ISSUE 3 | NOVEMBER 2019

# Africa Connected

## ENERGY IN AFRICA – INNOVATION, INVESTMENT AND RISK



DLA PIPER
AFRICA

# Contents



To find out how we can help you do business in Africa, please get in touch:
africaenquiries@dlapiper.com

# Connecting you to Africa

This issue's focus is innovation, investment and risk in Africa's energy sector.

Our Africa-wide articles look at the role of gas in powering Africa's future, geothermal power generation, and whether the African Continental Free Trade area can solve the continent's energy challenge.

Regional articles on West Africa discuss power reforms in the region and models for private investment in transmission infrastructure.

And country-specific pieces cover land acquisition for energy projects in Kenya, methane-generated power from Rwanda's Lake Kivu, and renewable energy in Mozambique.

Please send us your feedback on Africa Connected, including topics you'd like to see covered in future editions.

DL-Africaconnected@dlapiper.com

# The role of gas in powering Africa's future

**Simon Collier**
**Senior Associate**
DLA Piper
simon.collier@dlapiper.com

It is well-known that sub-Saharan Africa suffers from a lack of access to electricity. At the same time, there are 22 African countries with proven gas reserves. This suggests that gas should play an increasing role in meeting sub-Saharan Africa's demand for power: but is it that straightforward?

Sub-Saharan Africa is, of course, a very large and diverse region made up of countries that have different natural resources, policies and challenges. There are 13 countries in sub-Saharan Africa currently consuming gas for power generation.[1] Ten of those countries generate power from their own domestic gas production,[2] two rely on pipeline imports (Togo and Benin) and one uses a combination of domestic supply and pipeline imports (Ghana). At the moment there are no LNG imports in the region, but that could soon change.

## Prospects for gas-fired power generation in countries with domestic gas reserves

There is an opportunity to expand gas-fired power generation from domestic gas production in sub-Saharan Africa. The demand will arise not only from the need for more power in sub-Saharan Africa, but also from the opportunity to displace oil-fired power generation with cheaper and cleaner gas. Angola, Ghana, Cameroon, Senegal and Tanzania are all examples of countries with significant gas reserves currently using oil to generate power.

Until recently, Angola was an outlier among gas-producing states in sub-Saharan Africa as it had no gas-fired power generation. In 2017 the Soyo combined–cycle natural gas turbine plant introduced 750 MW of newly installed capacity (using a connecting pipeline from Angola LNG to the power plant). In the short to medium term, that project will consume a large part of currently available domestic gas resources. Further expansion in gas-fired power generation in Angola is likely to require the development of additional domestic gas resources or LNG imports.

In Ghana, gas is already a central part of the power generation mix (accounting for nearly 40% of power generation)[3] and its role is likely to increase as oil is displaced. Anticipated demand for gas-fired power generation is such that increasing domestic gas production, pipeline imports and LNG imports may all be required.

In Cameroon, Victoria Oil & Gas PLC, through its subsidiary Gaz du Cameroun (GDC), is the sole supplier of domestic gas for power generation. The government has said it requires additional grid power to meet growing demand.[4] In July 2019, GDC agreed commercial terms to supply gas to a proposed new 150 MW gas-fired power station, a project we are advising on, and there is likely to be scope for further growth in the country.

In Tanzania, material expansion of gas-fired power generation capacity is likely to be contingent on a positive final investment decision for its proposed LNG export plant,

1 *International Energy Agency World Energy Statistics and Balances 2018*

2 Angola, Cameroon, Congo, Cote d'Ivoire, Equatorial Guinea, Gabon, Mozambique, Nigeria, Senegal and Tanzania

3 *IEA World Energy Statistics and Balances 2018*

4 *https://www.victoriaoilandgas.com/wp-content/uploads/2019/07/VOG-Report-Accounts-to-31-December-2018.pdf*

which seems some way off. Equinor has disclosed that its production sharing agreement would allow for 10% of gas to go to the domestic market.[5]

In Senegal, BP took a positive final investment decision on the Tortue-Ahmeyim gas development project in December 2018. A construction contract has been awarded for a floating production storage and offloading (FPSO) unit to be used alongside a floating LNG facility (a converted LNG carrier) being provided by Golar LNG. As part of that development, a pipeline to supply natural gas to both Senegal and Mauritania is planned.

