

Africa's energy transition



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Industrialise or Decarbonise? Does it have to be a choice?

By **Dr Desné Masie**, Chief Strategist, IC Intelligence

Welcome to the July/August edition of IC Intelligence Insights, where I'm pleased to present some of the most compelling thinkers on central issues confronting the global economy today.

In this edition, we unpack a subject causing heated debate: whether it is judicious for high-carbon emitting, more-developed countries to expect low-carbon emitting, less-developed countries not to exploit hydrocarbon assets - whether domestically or externally sourced - for the much-needed industrialisation of their economies, in order to mitigate climate change.

Tackling these themes head-on are our contributors: Lord Peter Hain, Chair of IC Intelligence; Angus Chapman, Research Associate, IC Intelligence; Richard Halsey, energy policy advisor, International Institute for Sustainable Development; and Varun Khanna, electrical engineer and consultant at Clean Energy 4 Africa.

In his Chair's letter, Lord Hain shares a personal reflection on the role he played, while Britain's Minister for Africa, in the launch of the Africa-European Union Energy Partnership (AEEP). The

AEEP provided for the allocation of a part of Europe's huge aid and development budget to fund a massive renewable energy programme in partnership with private companies on the African continent, but, says Hain, it still has a way to go in making Africa a world leader in renewable energy given the continent's significant natural resources.

Chapman asks "who wins from Africa's oil and gas?" and takes a data-driven approach to arrive at potential answers, looking at factors like the ownership structure of new oil and gas projects. He also interrogates who really benefits from the recent acceleration in hydrocarbon exploration - international investors, or the poorest Africans.

Halsey, in turn, makes the case against gas as a cleaner transition fuel, by explaining that it will have poor outcomes for Africans over the long term.

Finally, Khanna talks us through the technical aspects of the African energy infrastructure complex that would make a broad-based accelerated transition to renewables practicable.

I hope you enjoy reading





Chair's Letter

July/August 2022

Lord Peter Hain

Energy self-sufficiency for Africa

At a Europe-Africa Summit in Gaborone twenty-two years ago, I proposed and got accepted a motion allocating part of Europe's mega aid and development budget to fund a massive Africa renewable energy programme in partnership with private companies.

I was Britain's Minister for Africa at the time, arguing that Europe needed to make this investment, both to combat climate change and because much of Europe's prosperity was rooted in historic exploitation of Africa and many European companies continue to reap large profits on the continent, not least from fossil fuels.

The Africa-European Union Energy Partnership (AEEP) followed, but it has yet to make real progress towards making the continent a world leader in renewable energy with its vast natural resources.

Although acknowledging the need to make that transition, many African states are simultaneously developing fossil fuel reserves.

Kenya for instance has both been building the biggest wind farm in Africa near Lake Turkana *and* developing oil fields there. Mozambique and Tanzania

are developing huge offshore gas reserves.

Nigeria and Angola are each processing hundreds of thousands of barrels of oil per day. European fossil fuel companies are exploiting Africa's huge reserves, violating Europe's own climate commitments. South Africa for instance has recently increased coal exports to Europe to replace Russian gas following President Putin's barbaric invasion of Ukraine.

After the U.N.'s COP26 climate meeting concluded last November, Mary Robinson, chair of The Elders and a former president of Ireland, remarked on "an historically shameful dereliction of duty" from world leaders. But at least the United Kingdom, United States, Germany, France and the European Union committed to provide \$8.5 billion to South Africa for its transition to renewable energy in a way that protected coal miners and their communities. Potentially a game-changer in how countries could wean their economies off fossil fuels, while protecting jobs and livelihoods.

But, she pointed out in June, "as is so often the case with high-profile financial commitments made in the media spotlight of global summits.... the



promised billions have yet to materialise.”

No wonder critics complain that the fine words on climate change of the February 2022 European Union-Africa Union Summit ring rather hollow.

Africa has an abundance of solar, wind and tidal stream, as well as other huge potential for hybrid generation and embedded generation; wave; hydro; wind; biomass and geothermal.

Remarkably, more energy falls from the sun on the planet’s deserts in six hours than the world consumes in a year, and yet the Sahara Desert, virtually uninhabited, has few solar farms, maybe because there is no ready access to the grid; but hopefully, as battery storage develops, the number of solar farms in the Sahara will multiply.

