonatrach has extended its gas deal with Tunisia for an additional eight years to 2027, with the possibility of another two-year extension. Angola has also moved forward with the development of two of its large-scale oil and gas infrastructure builds, which includes the launch of a US\$60m oil platform construction project and the construction of a gas processing plant with the capacity to process 400m cubic feet of natural gas per day.

These regional offtake agreements are geared to meet much-needed demand for power generation. However, the bankability and move from planning to implementation and construction for these and many other oil and gas projects are in question in a post COVID-19 global energy market. There is still much uncertainty in markets and must be weighed against the need for an estimated break-even crude oil price of more than US\$45/bbl.

New licensing and bidding rounds 2020

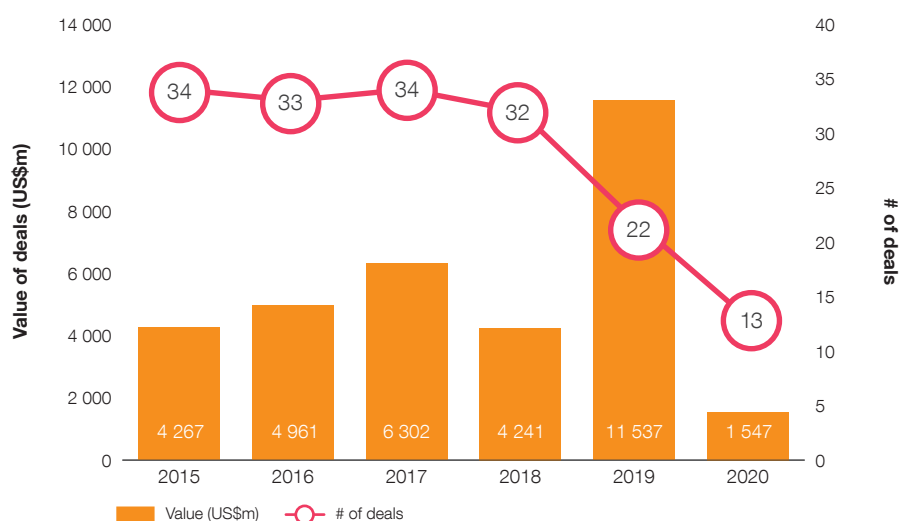
At the end of 2019 several African countries rich in oil and gas were determined to transform their energy sectors by extending licensing rounds in bids to entice investors. These included Angola, Côte d'Ivoire, Liberia, Sierra Leone, Gabon, Mozambique, Nigeria, Senegal, Uganda, Tanzania and South Sudan. Licensing round activity was set to start from 2020 to 2021 in these countries, where most of the frontier acreage is located offshore. However, several upstream licensing rounds for 2020 have been cancelled or delayed due to oil price volatility and the prolonged oil price plunge.

Mergers and acquisitions (M&A) trends 2019/2020

Due to falling demand during COVID-19 and prolonged low oil prices, global M&A activity has seen a steep decline in 2020 with an 88% decline by value and 40% decline by number when compared to 2019.

The upstream sector accounted for the bulk of African M&A in 2019. There were a total of 22 M&A deals in 2019 with the more notable deals including Total and ExxonMobil. Total SA acquired Tullow Oil's Ugandan assets in a US\$575m deal in April 2020 and ExxonMobil signed a memorandum of understanding with Algerian state-owned oil group Sonatrach to enter exploration opportunities in Algeria. Mozambique's natural gas was the most active focus area by number of deals.

Figure 4: African upstream M&A activity, 2015 – September 2020

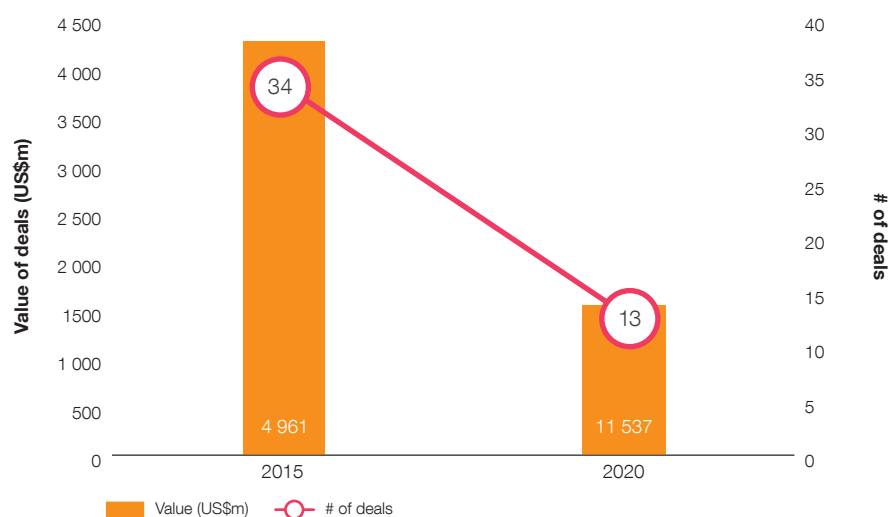


Notes: Information based on deal announcement dates and includes deals for which no transaction value has been disclosed.

Number of deals — end of 2019 (December 2019)

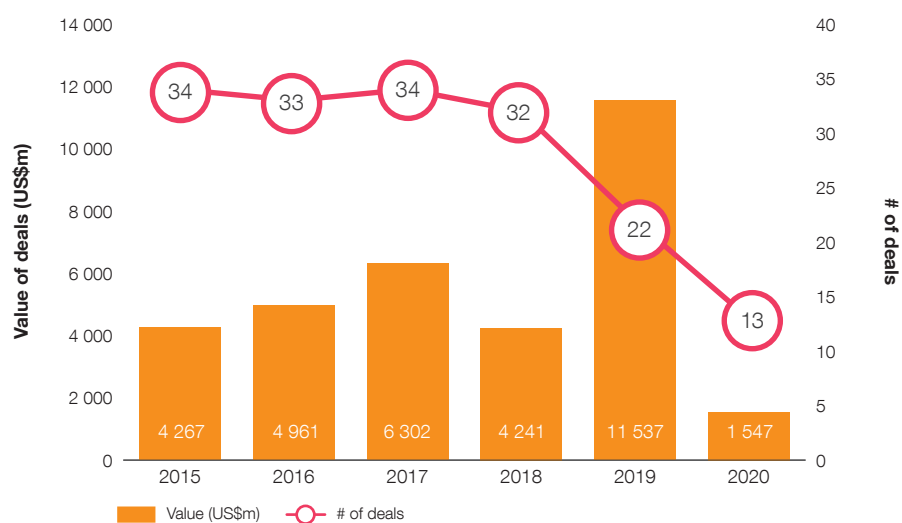
Source: Acuris, Capital IQ and Merger Market, PwC Analysis

Figure 5: African upstream M&A activity, 2015 vs September 2020



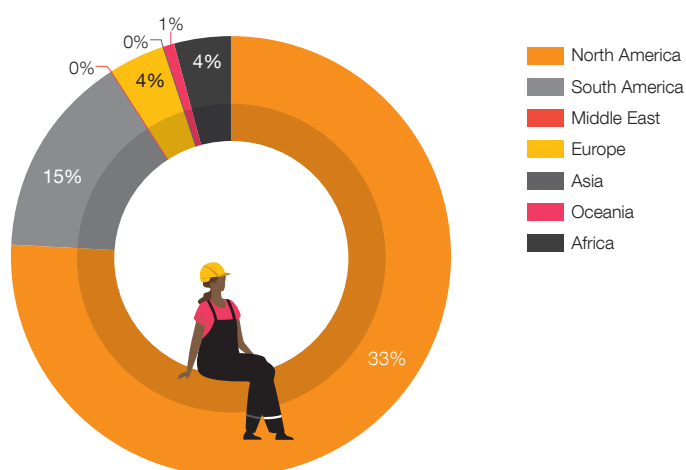
Note: Information based on deal announcement dates and includes deals for which no transaction value has been disclosed

Source: Acuris, Capital IQ and Merger Market, PwC analysis

Figure 6: African M&A activity across the value chain, 2018–2020

Note: 2020 activity to September

Source: Acuris, Capital IQ and Merger Market, PwC analysis

Figure 7: Africa's share of global upstream M&A deals (by value), 2020

Note: 2020 activity to September

Source: IHS Connect, PwC analysis

Top African oil and gas discoveries in 2019

The largest discovery was made offshore of Mauritania by BP. The resource is estimated to hold 1.3bn BOE. This discovery was the second largest global discovery in 2019, trailing behind Russia with 1.5bn BOE. The number of discoveries in Africa has remained steady from 2019 to 2020. Most major discoveries in 2019 were located offshore with more than half being deepwater discoveries.

Total's Brulpadda condensate discovery in the Mossel Bay deepwater offshore area in South Africa was the only African discovery in the 2018 global top ten. Total recently made a second discovery following Brulpadda, the Luiperd well encountered 73 metres of net gas condensate pay in well-developed good quality reservoirs after drilling to a total depth of about 3,400 metres. The Luiperd prospect is located to the east of the Brulpadda find in the same exploration block 11B/12B. Total has indicated that the discovery and the successful seismic acquisitions will help to progress development studies and engagement with South African authorities regarding the possible conditions of the gas commercialisation.

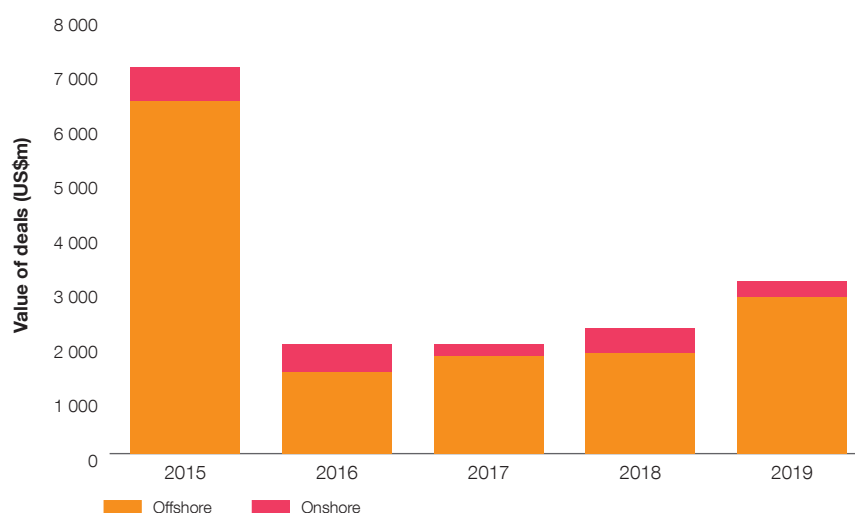
Top African oil and gas discoveries in 2019

Asset	Country	Region	Operator	Principal resource	Location	Estimated resources (mmbbl)
Orca MR	Mauritania	West Africa	BP	Gas	Offshore	1,323.85
Brulpadda ZA	South Africa	South Africa	Total	Sum	Offshore	562.46
Afina GH	Ghana	West Africa	Springfield E&P	Gas	Offshore	291.89
Agogo AO	Angola	West Africa	Eni	Liquids	Offshore	244.12
Obiafu 41 NG	Nigeria	West Africa	Eni	Gas	Onshore	95.29
GNN EG	Egypt	North Africa	PetroGulf Misr	Gas	Onshore	89.86
Agidigbo AO	Angola	West Africa	ENI	Liquids	Offshore	87.35
GNN EG	Egypt	North Africa	PetroGulf Misr	Liquids	Onshore	80.76
Agogo (EPF Phase 1 & 2) AO	Angola	West Africa	Eni	Liquids	Offshore	73.36
Akoma GH	Ghana	West Africa	Eni	Gas	Offshore	71.72

Source: Rystad Energy, PwC analysis

African discoveries by type, 2015–2019

Figure 8: Offshore vs onshore discoveries (mmbbl)



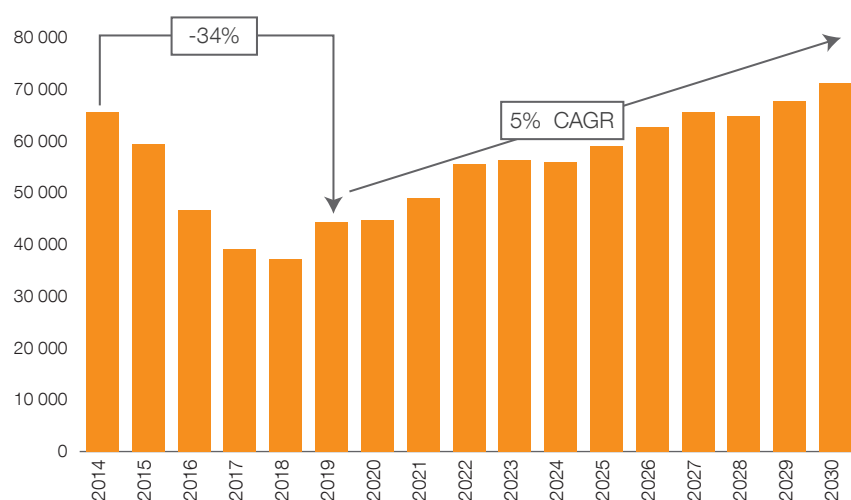
Source: Rystad Energy, PwC analysis

Capex spending

Due to the oil price crash between 2014 and 2016, Africa has seen a significant decline in capital expenditure (capex) on production, totalling 43% for the period 2014 to 2018. Africa's oil and gas sector saw a positive recovery in 2019, attracting investment for exploration, largely in offshore reserves.