There have also been recent moves to expand gas-fired power generation in Mozambique: a 400 MW gas-fired power project is being developed at Temane in Inhambane province. The plant will use gas supplied from the Pande-Temane fields. Given the recent positive final investment decision on the Area 1 LNG project in Mozambique, and the probable final investment decision Area 4 LNG project in the coming months, there could be scope for significant further expansion of gas-to-power in the country. One of the challenges is that the planned onshore LNG facilities are 2,500 km from the country's capital and largest city, Maputo. In May 2018 Great Lakes Africa Energy (GLAE) announced that it had signed a memorandum of understanding with the Mozambique government to build and operate a 250 MW gas-powered plant at Nacala District in the north of the country using gas from the Rovuma basin, but even that project will require gas to be transported approximately 600 km. GLAE has said it believes that mini-LNG might offer a solution.

Nigeria does not use oil for power generation. There is, however, enormous unfulfilled demand for power domestically and gas is central to plans for expansion of the country's power sector. That expansion has been constrained by structural problems and a chain of debt (from gas sellers to power generation companies to the Nigerian Bulk Energy Trading Company to distribution companies to end customers) not helped by the manner of the privatization of the Power Holding Company of Nigeria in November 2013. The transmission system and gas supply network infrastructure also requires significant investment and reliability of gas supply will also need to be improved to allow a major expansion in installed capacity.

## Prospects for new cross-border pipelines in sub-Saharan Africa

The only operational cross-border gas pipelines in sub-Saharan Africa are the 678 km West African Gas Pipeline (which takes gas from the Escravos-Lagos pipeline at the Nigeria Gas Company's Itoki Natural Gas Export Terminal to Benin, Togo and Ghana) and the 865 km ROMPCO Mozambique to Secunda pipeline (which takes gas from the onshore Pande and Temane fields in Mozambique to Sasol's operations in South Africa).

In 2009 Nigeria signed an intergovernmental agreement with Niger and Algeria for the development of the 4,400 km Trans-Sahara Gas Pipeline (1,037 km in Nigeria, 853 km in Niger, 2,310 km in Algeria and 220 km connecting Algeria to Spain). The Nigerian National Petroleum Corporation (NNPC) currently describes that project as "under consideration."[6] The Nigeria Gas Company, an NNPC subsidiary, is proceeding with the project to develop the 614 km Ajaokuta-Kaduna-Kano (AKK) pipeline, the first stage of the Trans-Nigeria Gas Pipeline project which is intended to form part of the Trans-Sahara Gas Pipeline system if it proceeds. We are currently advising on the AKK project.

The ROMPCO pipeline primarily supplies the PetroSA gas-to-liquids (GTL) refinery at Mossel Bay on South Africa's southern coast (which was commissioned in 1992 as the world's first GTL refinery). Currently there is no gas-fired power generation in South Africa and, if that is to change, it appears more likely that gas-fired power plants would be supplied by imported LNG (import terminals have been proposed at Richards Bay and Port Coega). It is possible that pipeline exports from Mozambique to South Africa could eventually increase with the development of the Rovuma basin reserves, but this is not currently part of the development plan for either the Area 1 or Area 4 project.

The Tanzania Petroleum Development Corporation has mooted supplying natural gas to Uganda and Kenya from the Tanzanian Rovuma basin reserves. As with the expansion of gas-fired power generation in Tanzania, the development of that project will require the LNG export project to proceed, and even then the commercial viability of a gas pipeline project from southern Tanzania is uncertain.