The failure to harness Africa’s huge green energy resource is shocking. Only 11% of the continent’s potential hydro-electricity is being used; in wind just 7% and in geothermal energy just 6% is being harnessed. Even with Africa’s abundance of sun, a measly 1% of estimated potential solar generation capacity is being delivered.

Yet the 20 countries with the lowest electricity access on the planet are in sub-Saharan Africa. Overall, 51.6% of the population of sub-Saharan Africa, approximately 586 million people, have no access to electricity.

Given the prohibitive cost of delivering a continent-wide grid with universal access, surely Africa can go its own way with stand-free renewable energy and leapfrog grid-based generation? It has done this through mobile telephony and mobile cash transfers.

Six years ago the late Archbishop Desmond Tutu called for an anti-apartheid-style boycott and disinvestment campaign against the fossil fuel industry for driving global warming.

‘We live in a world dominated by greed. We have allowed the interests of capital to outweigh the interests of human beings and our Earth. It is clear [the companies] are not simply going to give up; they stand to make too much money,’ he wrote.

As on so many things, he was a visionary prophet.



Who wins from Africa’s oil and gas?

Angus Chapman,
Research Associate, IC Intelligence

The 2022 African Economic Outlook (AEO), released by the African Development Bank in May, shaved 2.4 per cent off projected African GDP. This comes after the first continental recession in over half a decade, as the pain wrought by the COVID-19 pandemic is intensified by the economic fallout from Russia’s invasion of Ukraine.

The AEO also counted 131 climate-related extreme weather events in the past two years. Climate change is hitting Africa harder and earlier than anywhere else on earth, with the estimated impact of a high-warming scenario translating into a 15 per cent reduction in continental GDP per capita by 2050.

Africa is desperately searching for ways to combat these twin threats, with fossil fuels – particularly so-called ‘transition’ fuels such as natural gas – expected to do much of the heavy lifting. Analysts are looking to COP27, to be held in Egypt in November, as the moment when a powerful coterie of African voices will put their collective weight behind a push for expanded oil and gas production on the continent.

Dissecting the development dividend

From an environmental perspective, the case against fossil fuels is indisputable. Scores of analyses show that production from already-licensed oil and gas fields – to say nothing of any future exploration – will release





Figure 1: Ownership of projected production volume from new oil and gas projects in Africa, by headquarter location (2020-2050).

Source: Oil Change International

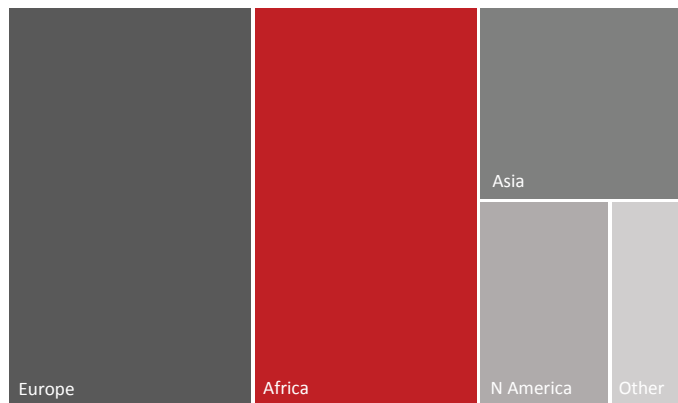
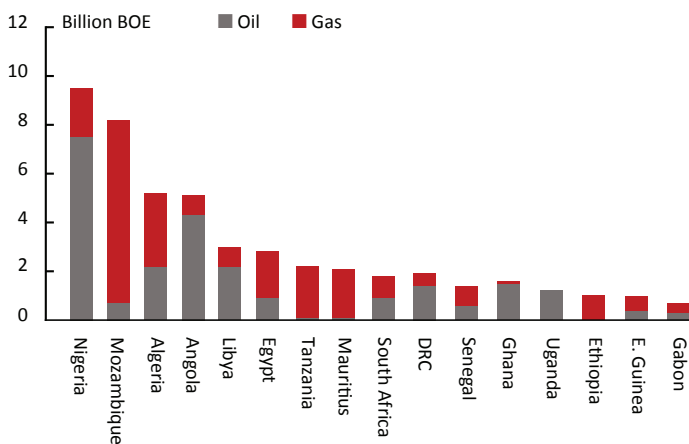


Figure 2: top African countries for oil and gas production from new projects (2020-2050).