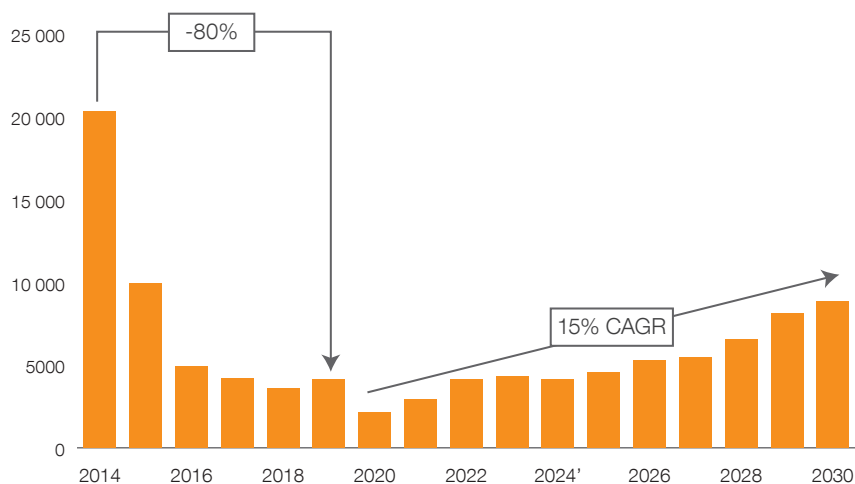
The initial 2020 outlook for capex spending prior to COVID-19 was optimistic, but the market has since realised a reduction in capex spend in 2020 as markets tumbled below the estimate break-even crude oil price of US\$45/ bbl. Reduction in capex spend has been evident through key projects being deferred by 1–3 years in past few months.

Figure 9: Africa oil and gas capex, 2014–2030 (US\$m)



Source: Rystad Energy. PwC analysis

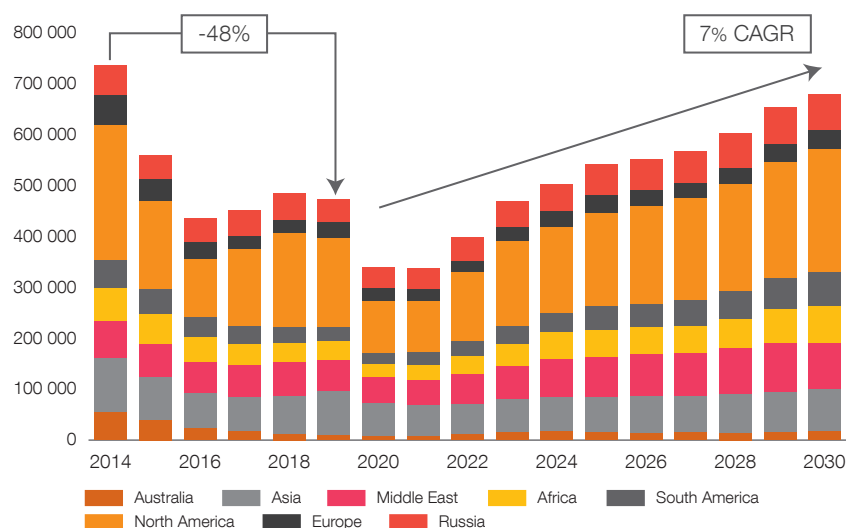
Figure 10: Africa exploration capex, 2014–2030 (US\$m)



Note: The impact of Covid-19 induced volatility on the oil and gas sector continues to remain uncertain and with this the potential for pricing and demand forecast changes

Source: Rystad Energy. PwC analysis



Figure 11: Global oil and gas capex, 2014–2030 (US\$m)

Source: Rystad Energy. PwC analysis

Upstream sector investment seemed to be recovering in 2019 with many companies moving into deeper waters and unconvensionals until 2020. However, since the onset of the pandemic, approximately 55 companies globally have announced cuts to their 2020 capital spending programmes, while 15 announced they will provide revisions to their 2020 spending plans soon.

In total, the reported cuts represent an approximately 25% decline in aggregate capital spending across the industry and are heavily weighted to oil production activity. Upstream spending is the lowest since 2006 with many IOCs and even national oil companies (NOCs) reassessing their budgets and capital allocation over the near and long term. Even with the oil price over US\$40/bbl, many companies are still implementing cost-cutting measures.

The current optimistic capex forecast is highly dependent on COVID-19's aftermath to completely settle for companies to determine whether or not it's pragmatic to increase capex spend.

COVID-19's impact on oil and gas

Notwithstanding the various headwinds faced by the African oil and gas sector in recent years, the industry had been on a path to a moderate recovery in the decade ahead.

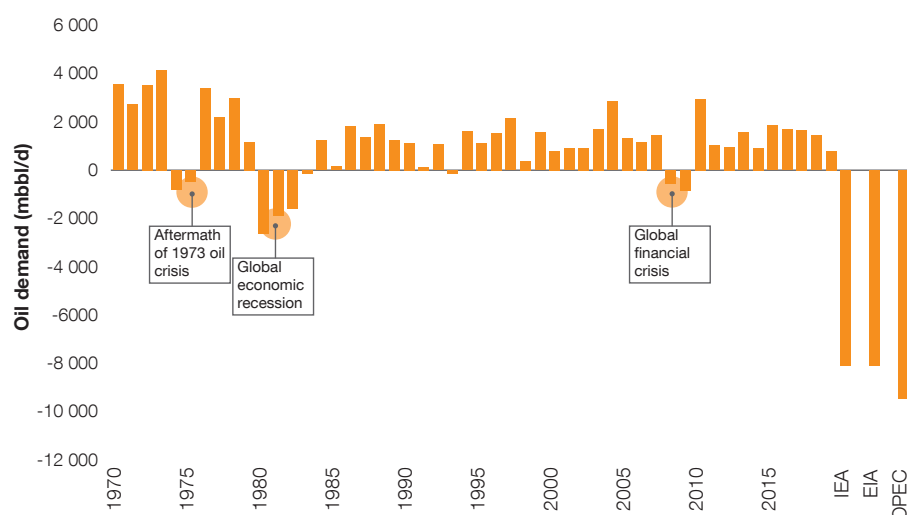
The onset of the global COVID-19 pandemic has however dealt Africa's oil and gas industry a significant blow, eroding most recent gains and short-term upside.

The global demand slump has forced significant production cuts with 2020 production projected to be down 19% for the top five African oil producing countries. As highlighted above, the lower projected price and global liquidity challenges for IOCs has also resulted in a massive contraction in investment activity and delays in project development. Adding to these industry challenges, Governments have faced further fiscal pressure as budgets have been diverted to healthcare and welfare as suggested by the UN Framework for COVID-19 responses.

The net impact has significantly increased the fiscal and economic distress in African oil and gas producing countries (African countries highly dependent on tourism have faced similar if not greater levels of distress).

As the COVID-19 pandemic spread rapidly across the globe in early 2020, the resulting national economic lockdowns precipitated a major collapse in demand for oil and related products, resulting in an unprecedented level of market disruption. At an estimated peak demand reduction of 25 mmbbl/d, the impact of the pandemic has dwarfed the 2007 Global Financial Crisis demand reduction of circa 1.4 mmbbl/d. According to several agencies 2020 average global demand slowdown is estimated at 7–9 mmbbl/d (approximately equal to the entire Africa production).

Figure 13: Global oil demand growth, 1970–e2020 (year-on-year)



Note: 1970–2018 is data from BP Statistical Review of World energy. 2019 based on IEA April 2020 Oil Market Report

Source: BP Statistical Review of World Energy 2019, IEA Oil Market Report, EIA, OPEC, PwC Strategy& research

When considering the impact on price, stable oil price projections in 2019 ranged between US\$60 and US\$70/bbl with longer-term peaks above US\$80/bbl, but as the COVID-19 related demand collapse unfolded and cooperation between Saudi Arabia and Russia on production levels failed, average prices quickly fell to US\$30/bbl in March, and dipped below US\$20/bbl in April 2020, the lowest price for Brent since the aftermath of 9/11 in 2001.

The level of volatility was best demonstrated by the West Texas Intermediate (WTI) oil futures contracts for May 2020, which entered negative territory. This was a historic first in the oil market as contracts dropped to US\$37/bbl, effectively meaning sellers had to pay their buyers as a result of shortfalls on global storage and ability to accept contract delivery.

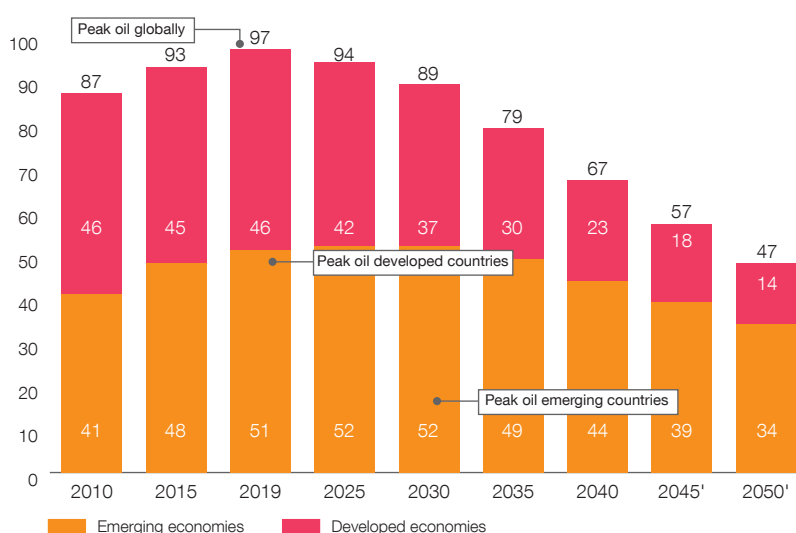
Although the price has since recovered to above US\$43/bbl, the stability of this price level remains in question with further weakening of future market fundamentals projected. Amid concerns of a second wave of pandemic-related lockdowns, the price was again below US\$40/bbl at the time of writing.

Despite the market recovery as national lockdowns eased, COVID-19 has created a significant inflection point in long-term global markets, leaving many governments and IOCs having to review their budgets and strategic market positions.

Long-lasting pandemic-induced behavioural changes, especially the impact of virtual working and travel restrictions, will permanently lower future demand. Because of this decline in transport, which traditionally accounted for nearly two-thirds of global oil demand, combined with accelerating electric vehicle penetration, it is estimated the world will never demand more oil than it did in 2019.

With global peak oil demand therefore behind us, it is clear that COVID-19 has accelerated the global energy transition by as much as five years. It is important to note, however, that there are significant differences in how this will play out in developed vs developing economies. While developed countries are moving quickly to accelerate the energy transition as an economic and investment stimulus, developing countries, specifically those in Africa, cannot afford to and largely lack the supporting infrastructure and domestic market skills to follow this trend. For this reason, peak oil demand in developing countries is only projected to be reached towards the end of this decade.

Figure 14: Decoupling demand for oil between developed and developing economies (mmbbl)



Source : BP World Energy Statistical Review 2020

This permanent and sudden long-term market shift has also significantly impacted international oil and gas companies with announcements of large losses, divestments, downscaling and lay-offs in a bid to remain sustainable and relevant.

Many of the major IOCs in Africa have written off / impaired some of their assets this year based on anticipated oil prices and assets they believe to be stranded. Chevron, BP, Shell, Total, Equinor, ExxonMobil and Eni have all announced asset write-downs, estimating US\$87bn of reserves that are now considered uneconomical for production (Shell and BP posted the highest write-downs at US\$22bn and US\$17.5bn respectively). Again, amplifying the scale of the market impact, ExxonMobil has fallen out of the Dow Jones Industrial Average for the first time in 92 years.

Other examples of how IOCs are shifting long-term focus are:

- Total's clean energy strategy aims to transform the company into a broad energy company by profitably growing energy production from LNG and power generation through renewables (Total estimates that oil product sales will decrease by 30% over the next decade). The company, like many others, is striving to reinvent itself as an energy company and be one of the companies that survives and flourishes.²
- ExxonMobil's relatively high debt-to-equity ratio and an estimated shortfall of US\$48bn has seen the company putting its global expansion on hold, sacrificing or stretching times lines for certain projects and reducing staff to cut costs.³

The impact of COVID-19 on gas has been less severe than oil, but it is still forecast that global demand for gas will drop by 4% in 2020 due to the economic slowdown experienced. Natural gas prices have seen a decrease over the year with the fall in demand taking effect in an already oversupplied market. Most global markets experienced reduced short-term industrial and gas-to-power demand due to the shutdowns brought on by the pandemic but buyers remain confident in medium- and long-term demand.

² "Getting to net zero by 2020," Total. Accessed 20 October 2020. <https://www.total.com/sites/g/files/nytnzq111/files/documents/2020-10/total-climate-report-2020.pdf>.

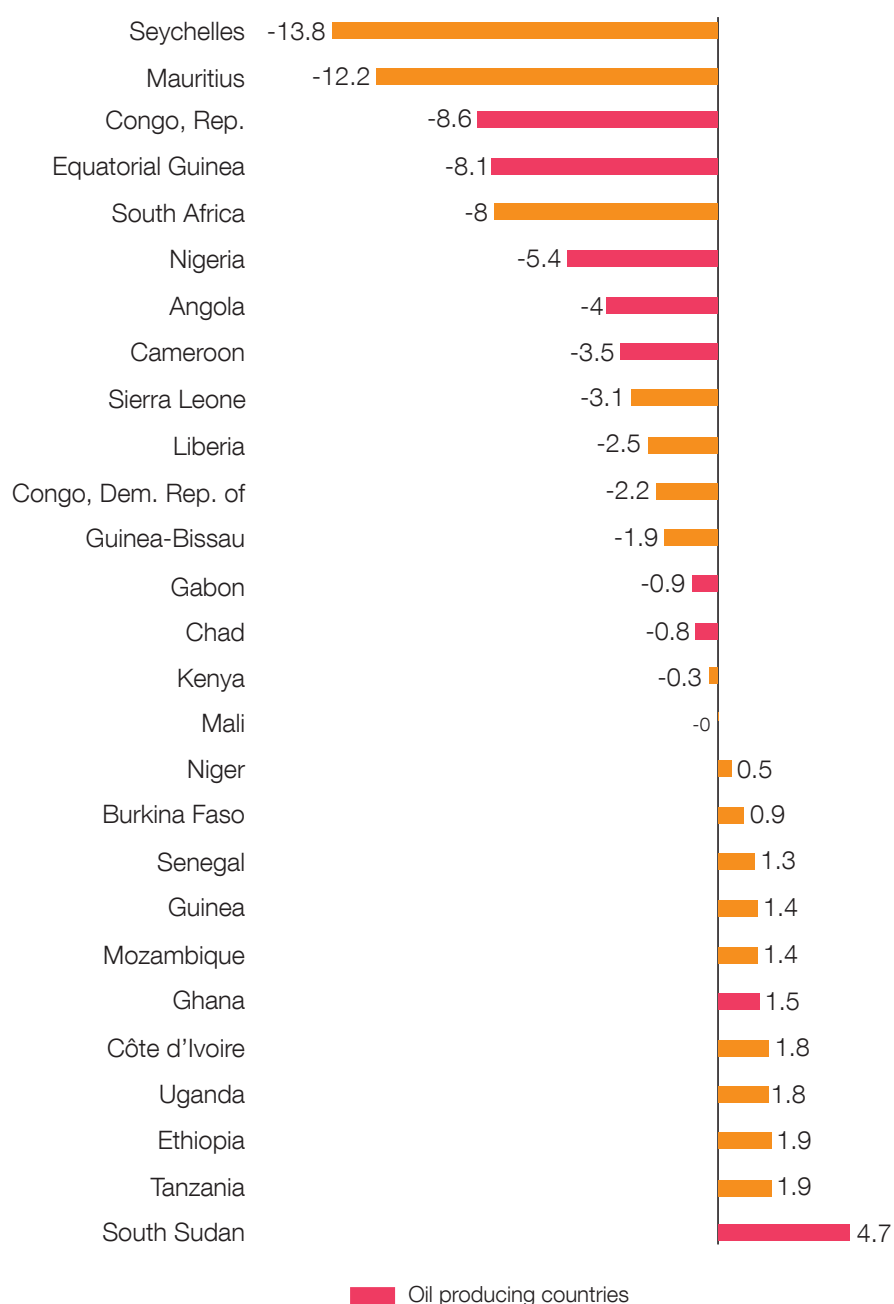
³ Jennifer Hiller, "EXCLUSIVE-Exxon Downsizes Global Empire As Wall Street Worries About Dividend," U.S., last modified September 8, 2020, <https://www.reuters.com/article/exxon-mobil-spending-idAFL1N2F62OQ>.



This more positive outlook for natural gas, which is often termed the renewable bridging fuel due to its lower carbon footprint, will see stronger price and demand recovery as countries move to rebuild their economies. Global peak demand for gas is projected to be in the mid-2030s, giving countries like Mozambique a significantly more buoyant outlook.

Reflecting on the broader impact of COVID-19 in Africa, most African countries enforced lockdown measures, dramatically affecting economic activity and their fiscal positions. These measures have had catastrophic effects on some of Africa's leading economies. With growth revised down for 37 countries out of 45 in sub-Saharan Africa and a regional GDP contraction of ~ US\$243bn in nominal terms, the IMF projects sub-Saharan Africa's economic growth will contract on average by 3.2% for 2020. Figure 15 shows the International Monetary Fund (IMF) revised GDP growth projections for sub-Saharan countries.

Figure 15: Projected GDP growth for 2020 (%)

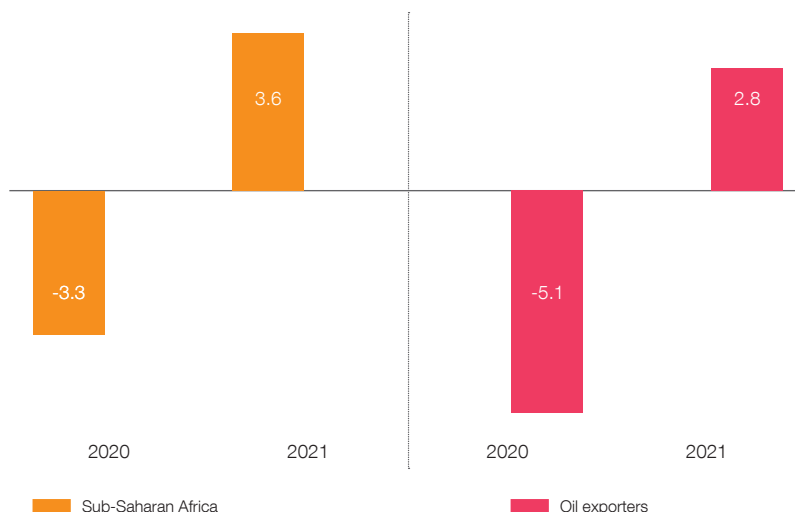


Source: IMF revised projections, Rystad Energy, PwC analysis



Those economies worst affected by the pandemic also tend to be those that are dependent on oil exports, commodities and tourism. Although the largest downward revisions are for tourism-dependent economies such as Comoros and Mauritius (on average nearly five percentage points), with economic growth and oil demand correlated. Oil exporters are projected to see GDP growth two percentage points lower than the average for sub-Saharan Africa, amounting to an expected 5.1 percentage point contraction in 2020.

Figure 16: Projected real GDP growth in sub-Saharan Africa, 2020–21 (%)



Source: IMF

GDP growth in sub-Saharan Africa is projected to recover gradually assuming that the pandemic abates and global trade resumes as lockdowns ease. Regional growth is projected to be 3.4% in 2021. This recovery is shallower than that expected globally as the economic stimulus packages deployed by sub-Saharan African countries are considerably smaller than those implemented by developed economies.

Growth for oil exporting countries will also remain lower on average at 2.8% in 2021. In the largest oil exporting economies (Nigeria and Angola), the IMF expects real GDP growth to return to pre-crisis levels only by 2023 or 2024.

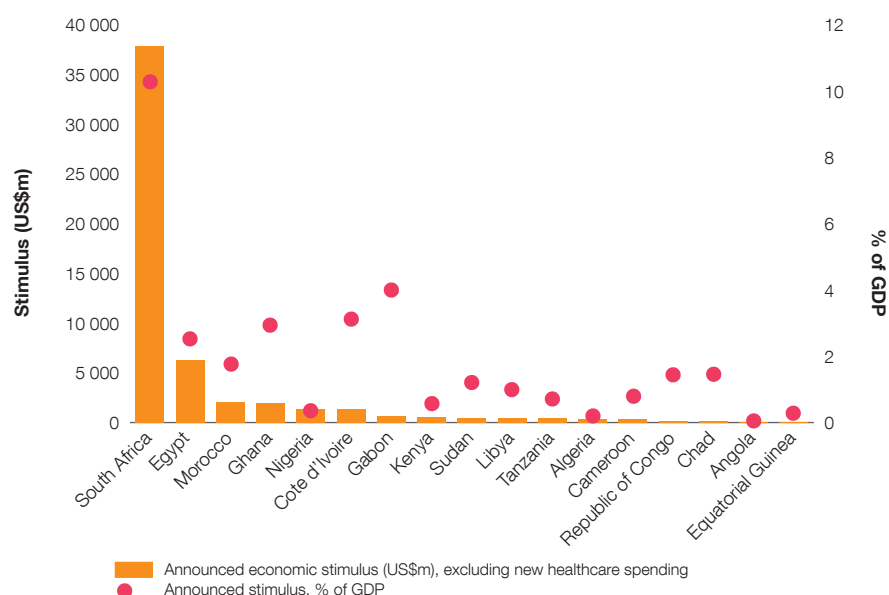
In Nigeria, the economic contraction is projected to deepen to 5.4% in 2020 as the country has been hit hard by plummeting oil prices, lower oil production quota and declining activity. Growth is projected to recover to 2.6% in 2021 with recovery of oil prices and production.

In Angola, activity is projected to continue to fall for a fifth year with GDP growth contracting by 4% in 2020, reflecting declines in oil production and prices, tightening credit conditions and declining domestic business activity. Growth is projected to recover to 2.6% in 2021 with recovery of oil prices and production, but according to the Angolan National Petroleum and Gas Agency (ANPG), significant capital loans are required in order to boost reserves by 40–57 Bbo of crude in order to maintain production levels above 1.0 mmb/d.

Like most of the world, African countries' responses to COVID-19 comprised of national lockdown measures and stimulus packages.

Similar to most countries around the world, African countries have aligned with the UN COVID-19 response framework supporting immediate socio-economic response through healthcare and welfare for citizens.

Figure 17: Stimulus packages announced in Africa



Source: MILKEN Institute COVID-19 Africa Watch Policy Tracker

Figure 17 outlines announced stimulus figures converted to US dollars and as a percentage of GDP. Of the 17 countries analysed and which deployed stimulus packages, ~82% responded with corporate tax deferrals and exemptions, ~72% announced healthcare spending to respond to COVID-19 and additional corporate support (including guarantees, subsidies, etc) and ~67% announced cash transfers to citizens (including unemployment benefits).

Already with fragile energy infrastructure and a high level of energy poverty in Africa, governments must pay particular attention to the implications of COVID-19's impact on the energy sector. The need to advance energy access and rebuilding economic activity through industrialisation are more critical than ever.

Unlike in the developed world, however, African countries largely lack the fiscal reserves and domestic market resilience to go beyond the immediate fiscal response to stimulate economic activity through policy and investment in areas such as infrastructure development and green energy transition.

By contrast, the developed world, which has the fiscal reserves and market capability, is using the energy transition as a key driver of economic stimulus. Accelerating policy shifts towards greening economies and early run-out of fossil fuels is being coupled with very large investment stimulus for greening technologies and implementation. The unintended consequence of this, however, is that it is accelerating the decline of the global oil and gas markets on which so many African countries depend.

The majority of stimulus packages deployed in developing countries are significantly smaller than those of developed countries and are structured to prioritise population health and economic stabilisation with very little capacity for economic and investment stimulus in infrastructure or energy.

As developed economies accelerate greening policy and investment, this further accelerates the global transition away from oil and gas, driving global demand down and negatively impacting exporting volumes for African economies.

Oil producers in Africa have been hit hard by a major drop in export revenues, dampened economic activity as a result of lockdown measures, severely impacted fiscal reserves and overall lower growth prospects, thus setting some of the largest economies on the continent back by up five years just to recover to pre-COVID-19 levels of GDP.

It is clear that from a long-term energy markets perspective, African economies need to reconsider their reliance on fossil fuel exports and will have to develop their renewable energy and green economy strategies.



Market review and impact for Africa

How will oil and gas prices respond in a changing global economy?

As we enter a new era of structurally lower oil prices and declining demand for fossil fuels, African countries that have for decades depended on their NOCs as a key source of government revenue are having to rebalance budgets and reassess economic growth models.

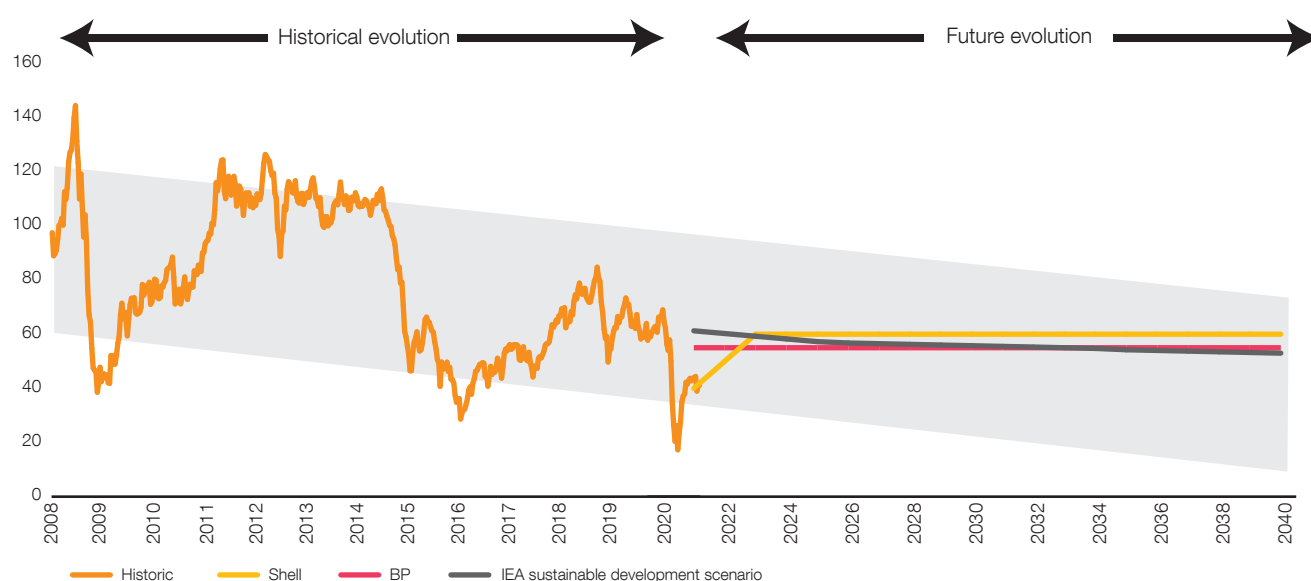
As outlined earlier, the developed world is able to invest and benefit from diversifying their economies through accelerated renewable energy programmes. Africa is, however, at risk of being left behind.