Source: Oil Change International



carbon emissions well beyond what is compatible with the 1.5 degree ceiling enshrined in the Paris Agreement. From an energy systems perspective too, it is strengthening quickly. Richard Halsey in this edition of IC Insights convincingly outlines the diminishing technical requirement for new fossil fuels on the African continent.

If the environmental imperative to abandon fossil fuels is so strong, and they are becoming

less technically necessary, what is the development rationale for a fossil fuel free-for-all? From a development perspective, the case rests on two key channels.

The first is that fossil fuel investment will generate broad-based wealth on the continent, with the returns on new projects being funnelled into African communities where they can drive quality of life improvements.

As figure 1 demonstrates, this channel is tenuous. According to data from Oil Change International, just 33 per cent of projected oil and gas production in Africa is controlled by African companies. The majority is controlled by companies in the global North; particularly Europe, with 36 per cent, but also Asia and North America. These companies have the only claim on the fuels that African fossil fuel projects generate, making it highly unlikely that a significant share of the revenues from their sale will remain in Africa to fund local development. They are vastly more likely to end up with foreign shareholders, with only that diminishing portion required for reinvestment in the projects providing any benefit to the African communities where the resources are situated.

Even if a significant proportion of the benefits from fossil fuel production accrue to Africa, rather than the international investors who own the resources, these are likely to be very unequally distributed.

As figure 2 shows, the lion's share of new oil and gas production is concentrated in a very small set of African nations. Nigeria and Mozambique alone account for 36 per cent of total planned production. Add Algeria and Angola, and almost 60 per cent is covered. Most countries in Africa have severe development needs, and all are heavily exposed to the ill effects of climate change. In the face of this common reality, however, just a handful of countries on the continent are set to profit from fossil fuel extraction. This suggests that, far from being a solution to pan-African problems of poverty and vulnerability, expanded fossil fuel production is more of a short-term boost for a lucky few. Given most – such as Nigeria, Algeria, Angola, Libya and Egypt – are already established fossil fuel producers whose resource wealth has thus far failed to translate into tangible development outcomes, it may not even be that.

The revenues from expanded fossil fuel production

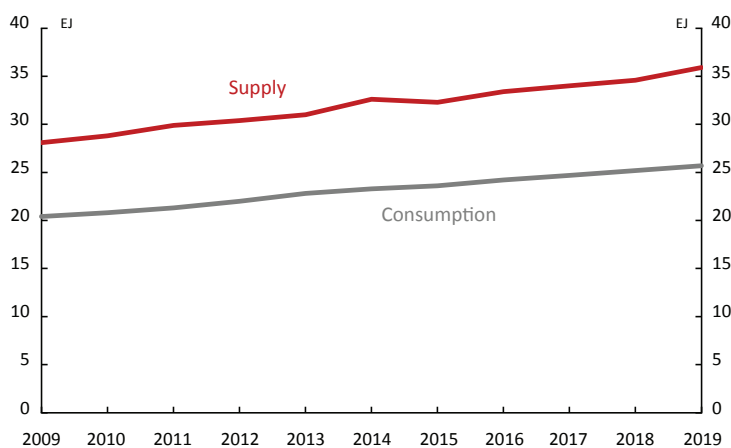


are unlikely to stay in Africa, and those that do are marked for a small number of resource-rich nations. The second channel, however, through which expanded fossil fuel production might be expected to deliver improved development outcomes in Africa is availability. If Africa extracted more oil and gas, say proponents, it could be used to expand energy access while replacing dirtier alternatives for heating and cooking. This deserves serious attention. Of the 759 million people the World Bank recorded as without access to electricity in 2019, and the 2.6 billion without access to clean cooking, 660 and 910 million respectively were in sub-Saharan Africa.

Expanded domestic fossil fuel production, however, is unlikely to solve these problems. If supply alone was the issue – if the demand for energy

Figure 3: Africa’s consumption and supply of global energy production (2009-2019)

Source: International Energy Agency



consistently ground up against the amount available from current sources, causing access deficits – we would expect Africa to consume at least the energy that it itself produced. As figure 3 shows, in fact, the reverse is true; Africa consistently produces more energy than it consumes.

That Africa cannot even consume all of the energy that it generates suggests alternate causes of the severe energy access deficit. Price, for instance, is likely a major factor. Fossil fuels are priced and traded on global markets, inserting a substantial wedge between what the average African can afford to pay for energy

and the price that energy can fetch internationally, even if it was extracted in Africa in the first place. According to GlobalPetrolPrices.com, which provides a real-time database of gasoline affordability, nine of the ten most unaffordable countries are in Africa. In Malawi, the least affordable, it costs 1.48 times average monthly income to fill one forty litre tank. It is hardly surprising, then, that Africans consume far less fossil fuels than they ought. At inelastic global prices, it is – and is likely to remain – simply too expensive.