As the global energy transition gains momentum, we anticipate that certain African countries will be more economically resilient, while others will be severely impacted. In this section, we reflect on those oil and gas producing countries at greatest and lowest risk of experiencing increased financial distress due to the global energy transition.

Brent oil price and demand

Forecast oil demand globally shows a curbed recovery over the next few years following the COVID-19 induced demand slump, with prices predicted to reach a ceiling of around US\$54/ bbl (compared to a pre-COVID view of long-term pricing ranging between US\$60–US\$70 bbl). It is estimated that this lower price forecast will cost Africa a potential US\$1tn in export revenues from oil over the next 20 years.

Figure 19: Brent Crude: Historic prices and outlook (US\$/bbl)



Source: Bloomberg, IEA, Shell, BP, PwC Analysis

As discussed in the previous chapter, although 2019 is now considered as global peak oil demand, developing economies will lag this and are expected to continue to grow demand until the latter end of this decade, before also reaching a peak and experiencing a slower decline or energy transition, initially as low as ~2% per annum. This higher domestic demand may be a valuable market opportunity for Africa to offset the broader decline in global demand.

To identify which African economies are most at risk (or less resilient) due to declining demand and global energy transition, we analysed the cost build-up of production against the long-term market pricing thresholds.

Impact on foreign earnings

Country	Production (thousand bbl/d)	Pre-COVID-19 budget benchmark price (US\$/bbl)	2020 average price (US\$40/bbl)	Foreign revenue loss (US\$bn)	2020 GDP (US\$bn)	Loss as % of GDP
Algeria	1 486	60	40	4.34	140.00	3.10%
Angola	1 417	55	40	7.37	70.00	10.53%
Chad	127	72	40	1.34	10.00	13.35%
Republic of Congo	339	55	40	1.67	10.82	15.44%
Egypt	686	68	40	2.31	220.00	1.05%
Equatorial Guinea	180	51	40	0.58	9.00	6.42%
Gabon	218	50	40	0.72	13.00	5.51%
Libya	1 227	50	40	4.03	45.00	8.96%
Nigeria	2 109	57	40	12.82	250.00	5.13%
South Sudan	139	50	40	0.51	3.40	14.92%
Sudan	102	50	40	–	9.70	0.00%
Ghana	200	63	40	0.94	50.00	1.88%
Côte d'Ivoire	33	50*	40	0.36	48.00	0.08%

Note: Budget benchmark prices for Gabon, Libya, South Sudan, Sudan and Côte d'Ivoire not available and assumed at a conservative benchmark of US\$50/bbl.

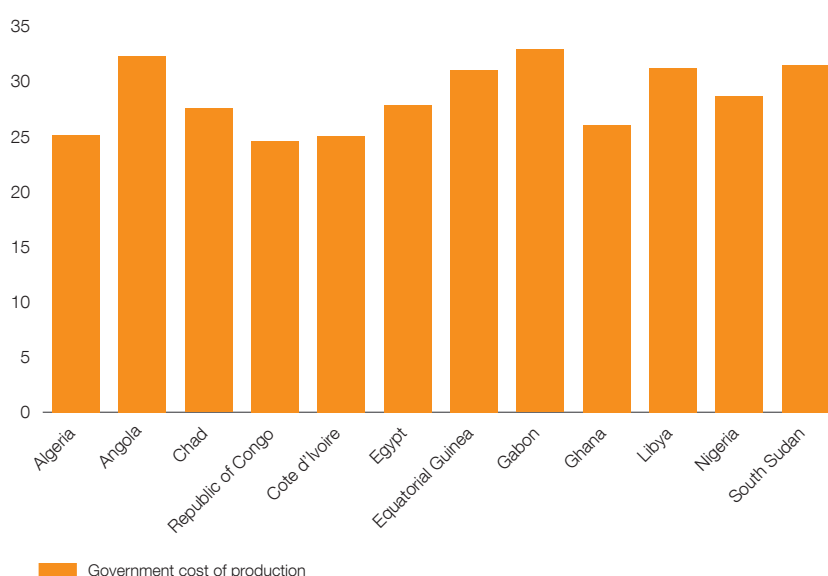
Source: IEA, PwC analysis



Examples of how the COVID-19 demand shock has impacted African producers:

- The Republic of Congo, already under severe fiscal stress and having received IMF loans, was hit hardest by the pandemic with a 15.4% decline in GDP due to the country's high dependence on oil export revenues.
- South Sudan, another oil-dependent economy, saw close to 15% in GDP loss and has been unable to pay oil-related logistics costs owed to neighbouring Sudan.
- Chad experienced significant losses as well as fiscal budget downgrade due to required restatement of the now overestimated budget benchmark price of US\$72/bbl being used.
- Angola and Libya, two of Africa's largest oil exporters, saw losses in GDP of 10.53% and 8.96% respectively.
- All of the countries listed here, barring Chad, are OPEC members, which implies agreed voluntary reductions in daily oil production outputs as part of the Declaration of Cooperation agreement in order to help curb the global oversupply.⁴

Figure 20: African oil production cost price points (US\$/bbl)



Note: The difference between the government cost of production and the ruling market price is the available incentive for IOC production and investment

Source: Rystad Energy, PwC analysis

In addition to lower production, 92% of African oil producers have been estimated to have production costs above the average market rates during the pandemic. These oil producers traditionally bank sizeable government off-takes per barrel (top five exporters all have government takes above 40% of cost, reaching as high as 57%) and have further been exposed with overstated budget benchmark prices.

The full demand impact of the pandemic and the market recovery still remains uncertain and countries most at risk will need to revise government takes and budget benchmark prices going forward.

The following countries are regarded as higher risk: Libya, Angola, Gabon, Equatorial Guinea and South Sudan. All have oil production costs above US\$30/ bbl and government take of a further 33–55% of cost, thus pushing them closer to the projected price threshold estimated at US\$54/bbl.

African NOCs in particular will need to recapitalise to survive as a number of them are already in financial distress.

⁴ Libya was exempt from a reduction in the most recent Declaration of Cooperation

International gas pricing

Forecast natural gas demand in Africa shows a gradual increase over the next 20 years with global peak gas only expected towards 2035–2040.

Up until 2008 oil and natural gas prices moved in tandem due to linkages on supply and demand sides, but have since largely decoupled. There are three main natural gas prices that are most relevant to African producers and exporters, including the Northeast Asia Spot LNG (NEA Spot LNG), Title Transfer Facility (TTF) and Henry Hub prices.

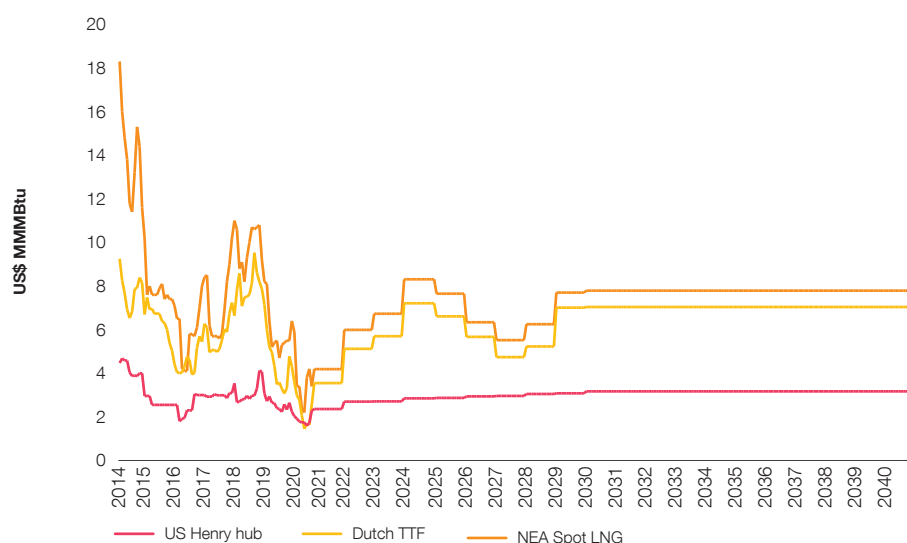
The NEA Spot LNG price remains most attractive in the long run, but this price includes the liquefaction, regasification, intermediary and transport costs. A significant influence on this price curve will be developments in Asian countries and their approach to an accelerated energy transition and decarbonising their economies. The likes of Japan, South Korea, India and China, have all recently made strong commitments towards decarbonisation, with China most recently announcing a commitment to be carbon neutral by 2060.

European markets have largely been oversupplied for the past two years and are using natural gas in local energy switching agendas as the region moves away from coal (eight European countries now claim to be 'coal free'). The future of the TTF price will also largely be dependent on the ambition and speed of European markets moving to renewables and the introduction of new technologies such as hydrogen, which is receiving strong support and funding from the EU.

The Henry Hub price is an often-quoted spot price for natural gas that is very specific to the North American gas market, but used internationally as a benchmark due to large trading volumes, transparency and high liquidity.

Forecast gas prices show strong recovery over the coming years, but with volatility remaining a concern. NEA Spot LNG and TTF prices show greater volatility before rebalancing again with long-term prices at US\$7.80 and US\$7.05/MMBtu respectively. The Henry Hub long-term price is predicted to increase to US\$3.45/MMBtu in 2040. The increase in these prices will contribute to a potential US\$215bn in additional export revenues for Africa over the next 20 years when compared to pre-COVID-19 prices. These gains, however, will not offset the immense loss in oil revenues forecast for Africa.



Figure 21: International natural gas prices (US\$/MMBtu)

Source: Bloomberg, Rystad Energy, PwC analysis

To determine the impact of lower gas prices on the GDP of African producers as a result of COVID-19, we compared pre-COVID and recovery prices with exports to specific regions.

Impact on foreign earnings

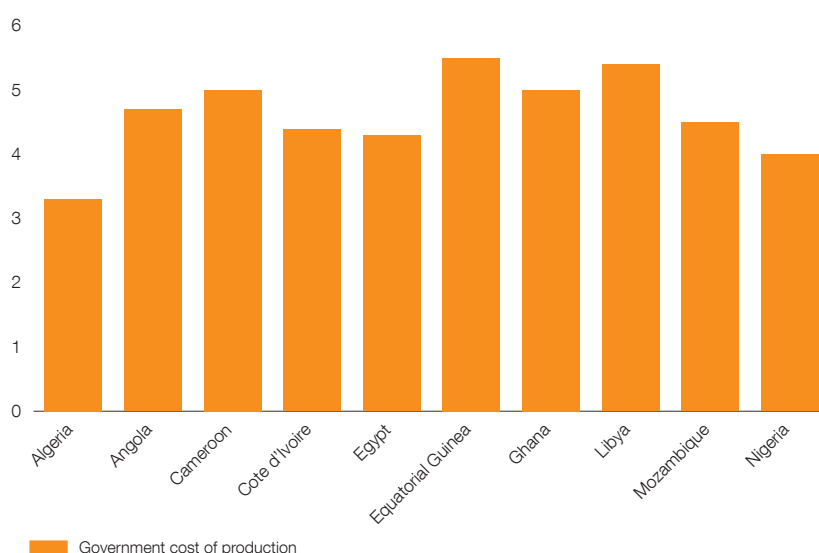
	Production (annual bcm)	Exports	Exports %	Main destination	Foreign revenue loss (US\$bn)	2020 GDP (US\$bn)	Loss as % of GDP
Algeria	86.2	45.6	52.9%	Europe	2.28	140.00	1.63%
Angola	5.6	4.8	86.1%	Asia	0.19	70.00	0.27%
Egypt	64.9	1.9	2.9%	Europe and Asia	0.09	220.00	0.04%
Equatorial Guinea	7.0	5.0	71.0%	Asia	0.19	9.00	2.18%
Libya	9.4	4.1	43.4%	Europe	0.20	45.00	0.45%
Nigeria	49.3	24.8	50.3%	Europe and Asia	1.11	250.00	0.44%
Cameroon	1.5	0.7	50.3%	Asia	0.03	34.00	0.09%
Mozambique	6.0	4.9	81.0%	South Africa	-*	11.50	0.00%

*Long-term sales agreements between Mozambique and South Africa see no foreign revenue loss for Mozambique
Source: IEA, PwC analysis

Algeria is projecting recovery of up to 58% of the projected shortfall in oil revenues through improved gas exports

Only Equatorial Guinea and Algeria saw notable losses as a percentage of GDP at 2.18% and 1.63% respectively. Algeria is the largest African gas exporter, with most African producers using natural gas for local economic development, largely power generation.

Figure 22: Natural gas production costs (US\$/MMBtu)



Source: Rystad Energy, PwC analysis

The more robust market outlook for natural gas is good news for African producers in general. Algeria, Nigeria and Libya, which are more reliant on the European market, may likely see an earlier decline in demand than say Egypt, Angola and Nigeria (to a lesser extent) and Mozambique (production scheduled to start in 2023 from Coral FLNG unit), which are more reliant on Asian markets and which should prove to be more resilient.

A large number of African exporters participate in both commodities. The significant decline in oil prices is not envisaged to be offset by the projected gas price recovery with Algeria projecting the most favourable outcome of being able to recover up to 58% of the projected shortfall in oil revenues through improved gas exports; Nigeria's offset is estimated at 10%, Angola's at 5.5%, Libya's at 2.3% and Egypt's at only 0.4%. This shows some economic upside, but African oil and gas exporters will still be net losers.

Countries' fiscal resilience to macro global oil and gas demand changes

African oil and gas producing countries must act quickly to consider their long-term market positions and potentially move to diversify their economies or risk even greater financial and economic stress. This is particularly important for oil exporters with a high degree of sector concentration. Even countries that are seen as highly resilient should still consider how to benefit from the green economy shift and the significant investment stimulus being mobilised by the developed world.

Based on our analysis of demand, production cost and general country exposure to oil and gas, we have defined an indicative level of resilience for oil and gas producing countries in Africa, which is set out in the table that follows.

Resilience of African oil and gas producing countries to global demand changes

Region	Countries	Oil	Oil	Gas	Gas	Cost of production	Dependence on oil and gas exporting revenue	Level of resilience to energy market disruption
		Exports above 100mbbl/d	Domestic market use	Exports	Domestic market use			
North Africa	Egypt	√	√	√	√	Low (oil) Moderate (gas)	Low	Higher resilience
East Africa	Kenya	x	x	x	x	N/a	No dependence	Higher resilience
North Africa	Morocco	x	x	x	x	N/a	No dependence	Higher resilience
West Africa	Senegal	x	x	√	x	High (oil) High (gas)	No dependence (oil / gas to commence 2022)	Higher resilience
Southern Africa	South Africa	Exploration	x	x	√	Low (oil)	Low	Higher resilience
North Africa	Algeria	√	√	√	√	Low (oil) Low (gas)	Moderate (dependence on oil partially offset by gas revenues)	Higher resilience
West Africa	Cameroon	x	x	√	√	High (gas)	Low	Higher resilience
West Africa	Côte d'Ivoire	√	x	x	√	Low (oil) Low (gas)	Low	Higher resilience
West Africa	Ghana	√	x	x	√	High (oil) Moderate (gas)	Moderate	Higher resilience
East Africa	Tanzania	x	x	x	x	N/a	No dependence	Higher resilience
East Africa	Uganda	x	x	x	x	N/a	No dependence	Higher resilience
Central Africa	Angola	√	√	√	√	Moderate (oil) Moderate (gas)	High	Lower resilience

Region	Countries	Oil Exports above 100mbbl/d	Oil Domestic market use	Gas Exports	Gas Domestic market use	Cost of production	Dependence on oil and gas exporting revenue	Level of resilience to energy market disruption
Southern Africa	Mozambique	x	x	√	√	High (gas)	High	Lower resilience
West Africa	Nigeria	√	√	√	√	Moderate (oil) High (gas)	High	Lower resilience
Central Africa	Chad	√	x	x	x	Low (oil)	High	Lower resilience
Southern Africa	Republic of Congo	√	x	x	√	Moderate (oil)	High	Lower resilience
Central Africa	Equatorial Guinea	√	√	√	√	High (oil) High (gas)	High	Lower resilience
Central Africa	Gabon	√	x	x	√	High (oil)	High	Lower resilience
North Africa	Libya	√	√	√	√	Low (oil) Low (gas)	High	Lower resilience
North Africa	South Sudan	√	x	x	x	Moderate (oil)	High	Lower resilience

Note: Table shows countries with oil exports in excess of 100 bbl/d
Source: PwC South Africa

Low resilience countries will experience greater negative impact from the energy transition and the move from fossil fuels, while high resilience countries will be better able to withstand these disruptions.

The degree of resilience referenced in our analysis is based on the following considerations:

- The percentage of oil exports as a percentage of overall country exports;
- Export country diversity — lower resilience if exports are destined for a small number of countries; and
- The degree to which the oil exports represent a high portion of the country's GDP and percentage of government revenue.

Role of energy policies in the changing energy sector

In the wake of the COVID-19 pandemic, governments around the world are grappling with how to stimulate an economic recovery.

Most developed economies are including a significant focus on the global energy transition and greening of their economies as a lever to drive investment and economic resurgence. This is being seen through an acceleration of policy disincentives on fossil fuels as well as fiscal stimulus of greening initiatives and acceleration of new technology such as green hydrogen. This accelerated global energy transition is, however, leaving Africa at higher risk due to the developed world's rapidly declining demand for oil exports from Africa.

It is important to emphasise that this demand inflection point is also creating a more pronounced split in demand, where unlike the developed world, developing economies are expected to continue increasing oil consumption for at least the rest of this decade and Africa is an example of this.

Although it is unlikely that Africa has the funding to match the pace of energy transition adopted by the developed world, the continent must carefully manage its inherently slower energy transition to ensure that benefits from renewable technologies and leveraging a growing global green energy market are not lost to African economies.

In the previous section we highlighted the fact that African countries have varying levels of resilience to the economic and market volatility associated with the energy transition and the COVID-19 pandemic. Countries with a lower resilience will likely experience increasing fiscal strain due to global changes in oil and gas demand. In parallel, these countries are also experiencing broader economic strain as a result of the pandemic.

Our analysis considers the intersection of these two drivers on the net economic resilience (impact of energy market shifts plus COVID-19 recovery) of oil and gas-based economies in Africa and asks where this leaves these countries in terms of their longer-term sustainability and growth prospects. Countries with a lower net economic resilience will need to act with greater urgency to find a means to compensate for the projected widening fiscal gap.



Adoption of the energy transition can provide a 'lifeline' in light of declining oil demand

While being the biggest global disruptor this decade, global evidence suggests that the energy transition does in fact create significant positive economic impact and opportunities, and Africa can benefit tremendously from the technology foundations and learning curves largely paid for by the developed world.

By considering the African energy policy environment one can infer as to whether countries are creating a dynamic or static policy environment in relation to capturing the benefits and economic growth that can be leveraged from the energy transition.

The world is rapidly investing in renewable energy technologies and implementation

European Union

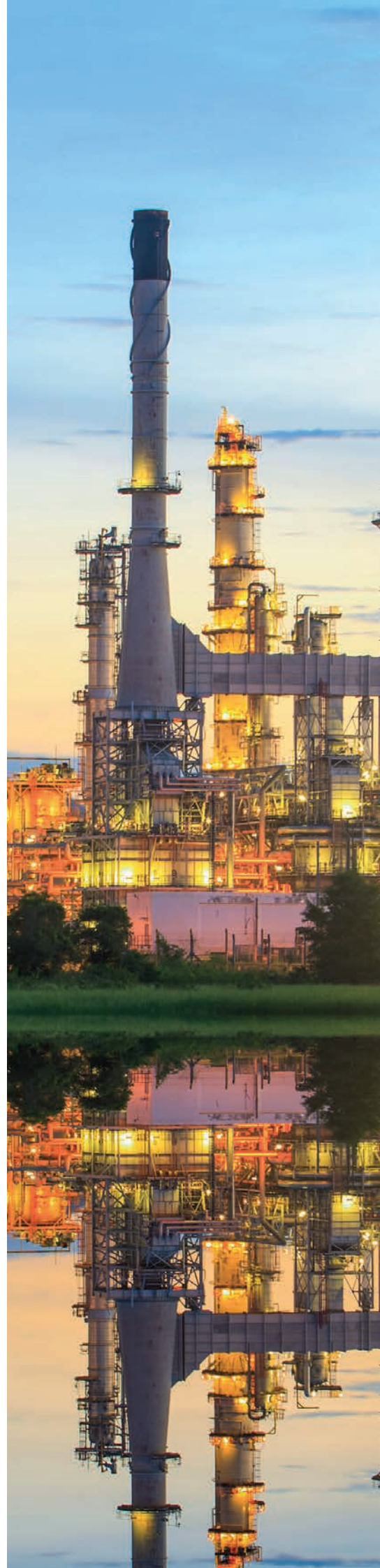
The United Kingdom (UK) and European Union (EU) are considered to be global leaders in green policies. The EU is working towards a bloc-wide 2050 net-zero-emissions target and an envisaged ban on sales of non-electric vehicles by 2030. The 'Clean energy for all Europeans' package, is aimed at keeping the EU a global leader in renewables. Bloomberg Green reported recently that European governments have announced the most ambitious climate change plan to date worth an estimated US\$572bn, including an estimated US\$10bn for development of a green hydrogen industry.

United Kingdom

The UK has a statutory 2050 target to reduce emissions by at least 80% from 1990 levels and an integrated energy and climate policy framework. Since 2016, it has streamlined its energy and climate policies towards efforts to strengthen the innovation, productivity, and competitiveness of the industry with the Clean Growth Strategy of 2017 providing government funding of GBP2.5bn for innovation and low-carbon investment up to 2021 as well as phasing out all remaining unabated coal-fired power generation by 2025.

China

China is currently the global leader in wind and solar energy implementation and BloombergNEF has predicted more electric vehicles (EVs) on the road in China than non-EVs by 2030. More notably, China recently announced its new climate strategy targeting an aggressive net zero by 2050 and being carbon neutral by 2060, with strong state support, legislation and financial muscle behind it.





United States (US)

Even the US, which has been pro-hydrocarbons and recently withdrew from the Paris Agreement, has plans in place to be carbon neutral by 2050. Climate Action Tracker statistics have noted that plans are in place to cut US emissions to net-zero by 2050 and ambitious power generation sector plans could see the sector carbon-free by 2035. The calculated costs for the US to be carbon neutral are forecast to be as low as 0.4% of its GDP, while the transition will also create many new industries and opportunities. Examples of more granular reforms are California's new building regulations requiring all new buildings to have solar installations and decommissioning of natural gas peaking plants in favour of storage across numerous states.

Following the US election of Joe Biden, it is expected that the US will rejoin the Paris Agreement. It is predicted there will be a roll out of US\$400bn investment stimulus in clean energy and the commitment to Net Zero by 2050.

India

India is actively seeking to diversify the country's energy mix by replacing coal with natural gas and to expand the use of gas both in urban households and as a vehicle fuel. India has set an ambitious goal of increasing the share of natural gas in the country's energy mix to 15% and reducing coal dependence. India also has ambitious plans to build renewable energy by auctioning more than 40GW of new renewable energy every year until 2030, by which time capacity would reach 450GW.

Renewable technology policies and implementation in Africa

Two international treaties set the policy context for the energy transition globally: the UN Sustainable Development Goals (SDGs) and the Paris Agreement. These treaties/goals have similarly been the foundation of energy transition policies in African countries.

The energy policy landscape across Africa varies considerably between countries with a high-level review of the 20 oil and gas producing countries showing the extent of the variance. Ultimately, the consensus is that renewable energy will continue to substitute the need for hydrocarbons. As export revenues and domestic demand change, energy transition readiness will be an important sustainability factor for many countries that have relied on their oil and gas endowments.

Methodology

Our energy policy review provides insights into a respective African country's readiness to take advantage of opportunities relating to the energy transition and greening initiatives by considering whether energy-related policies, regulatory and legal frameworks are more dynamic or static.

Countries we consider to have more dynamic energy policy environments are those in which

- policies are in place;
- policies are clear and relevant to changing conditions of certainty; and
- there has been some level of policy implementation.

Countries we consider to have more static policy environments are those:

- that lack adequate policies; or
- where policies are dated and have a lesser degree of clarity; or
- where there is little evidence of implementation.

Key policies, regulations and legislation, and implementation / targets achieved

	Paris Agreement (carbon emission targets)	Integrated power generation/renewable energy master plan	Energy transition policy framework/Integrated energy road map	Liquid fuel (oil/gas) master plan policy	Cleaner fuels policy	Carbon tax/policy pricing incentives	Electrification connectivity of people	Biofuel policy/ regulations	Carbon capture and storage/flaring	Other green/low carbon policies
Nigeria										
Implemented										
South Africa										
Implemented										
Angola										
Implemented										
Algeria										
Implemented										
Ghana										
Implemented										
Gabon										
Implemented										
Chad										
Implemented										
Egypt										
Implemented										
Equatorial Guinea										
Implemented										
Libya										
Implemented										
South Sudan										
Implemented										
Mozambique										
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Kenya										
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Uganda										
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Tanzania										
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Morocco										
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Senegal										
Implemented										
Cote d'Ivoire										
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Cameroon										
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Key

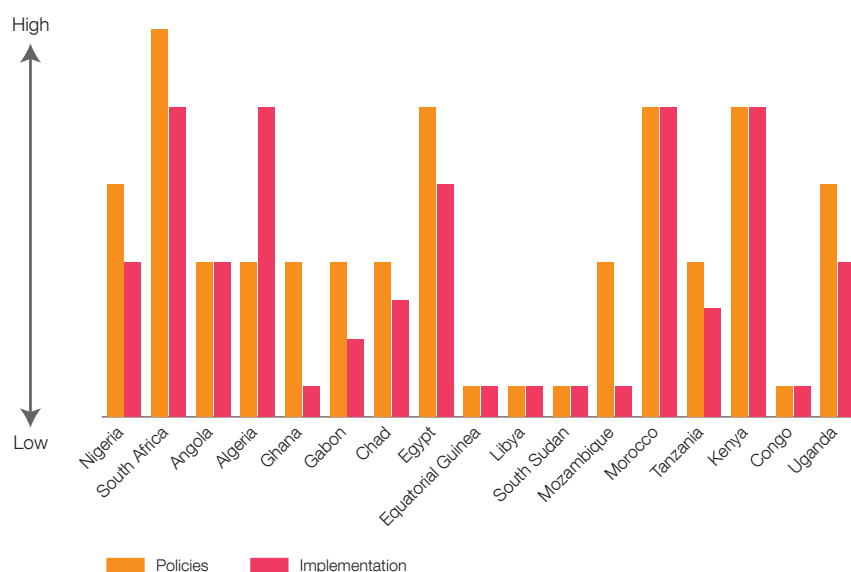
Status of policies, regulations and legislation		Status of policies, regulations and legislation implementation / targets achieved	
	Policies, regulations and legislation in place, but are dated and being updated		More than 75% implemented
	Policies, regulations and legislation in place, but are dated and being updated		Between 25% and 75% implemented
	Policies, regulations and legislation in place, none, not currently in place or clearly articulated		0% to 25% implementation

Source: PwC analysis

Our overriding observation about the policy environment in Africa is that countries largely have some form of basic energy transition policies, plans or strategies in place and that Africa has largely committed to the Paris Agreement and global decarbonisation agenda. What is also evident, however is a general lag in implementation, resulting in a slow uptake of renewable energy technologies and continued energy poverty across Africa.