In addition to pure unaffordability, the high price of fossil fuels on international markets makes it increasingly likely that African oil and gas will be exported, rather than retained for domestic consumption. This is especially relevant given recent attempts by European countries to wean themselves off Russian gas. Chancellor Olaf Scholtz visited Senegal and Niger in May to shore up Germany’s claim on their future gas supply, while in March Italy reached large new supply agreements with Angola, the DRC, Algeria and Egypt. More will follow, with each drop of new fossil fuels exported to wealthy Western consumers reducing access for power-starved Africans.

As Varun Khanna highlights in this edition of IC Insights, infrastructure is another major factor. According to the latest Afrobarometer survey, just 43 per cent of African households are connected to a national electricity grid. The problem is particularly acute in rural sub-Saharan countries such as Malawi, Burkina Faso and Niger where less than one in four are connected. Expanded fossil fuel production does little to solve this problem; it is not a dearth of supply that is the issue, rather an inability to get energy to those who need it most.

Given the thin environmental and technical justification for expanded fossil fuel production, advocates have turned to development as the key rationale for Africa to extract as much oil and gas as possible. The development dividend from this expansion, however, is weak. It is not at all clear that it will create broad-based wealth on the African continent, nor alleviate crippling energy access deficits. The most likely winners from African fossil fuels are not Africans, but the foreign companies who own the majority of the resources, and the wealthy nations whose carbon-intensive development caused the climate change that is currently killing people on the continent.





There Are Better Opportunities to Benefit Africans Than Natural Gas

Richard Halsey



Africa is facing a burning question: is the development of fossil gas infrastructure the right choice for its future? A wave of new evidence suggests that gas exploitation will not bring the expected long-term economic and development benefits for the continent. Instead, the short-term winners would be the international fossil fuel companies currently circling Africa, and the European countries looking for stop-gap alternatives to Russian gas.

Gas Contributes to Climate Change

Of all the continents, Africa stands on the frontline

of the impacts of climate change as it is warming the fastest and has the fewest resources to adapt to it.

But climate science is clear. To limit the rise in global temperature to 1.5°C above pre-industrial levels—which would allow the planet to avoid the worst climate impacts—there can be no new coal, oil, and gas development globally. What's more, research published in the journal *Environmental Research Letters* in May reveals that almost 40% of already developed reserves of fossil fuels must remain unextracted to meet the 1.5°C target.

The message is simple—the world must move away from fossil fuels, including gas, as fast as possible.

It is true that Africa has historically been responsible for a very low percentage of global greenhouse gas emissions. Yet, waiving the global obligation to stop gas expansion in Africa on the grounds of historical fairness would only make sense if gas was a good long-term choice for Africans—which is not the case.

A Dash for Gas in Africa Will Primarily Benefit Multinational Gas Firms, not Africans

Raw material extraction in Africa has a long history of privatizing the profits and socializing the damages, which has left many communities worse off than they started, despite upfront promises of the opposite.





A case study of Mozambique by think tank E3G shows how the notion of “gas for development” has failed. In addition to the conflict and corruption surrounding gas projects in Cabo Delgado, household spending in the area has dropped by 38% in 5 years. The government strategy to use gas discoveries to lift Mozambique out of poverty has not worked, and Mozambicans are now on average poorer than when gas was discovered, while inequality has also increased. Even if these big gas projects had gone better, they are operated by Total Energies, Exxon, and Eni—all multinational companies based in the Global North.

Germany is currently in talks with Senegal about tapping large gas reserves, but despite any media spin, this is not about alleviating energy poverty in the region—it is about securing non-Russian gas supply in the wake of the Ukraine invasion.

Stranded Assets, Better Alternatives, and Leapfrogging

A 2021 report by the International Institute for Sustainable Development (IISD) found that lower-carbon alternatives for gas are either already cheaper or will be in the future. Investments in gas will therefore likely lead to stranded assets—meaning that this infrastructure will lose economic competitiveness or viability well before the end of its anticipated lifespan. In India, a massive 60%—

14.3 GW—of gas-fired power stations were already declared stranded in 2015, and 11 GW of these facilities had only been running for 5 years or less.