Certain countries have set out ambitious integrated power generation targets and programmes for transitioning to lower-carbon energy/electricity networks, particularly through expansion of renewable energy. However, the level of detail and certainty differs greatly from country to country with some only having high-level targets, while others have detailed policies and implementation plans.

Figure 23: Progressiveness of energy transition policies in place and level of implementation



Note: Analysis completed considering i) the number of policies and regulations and whether strategies include an integrated energy plan encompassing power generation and other sectors in respect to cleaner energy, and ii) the level of implementation of renewable energy projects that have happened or are currently occurring.

Source: PwC analysis

Noteworthy examples

Despite years of policy indecision and a stalled renewable generation plan, South Africa has made strong progress in confirming its commitment to a dynamic energy policy environment and greening initiatives. Commitments to be carbon neutral by 2050 are underpinned by a legislated national renewable energy procurement programme with committed purchase of over 14.8GW of new-build renewable energy capacity and retiring an estimated 11GW of old coal power plants by 2030. Recent progressive policy statements also indicate an acceleration in market liberalisation through an independent system market operator and fast-tracking licensing of embedded generation as well tightening of fuel emissions specifications and introduction of carbon tax.

Examples such as Libya, Côte d'Ivoire and South Sudan appear not to have clear energy planning or policy, yet some progressive renewable development is taking place. In the absence of official policies and strategies, the policy environment is, however, considered static.

Mozambique has unique characteristics as, although it is primarily focused on new generation with gas-fired power, it has managed to deliver a very dynamic policy environment in relation to securing LNG export projects and mega investment from global players. Developing Mozambique's hydrocarbon resources has necessitated a greater degree of policy reform, speed and certainty.

Countries such as Angola, Algeria, Gabon, Egypt and Uganda have updated hydrocarbon legislation, regulations and decrees over the last three years in respect of local content, government revenue, transparency, fiscal measures and other reforms. However, these have been poorly aligned to an overall national energy strategy that includes energy transition.

Kenya, Algeria, Egypt, Morocco and South Africa have been the most proactive with progressive and clear policies, yet all remain short of their initial renewable energy installation targets.

Many oil and gas exporting countries, specifically Nigeria and Angola, focus heavily on policy associated with taxation and regulation of the oil and gas sectors, which has detracted from progressing renewable energy policy. With increasing risk of marginal and stranded oil and gas fields and resources, greater incentives for marginal exploration and production will be required, which will entail rethinking of many of the historical legislative approaches.

Characteristics of countries with progressive and successful energy policy environments

Countries considered to have strong, progressive and successful energy policy environments have several common characteristics — sustained political commitment, available funding, enabling policies or incentives, and strong institutions. Other key considerations are balancing the objective of the financial viability of supply with the need for consumer affordability. Integrated energy policies and strategies provide a holistic, all-encompassing plan for all sectors reliant on energy. Robust policy frameworks should therefore address a wide range of market issues from regulation to financing to business support and training. Monitoring and evaluation of the policy implementation are also key to their success.

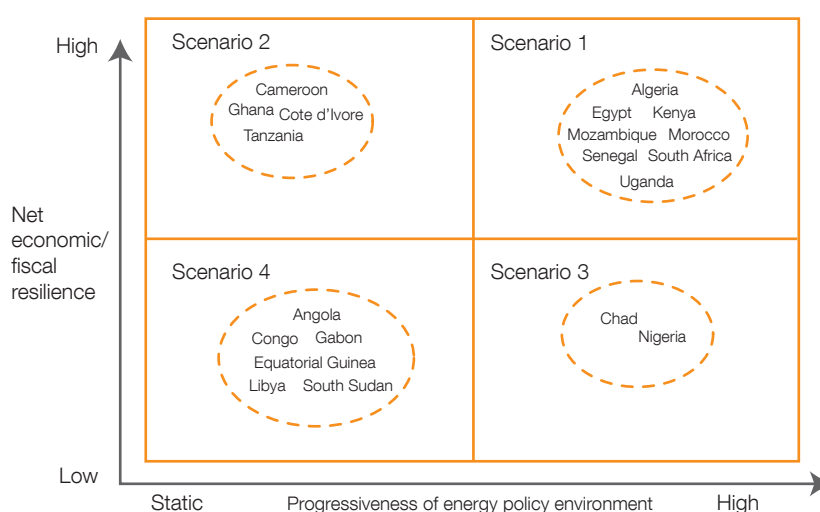
Examples of enabling policies to accelerate the use of new renewables include subsidy reforms such as the discontinuation of fossil fuel subsidies, introduction of carbon taxes, feed-in tariffs and tax rebates to increase market competition. For example, in Kenya, 700,000 home solar systems were installed on the pay-as-you go purchase model, which is a flexible payment plan that makes electricity accessible to more people.



Contrasting fiscal resilience and policy environment

The net economic resilience narrative combined with the respective static or dynamic energy policy environment gives us insight into the potential long-term energy-related risk and development we can expect for various countries. We have provided an indicative grouping of countries as outlined below to enable further discussion.

Figure 24: Categorisation of countries by fiscal resilience and policy environment



Source: PwC analysis

• Scenario 1

Indicative country clustering shows Egypt, Mozambique, Algeria, South Africa, Kenya, Senegal, Uganda and Morocco have potentially a greater degree of net economic resilience, which combined with a more dynamic energy policy environment positions them well to capitalise on benefits associated with the energy transition at a more accelerated pace.

• Scenario 2

Indicative country clustering shows Tanzania, Côte d'Ivoire, Cameroon and Ghana have potentially a greater degree of net economic resilience, but have a less progressive energy policy environment and tend to favour pursuing or accelerating existing oil and gas policy over a more progressive energy transition policy. While they have a greater degree of resilience, they need to be cognisant of the momentum of energy transition and need to consider how to enable the transition as longer-term oil and gas markets decline.



Access to affordable energy is a strong enabler of economic growth, specifically in industry, agriculture and transportation.

- **Scenario 3**

Indicative country clustering shows Nigeria and Chad have potentially a lower degree of net economic resilience, but still maintain progressive energy policy environment. Although Nigeria, the largest African economy, has high dependence on oil revenues, which creates higher risk, recent policy reform indicates a more progressive future. With their lower economic resilience, yet relatively dynamic energy policy environments, these countries can and should potentially be early adopters of energy transition in order to diversify and strengthen their economies.

- **Scenario 4**

Indicative country clustering shows Libya, Equatorial Guinea, South Sudan, Congo, Angola and Gabon have potentially a lower degree of net economic resilience as well as being assessed to having a more static energy policy environment. Without action to embrace reform, these countries face a higher risk of economic distress.

Policies: Upsides and downsides

Energy transition policies in Africa mainly focus on power generation and largely lack a holistic approach to energy, particularly sustainable energy transition. Access to affordable energy is a strong enabler of economic growth, specifically in industry, agriculture and transportation, which are critical to long-term sustainable and inclusive growth in Africa. Although sustainability and energy efficiency do appear in most policy frameworks, holistic implementation planning with clear targets are largely not evident.

The majority of the oil and gas exporting countries do not have adequate energy transition policies in place and are still largely focusing on hydrocarbons for domestic power as well as continued exports. Countries with clear energy transition policy frameworks and sector plans will be best positioned to benefit from the global shift towards greener economies.

If Africa does not keep pace, the benefits of the global energy transition will be lost

How can African oil and gas producing economies best navigate the global energy transition and market disruption, and will an early adoption of the energy transition deliver net benefits?

As outlined in the previous chapter, despite most African countries having 'greening' policies in place, implementation is largely lacking, domestic market momentum is low and countries can't afford the level of investment or incentives being implemented by the developed world.

Adoption of renewable energy technologies will not create a direct like-for-like substitute for long-term direct oil and gas export revenues. Such a transition will, however, enable a more inclusive and equitable access to energy and related economic growth. Investments in renewable energy have been shown to have a significant GDP multiplier effect. According to the International Renewable Energy Agency (IRENA), for every US dollar invested in renewable energy, an additional US\$0.93 of GDP growth above business as usual is expected to occur.⁵ This should be seen in the context of Africa's energy poverty. It is estimated that nearly two-thirds of Africans do not currently have access to reliable electricity and an estimated 60% of sub-Saharan Africa's total energy is derived from traditional biofuels.

⁵ "Global Energy Transformation: A Roadmap to 2050 (2019 Edition)." IRENA – International Renewable Energy Agency. Accessed 29 October 2020. <https://www.irena.org/publications/2019/Apr/Global-energy-transformation-A-roadmap-to-2050-2019Edition>



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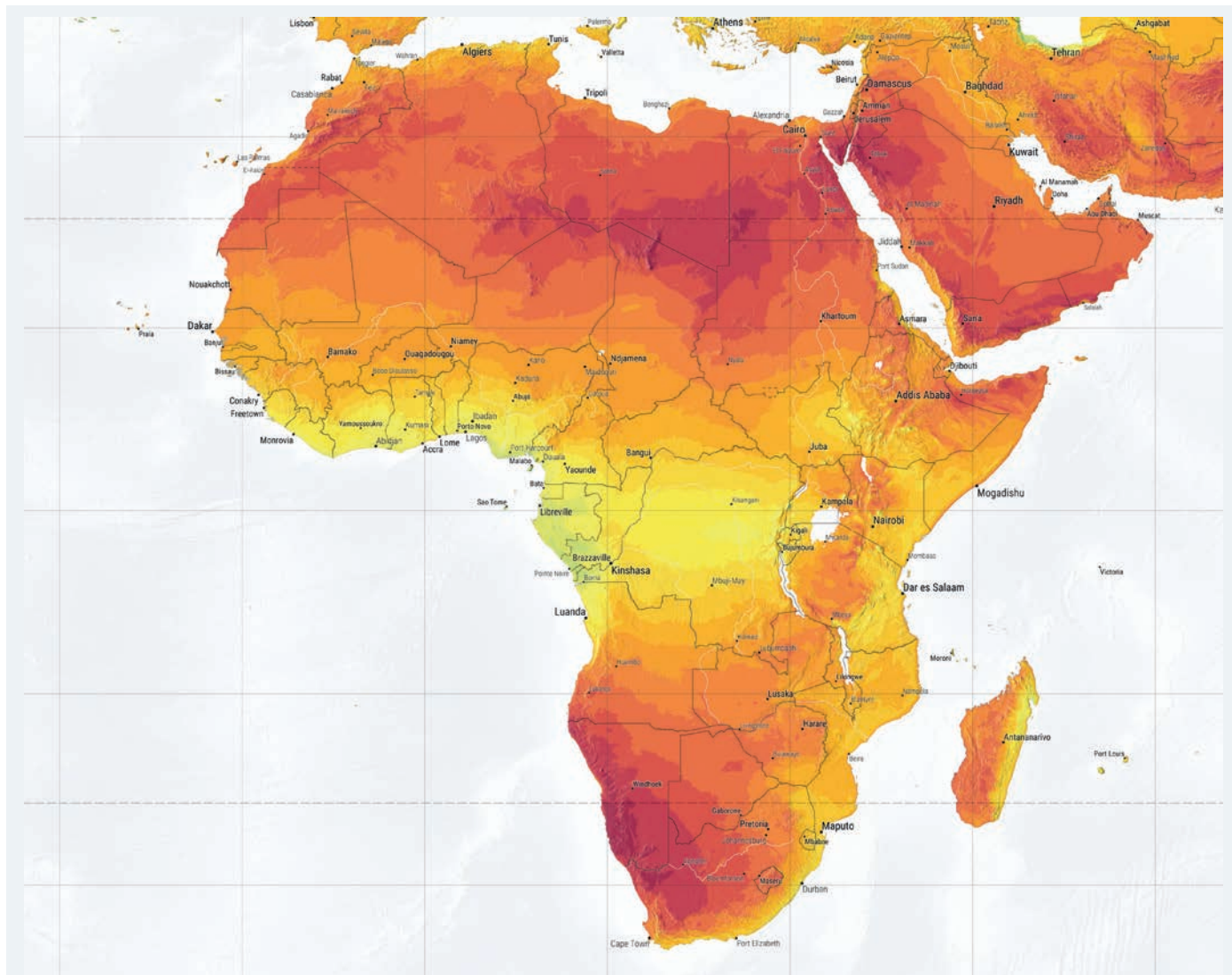
countries globally had more than 10GW of installed renewable power capacity in 2019

Energy transition is accelerating across the globe

With annualised global growth of 13.7% over the last decade, renewable energy growth is outpacing all other forms of energy. Although the most rapid scaling is in China, the US and India, 32 countries globally had more than 10GW of installed renewable power capacity in 2019, in comparison to the total installed solar PV generation in Africa, estimated at 5GW in 2018.

Despite having some of the best solar and wind assets, especially in Southern Africa, Africa's growth rate and global share of renewables remains far below the rest of the world, with access to modern energy services barely outpacing population growth.

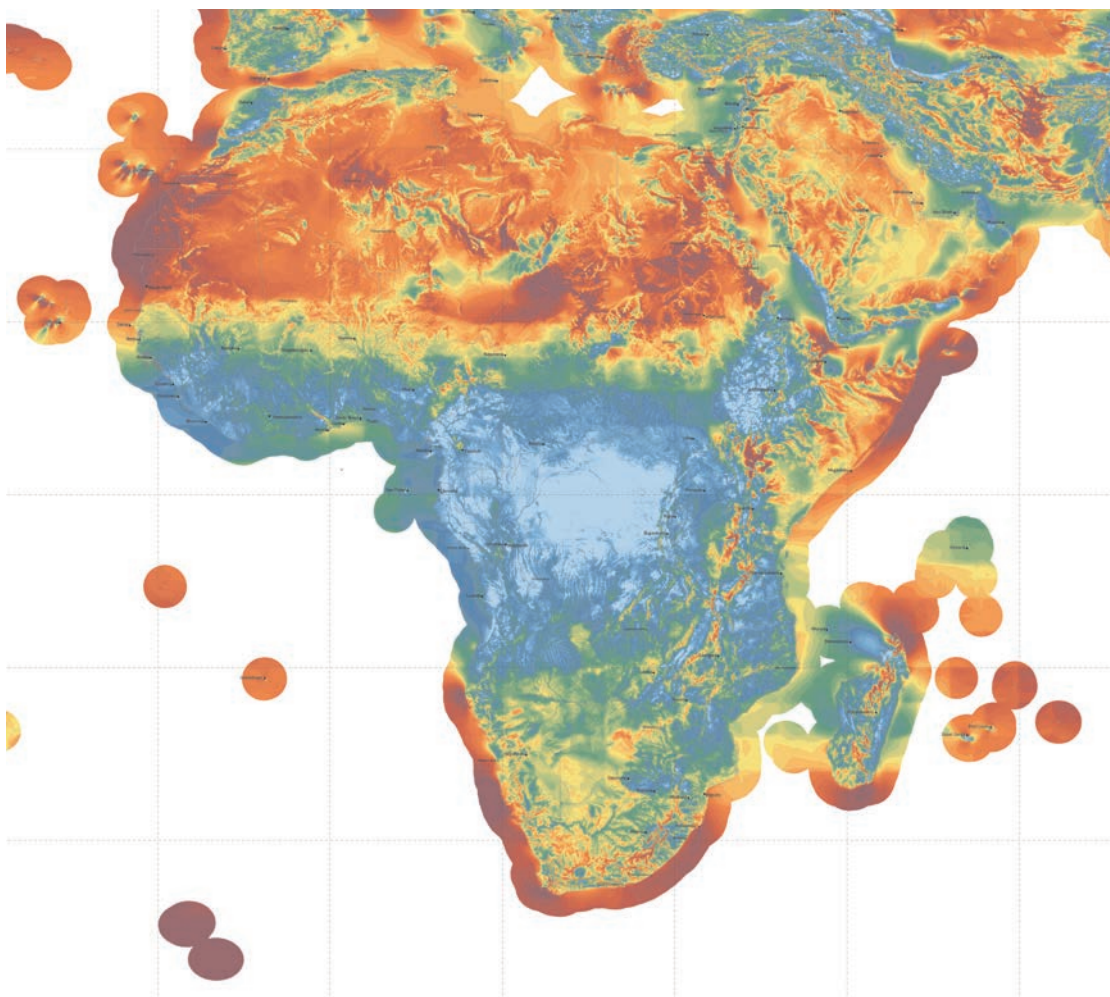
Potential of solar energy in Africa



Source: Map courtesy/copyright of The World Bank⁶

⁶ Map obtained from the Global Solar Atlas 2.0, a free, web-based application is developed and operated by the company Solargis s.r.o. on behalf of the World Bank Group, utilizing Solargis data, with funding provided by the Energy Sector Management Assistance Program (ESMAP). For additional information: <https://globalsolaratlas.info>

Potential of wind energy in Africa

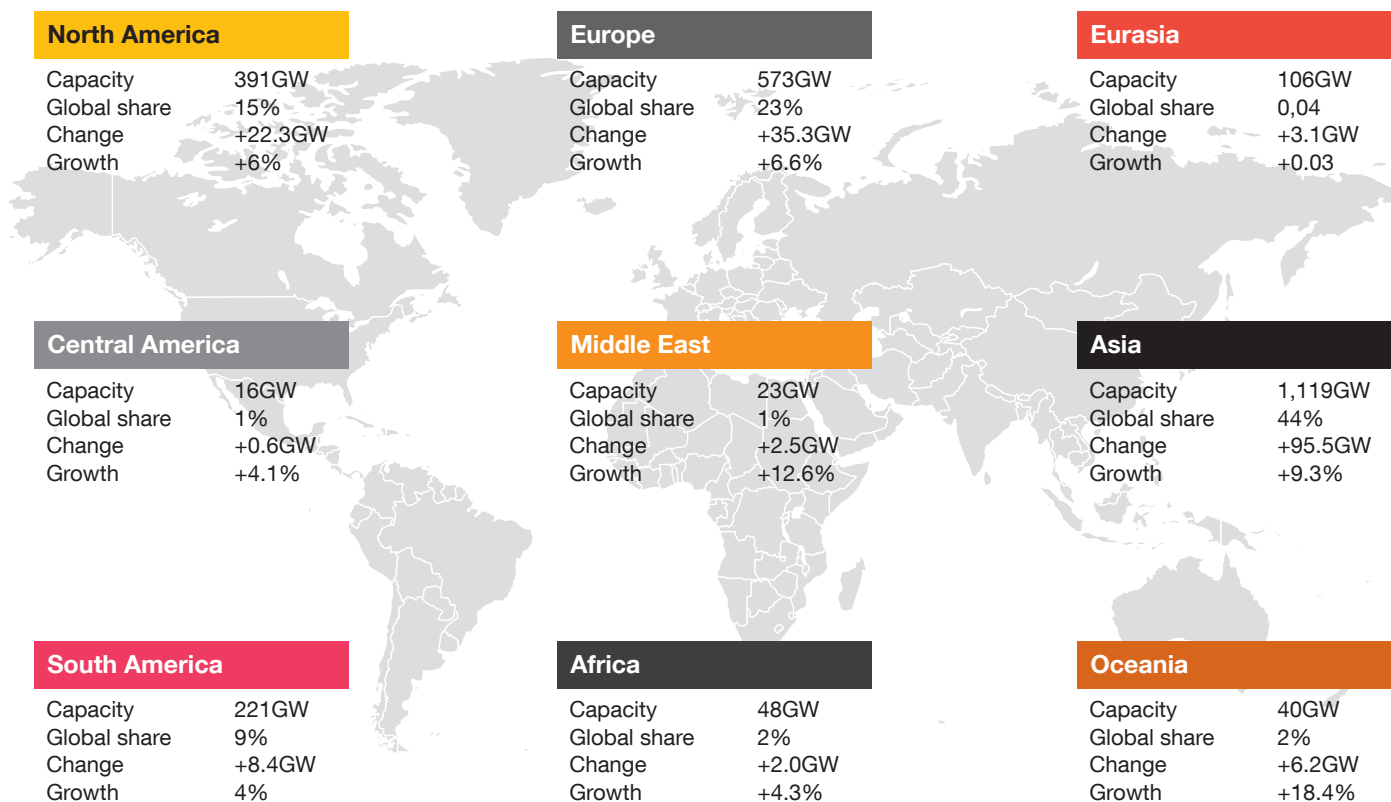


Source: Map courtesy/copyright of The World Bank⁷

⁷ Map obtained from the Global Wind Atlas 3.0, a free, web-based application developed, owned and operated by the Technical University of Denmark (DTU). The Global Wind Atlas 3.0 is released in partnership with the World Bank Group, utilizing data provided by Vortex, using funding provided by the Energy Sector Management Assistance Program (ESMAP). For additional information: <https://globalwindatlas.info>



Renewable energy adoption by region



Source: IRENA⁸

⁸ "Renewable capacity highlights (31 March 2020)." IRENA – International Renewable Energy Agency. Accessed 29 October 2020. https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Mar/IRENA_RE_Capacity_Highlights_2020.pdf

Harnessing the benefits from an energy transition

It is estimated that Africa requires an annual investment of US\$70bn in renewable energy projects until 2030 for clean energy development in line with SDG 7 (Ensure access to affordable, reliable, sustainable and modern energy for all) to take place.

In contrast, data from fDi Markets shows that US\$23.3bn was invested across 159 renewable projects globally in Q1 2020, making it the strongest first quarter in a decade, and major project announcements (Iberdrola's US\$6bn investment in Mexico and the US\$2bn, 15GW Asian Renewable Investment Hub in Australia) have continued.⁹

⁹ "Covid-19 Accelerates Energy Investment Shift to Renewables." FDI Intelligence. Accessed 3 November 2020. <https://www.fdiintelligence.com/article/77658>



Funding opportunities

One of the upsides of COVID-19 recovery stimulus is the emergence of independent funding opportunities set up specifically to support clean energy companies. Some of these include the COVID-19 Energy Access Relief Fund, the GET-Invest COVID-19 Window for energy projects in sub-Saharan Africa and the Caribbean, the REACT Kenya Relief Fund for off-grid companies, and the All On COVID-19 Solar Relief Fund in Nigeria, to name a few.

African countries are in a position to capitalise on global financing and funds for green energy as well as growing private sector appetite for financing renewable energy projects, but clear and coherent policy, and an enabling regulatory and economic environment is vital.

Job creation

One of the key positive multipliers for economic recovery through energy transition is the resultant impact on employment. A common line of reasoning with regards to energy transition is the argument for a just transition, where developing economies are entitled to their share of global emissions and as such can keep fossil industries operating to preserve jobs and economic activity. However, quite to the contrary the adoption of renewable technologies has been shown globally to have a far greater employment multiplier effect and be economically more attractive than continuing to rely on fossil fuels.

Average employment creation across all renewable energy technologies has been found to be four to five times greater than that of conventional energy

Average employment creation across all renewable energy technologies has been found to be four to five times greater than that of conventional energy.¹⁰ Measured in terms of investment, the fossil fuel industry creates 5.3 jobs per US\$1 million invested, whereas the clean energy sector (renewable energy and energy efficiency) creates over three times this amount at 16.7 jobs per US\$1m invested.

Renewable technologies are more labour intensive and have a longer and more diverse supply chain. Job creation occurs across the full length of the value chain, encompassing jobs from manufacturing and distribution; supply; installation, operation and maintenance, and even services like project management.

Indirect benefits

Employment creation is also not limited to direct employment in the renewable sector. Providing access to electricity from mini-grids and solar for home and businesses, has created about five times as many non-energy jobs as direct, formal jobs were created. Broader economic activity in rural communities has also been boosted.¹¹

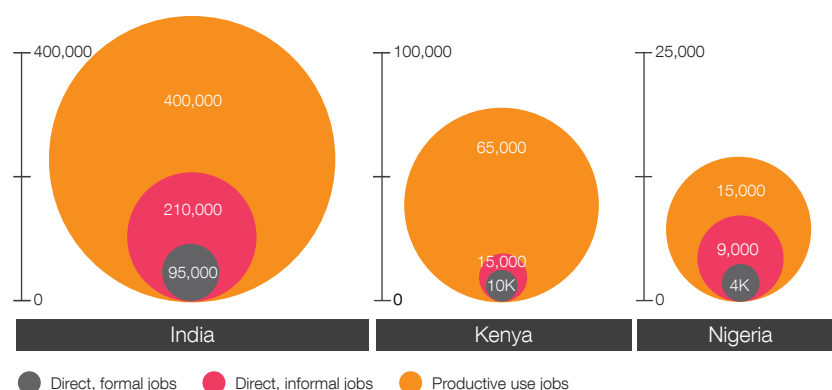
¹⁰ "EUEI Policy Brief: Employment Potential of Energy ODA" European Union Energy Initiative Partnership Dialogue Facility (EUEI PDF). Accessed 3 November 2020. http://www.euei-pdf.org/sites/default/files/field_publication_file/euei_policy_brief_-_1_-_employment_potential_of_energy_oda_0.pdf

¹¹ "Renewable Energy Jobs in Sub-Saharan Africa and Asia 2019." Power For All. Accessed 29 October 2020. <https://www.powerforall.org/resources/reports/powering-jobs-census-2019-energy-access-workforce>

The number of renewable energy jobs worldwide could more than triple to reach 42m by 2050, while the fossil fuel industry is expected to lose more than 6m jobs over the same time period

India, Kenya and Nigeria's decentralised renewable energy solutions (including mini-grids, solar for households and businesses, and systems to power machinery such as irrigation pumps and other appliances) already employ as many people as the traditional utility power sector.¹² In Kenya, decentralised renewable energy companies directly employ 10,000 formal workers, and that number is expected to grow 70% by 2022–23. In Nigeria, direct employment by the sector is expected to boom more than tenfold by 2022–23 to provide 52,000 jobs.