The energy sector is experiencing a massive technological disruption. The capabilities and costs of renewable energy and energy storage have improved dramatically in the last decade. In many cases this negates the notion that gas is necessary as a “transition fuel.”

In fact, there are already opportunities for low-carbon alternatives to leapfrog some gas functions. For example, utility-scale batteries can replace gas plants used for a short period of time to cover peak electricity demand. As other gas alternatives also become cost competitive, the fuel will be squeezed out of the market entirely. Meanwhile, the implementation of sustainable energy systems will create green jobs and drive economic development.

It is in this context that African countries must determine if gas is still a rational choice for their national interests. There are many vested interests and gas lobbyists pushing hard for African gas—and a quick buck—but cheaper, climate-friendly alternatives are undoubtedly a better medium- to long-term choice for Africans and the planet.

Richard Halsey is a policy advisor on the South African energy team at the International Institute for Sustainable Development.





Future directions for African energy systems

Varun Khanna

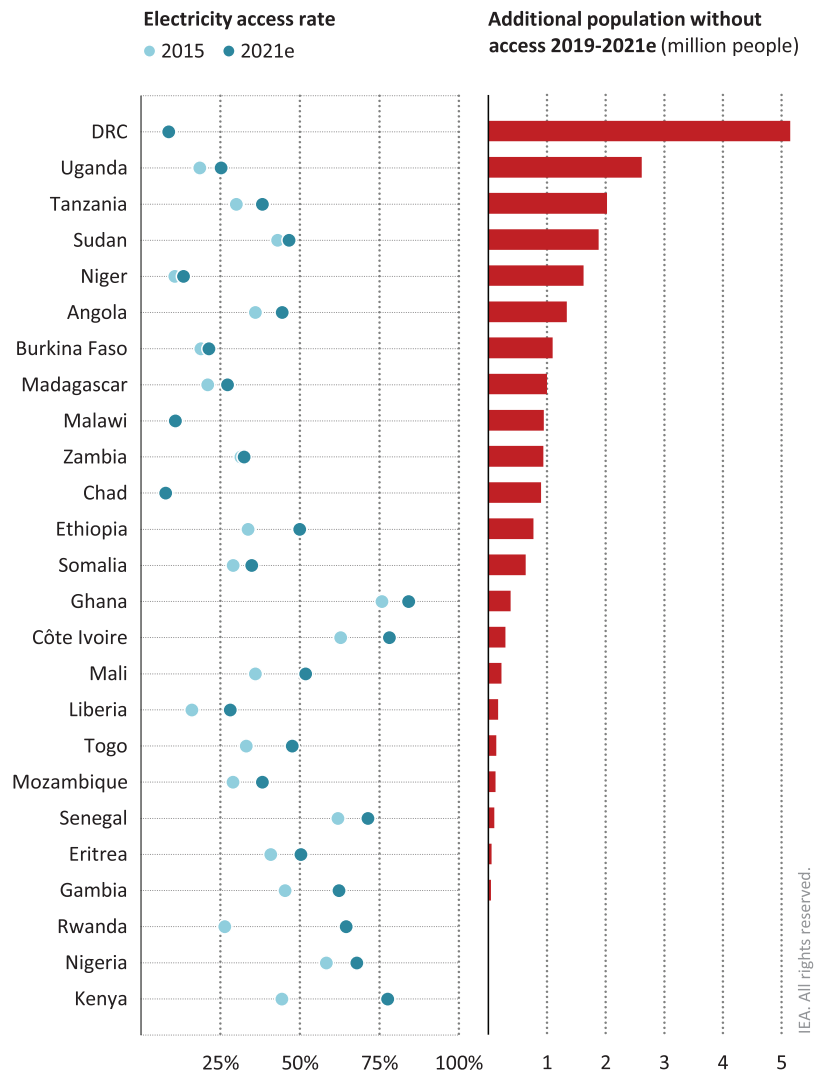
Africa's electricity distribution systems are in flux. While some countries in Northern and Southern Africa enjoy relatively high levels of energy access, sub-Saharan Africa is still lacking. With the continued proliferation of energy storage and distributed renewables, however, Africa is poised to vault to the forefront of the deployment of distributed generation. Sub-Saharan Africa can actually capitalise on the fact energy access is well below 50 per cent; because there has not been significant investment made in existing infrastructure, it is still a blank slate. Where some countries have developed centralized generation with transmission systems, power pools and interties along with unidirectional distribution systems to ensure that power gets to households, very little of that is in place in sub-Saharan countries, and even less so in rural areas. Therefore, to configure a grid that is bidirectional, distributed and transaction-based should be an easier task.

Major barriers to energy access on the African continent include legislation, financing, ownership regulations and lack of confidence in metering. In terms of conglomerated, vertically integrated, state-owned utilities, for example, many international jurisdictions are evolving toward a more disaggregated power sector; decoupling key areas of the industry, defining



Figure 1: electricity access rates in selected countries

(Source: IEA Africa Energy Outlook 2022)

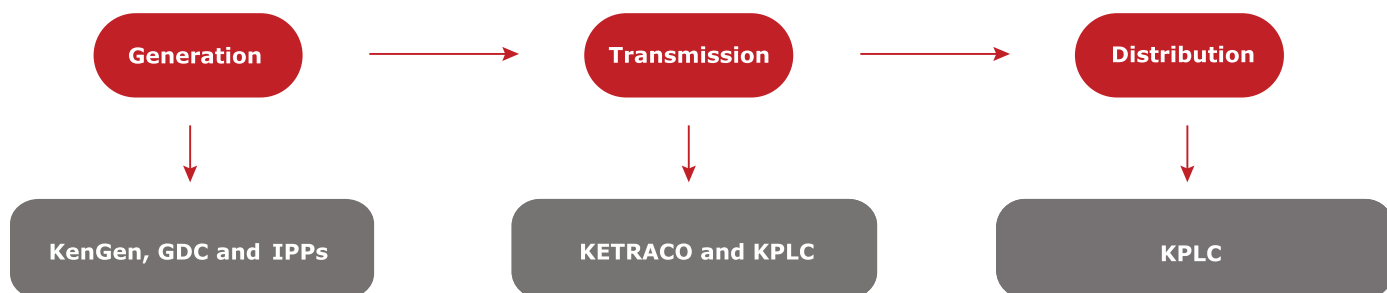


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Figure 2: Kenya Electricity Market Dynamics

Source: https://electricitylawyer.com/wp-content/uploads/2022/01/KENYA_LRF.pdf



individual institutions for each area and succinctly defining the roles and responsibilities for each of these institutions. Independent licensing, allowing entities to connect more flexibly to the grid and the definition and implementation of net metering are other key reforms.

As energy systems evolve, further changes to legislation may be required to allow the operation of independent mini-grids and the ability to “island” from the main grid. These will be essential for rural electrification and deeper penetration of renewable energy across sub-Saharan Africa.

Continued progress towards electrification involves encouraging individual and private sector participation. This requires defining rules and rates for connecting to and supplying the grid with power; commonly called feed-in tariffs (FITs). Currently, FIT rates are often tiered, addressing generation less than 100kW, between 100kW and 1MW and greater than 1MW separately due to their differing requirements. Introducing net metering, therefore, is a helpful step, as it provides a consistent basis by which to evaluate the contribution of a generator towards fulfillment of the contract. Sealed and verifiable metering provides confidence to both the utility and the generator owner. Features such as energy storage, reactive power support and the ability to transact between parties can be added as the grid and the electricity framework evolves.

With a goal of powering the country with 100% renewables, Kenya has made significant changes to its electricity landscape that can act as a blueprint

for other nations. Kenya’s energy reform journey commenced around 1996 with the decoupling of generation from transmission and distribution; a process that accelerated following the 2008 release of the Kenya Vision 2030 strategy, which placed energy at the centre of the country’s development plan and led to the separation of each area of the power sector into its own entity. In 2018, the government launched the Kenya National Electrification Strategy, which promotes private participation in off-grid solutions and stand-alone systems. And in 2019 the Energy Act made further steps towards a modern grid, consolidating existing legislation and setting out laws and regulations regarding the production, generation, transmission, distribution and sale of energy while also regulating the use of traditional fossil fuels.

While issues still exist around financing mechanisms and credit facilities, and some transactions are still to be developed, the ability to obtain independent generation licensing along with the feed-in-tariff mechanism puts Kenya at the forefront of Africa’s renewable energy evolution. As with other jurisdictions that have leveraged FITs, this has led to the development of independent power producers, deployment of storage and the provision of other grid support mechanisms. These are all precursors to developing an electricity market that can provide long-term benefits to the country and its citizens.

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