Figure 25: Formal, informal and productive use employment estimates for 2017–18



Source: Power For All

IRENA predicts that the number of renewable energy jobs worldwide could more than triple to reach 42m by 2050, while energy-efficiency jobs would grow sixfold, employing over 21m more people. By contrast, the fossil fuel industry is expected to lose more than six million jobs over the same time period, before considering the further impact of COVID-19.¹³

The decentralised nature of renewable energy not only creates more jobs, but also greater opportunity for smaller enterprise development and semi-skilled labour, which is highly suited to the African environment. In emerging economies, the key capabilities required for this sector encompass digital, technical, and vocational skills.¹⁴ Several countries have programmes in place to accelerate such skills development, but in many cases these are underfunded and underutilised. Human capital thus appears to be one of the areas least prepared for the energy transition.

With penetration of renewable energy in African still low at only 2% of the global renewable energy and renewables representing only 1% of the overall energy mix in Africa, the potential for job creation and economic development is vast.

¹² James Ellsmoor, "Forbes: Renewable Energy Provides Growing Source Of Skilled Jobs For Africa And Asia." Power For All. Accessed 29 October 2020. <https://www.powerforall.org/news-media/articles/renewable-energy-provides-growing-source-of-skilled-jobs-africa-and-asia>

¹³ "3 Reasons to Invest in Renewable Energy Now." World Resources Institute. Last modified 22 July 2020. <https://www.wri.org/blog/2020/05/coronavirus-renewable-energy-stimulus-packages>.

¹⁴ "Africa's Energy Transition: Opportunities and Challenges for Decent Work," Tralac. Accessed 3 November 2020. <https://www.tralac.org/news/article/12979-africa-s-energy-transition-opportunities-and-challenges-for-decent-work.html>

Localisation and beneficiation

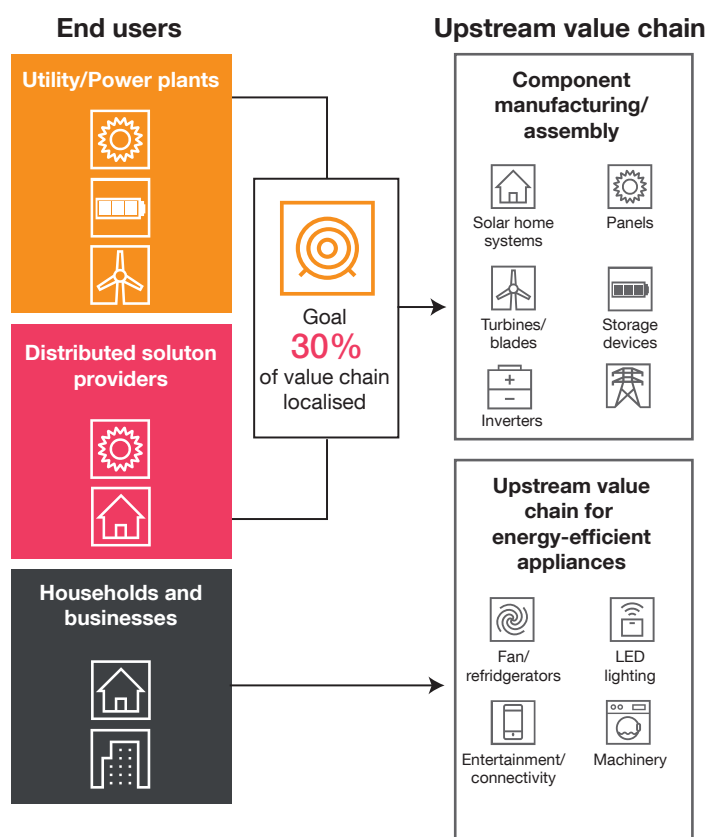
One of the notable learnings from the COVID-19 pandemic has been the fragility of global supply chains and the risk associated with over-reliance on single sources for goods and commodities.

Local content development of renewable technologies and beneficiation are important drivers of job creation and economic growth. Governments can facilitate progressive localisation of manufacturing and production of renewable technologies through direct and indirect investments to support local economies of scale. Direct investment could include loan guarantees or contributing capital for upfront investment in assembly plants. Indirect investments to be considered may include reducing or eliminating import duties and value-added tax (VAT) on items in the renewable technology supply chain. Import taxes and fees can add +/- 50% to the overall cost of solar systems. Even when considering importing parts, but local assembly of the systems, high customs, VAT and local taxes can drive up the price of systems.

For Africa, with its significant youth unemployment, diversifying the economy and creating sustainable long-term domestic market activity is imperative and the renewable energy transition is an ideal opportunity to achieve this, supported by global trends, investor mandates and sustainability themes.

The energy transition provides Africa an opportunity to grow domestic market activity and create inclusive economic growth

Opportunities in the upstream value chain



Source: Sustainable Energy for All¹⁵

¹⁵ "The Recover Better with Sustainable Energy Guide for African Countries." Sustainable Energy for All. Accessed 29 October 2020. <https://www.seforall.org/publications/recover-better-africa>

Examples in Africa

Some examples of localisation in the renewable energy sector across Africa include:

- Uganda has started construction of its first EVs with support from the Chinese manufacturer CHTC Motor. The ambition is to manufacture 90% of the required components locally and have the first vehicles ready by July 2021.
- In late 2019, Kampala and Kigali (Rwanda and Uganda) unveiled electric vehicle assembly plants.
- Ethiopia has plans underway for a local electric vehicle assembler, Tom Renewable Electric Bike Assembly & Sales, to start production in the country.

Filling the oil and gas revenue gap: Pivoting the mining and extraction sector's focus

By positioning African countries' mining policy and capacity, advantage can be taken of the demand for commodities required to support the global energy transition

Africa is a resource rich continent and as global demand for oil and gas exports decline in the long term, opportunities may lie in the pivot of the mining and extractive sector to focus on alternative commodities associated with the energy transition. Commodities and minerals required in the manufacture of renewable technologies, EVs, EV batteries and storage solutions and green hydrogen are all examples of future markets that Africa can supply.

Herein lies the opportunity for Africa.

The World Bank estimates that 3bn tonnes of minerals will be required by 2050 to deploy sufficient wind, solar and geothermal power as well as energy storage to meet the demand for clean energy technologies. Based on lessons learnt from the COVID-19 pandemic, the World Bank has also warned countries against single-source producers for these and so new sources of commodities and beneficiation are being sought. Africa has an opportunity to increase its prominence as a provider of these, as it has significant deposits of the rare earth and core mineral components for new technologies such as lithium batteries. These include cobalt, lithium, manganese and nickel.



Core mineral deposits in Africa

Nickel

Zimbabwe is among the top five nickel producing countries in Africa, having produced +/- 19,000 metric tonnes in 2019.

The full value of Zimbabwe's nickel deposits remains largely unknown, but the government has announced an additional 30 nickel deposits are known of, but yet to be developed.

Bindura Nickel Corporation, Zimbabwe's largest nickel producer, has a nickel smelter which is 83% complete. On completion of the smelter, the government is estimating that this will further boost their revenues with beneficiation. Zimbabwe reported the second highest dollar value in nickel exports in 2019 at US\$737.1m (16%), with Zambia twelfth at US\$14.6m (0.3%).

Lithium

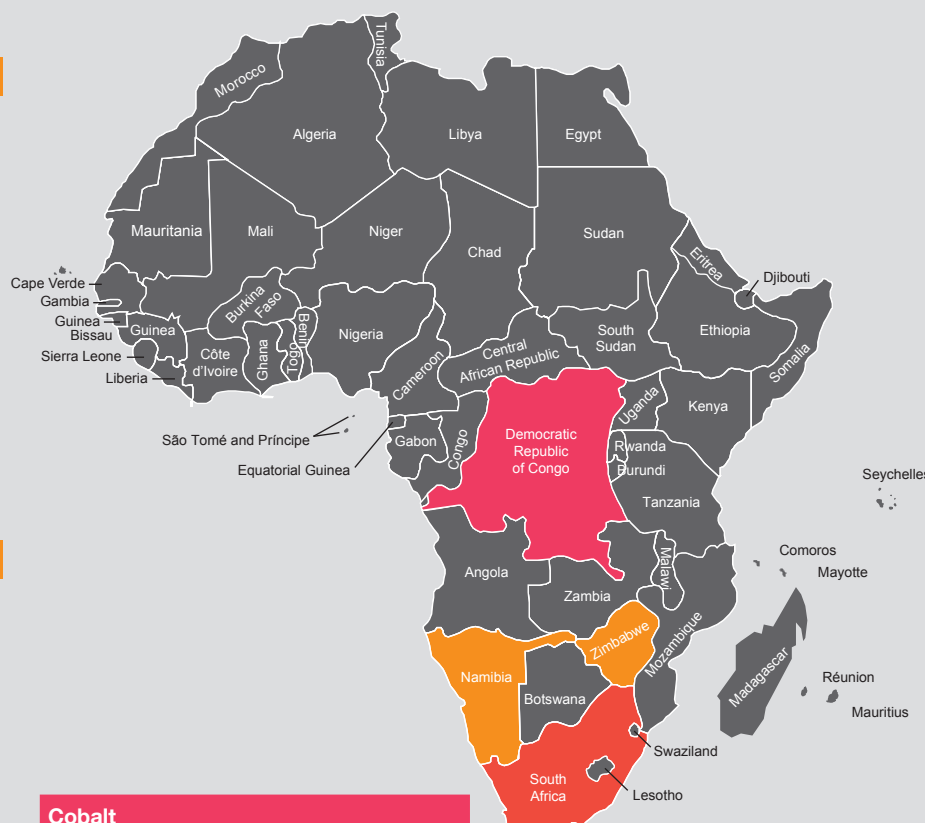
Zimbabwe's privately owned Bikita Minerals is currently the only lithium producer in the country, and reportedly holds one of the world's largest-known lithium deposit at over 11 million tonnes. There are three other miners working towards production.

Total reserves in Zimbabwe stand at 70,000 tonnes (US Geological Survey).

There are plans to develop an ore processing plant to create opportunity for economic development and job creation

In April 2018, Desert Lion Energy began shipping lithium concentrate from Namibia's first large-scale lithium mine in the Erongo region of Namibia.

In 2019, lithium spot prices fell by 70% due to concerns that the supply of lithium might outpace the demand, but due to the rapid adoption of EVs, lithium is seeing growth in demand again and it is estimated it may reach 1.637 million tonnes in 2025 and to surpass a price of \$13,000 per tonne at this time.



Cobalt

The DRC is the leading cobalt producing country, responsible for more than 60% of the world's cobalt production.

Copper and cobalt production in the DRC is currently restrained by insufficient smelter capacity, inadequate electricity supply and the required waivers needed in relation to the 2013 legislation that bans copper and cobalt concentrate exports.

The Lualaba Copper Smelter launched in January 2020 as a joint venture between China Nonferrous Metal Mining Group and the government is capable of processing 4000,000 tons of copper concentrate, but this is still far below potential copper production volumes. The DRC produced 750,000 tonnes of copper concentrate in the first half of 2020.

Manganese

South Africa is the world's largest producer of manganese, accounting for 33.5% of global production. This manganese mining is concentrated in the Kalahari Desert, which is believed to hold more than 70% of global reserves.

South Africa exports just over 90% of the 14m tonnes of manganese produced a year. This provides good export earnings (+/- R43.7 bn in 2018), but further opportunity may lie not only in increasing production capacity to meet global demand, but improved ways to leverage local beneficiation of manganese ore before it is exported.

Source: PwC analysis

Economic diversification and export revenues through manufacture of green hydrogen

World energy production is becoming increasingly geographically constrained, necessitating the need for cross-border transportation of storage of energy. Being able to leverage Africa's world-leading renewable power potential, many African countries will be well positioned to secure their own domestic supply of clean energy to anchor economic growth, but more importantly, could also become exporters of energy in the form of green hydrogen and hydrogen-enabled chemicals, fuels and products to high demand markets in Europe and Asia.

Development of a green hydrogen production sectors could be key to African countries becoming net exporters in a global market, which could contribute much-needed foreign currencies to their economies, job creation, FDI attraction and skills development, but also to secure clean domestic energy supply that is de-risked from supply chain disruptions and currency devaluation.

Conclusion: Accelerated adoption of renewable energy could be the economic game-changer for many African countries

The developed world is rapidly creating a new global energy market and reality. In contrast, it is clear that when broadly categorised, Africa will not realise long-term sustainable and inclusive economic growth based on its oil and gas industries, and will ultimately also transition to this new global reality.

Rather than resisting this global shift under the guise of a 'just transition', African citizens may be better served by their respective governments by the creation of clear country strategies and policy dialogue aimed at capitalising on the global energy transition.

As discussed in this analysis, renewable energy industries have been shown to have positive and inclusive economic impact. This provides opportunities for African economies to diversify through, among others, leveraging their natural assets, including wind and solar array, but also new-age minerals.

Despite the need to keep improving the policy and planning environment, we have evidenced that there is already a strong focus and good progress being made in some African countries. The biggest challenge, however, remains the need to exponentially increase the scale and speed of execution, but this calls into question the affordability of renewable energy in African markets as well as governments' weakening fiscal capabilities.

Perhaps a more globally beneficial or 'just transition' would be deeper investment stimulus and support for energy transition in Africa from the developed world. This would help to accelerate global climate response as well as support sustainable Africa economic growth and thus create a win-win for all global citizens.

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