5 *https://www.equinor.com/content/dam/statoil/documents/where-we-are/equinor-block-2-project-121018.pdf*

6 https://www.nnpcgroup.com/Investor-Relations/Pages/Nigeria-Gas.aspx

Even where there is the political will, new cross-border pipeline projects are only likely to be developed if they can be commercially justified as a way to monetize gas reserves. In the absence of equity participation from stakeholders in upstream gas projects, governments will face an uphill battle to fund the necessary equity contribution for a new pipeline project.

Could power generated from gas be exported to regional markets?

There are four existing power pools in sub-Saharan Africa, within which countries have interconnected power systems: the Southern African Power Pool (SAPP), the East African Power Pool (EAPP), the West African Power Pool (WAPP) and the Central African Power Pool (CAPP).

In order to expand gas-by-wire imports, transmission and distribution infrastructure will require significant development to improve capacity and efficiency. In the medium-term, expansion of gas-by-wire seems most likely in West Africa, where land-locked countries or coastal countries with relatively small markets could take advantage of upstream gas projects (or even LNG import projects) in neighboring countries.

## Prospects for LNG import projects in sub-Saharan Africa

A number of members of the WAPP have proposed LNG import projects, perhaps reasoning that any shortfall in domestic demand for power generated from gas could be exported around the power pool. Ghana seems closest to realizing this goal, having granted a concession to Tema LNG Terminal Company Limited (Tema LNG), a joint venture between Helios Investment Partners and the Ghana National Petroleum Company (GNPC), to construct an LNG import terminal. Tema LNG has entered into a construction contract with China Harbour Engineering Company to build onshore facilities and Jiangnan Shipyard for a floating storage and regasification unit (FSRU).[7] LNG is reportedly to be supplied by Rosneft to GNPC under a 12-year supply agreement. When the construction contracts were announced in September 2018 it was said that the FSRU will be ready in 18 months, meaning first LNG imports could come as early as March 2020.

One of the challenges for LNG import projects is scale. The Ghanaian government has said that the import terminal at Tema will supply 30% of Ghana's power generation capacity,[8] a very large part of the feedstock requirement for a country that has significant gas reserves of its own, with the Sankofa field now supplying gas for 1,000 MW of power generation capacity (a project we know well having advised the lenders on a USD500 million letter of credit facility made available to the Ghana National Petroleum Corporation to support its role in the development of the Sankofa field).[9] Technological developments in small-scale LNG may, in time, reduce the minimum volume requirements and open up a wider range of markets.

In July 2019 Total announced[10] an agreement to develop and operate an FSRU located off the coast of Benin together with a pipeline to supply existing and planned gas-fired power plants, although it remains to be seen how quickly that project will proceed. In November 2016 a consortium led by Total announced that it had been granted rights to construct an FSRU in Cote d'Ivoire[11] together with pipeline connecting the FSRU to existing and planned power plants in Abidjan, but no final investment decision has yet been announced.

South Africa continues to explore options for a LNG imports[12] and an LNG terminal has also been proposed at Walvis Bay in Namibia.[13]

7 https://www.reuters.com/article/lng-ghana/ghana-resurrects-lng-import-terminal-with-chinese-deals-idUSL2N1VX09W

8 http://www.ghana.gov.gh/index.php/media-center/news/4988-construction-of-tema-lng-terminal-project-agreement-signed

9 http://dlapi.pr/GYSpYF

10 https://www.total.com/en/media/news/press-releases/total-will-develop-lng-market-benin

11 https://www.total.com/en/media/news/press-releases/ivory-coast-total-becomes-operator-lng-terminal-project

12 https://ijglobal.com/articles/140525/ifc-infraventures-to-support-south-african-lng-terminal

13 https://www.walvisbaypowerplant.com/the-power-plant

Other LNG import projects in the region have either previously been considered and put on hold (such as in Kenya)[14] or are currently under consideration (such as in Mauritius[15] and the Seychelles).[16]

Given that a delivered gas price of around USD8/MMBtu is competitive with oil-fired power at an oil price as low as USD50/barrel;[17] it is more than possible that the economics will support LNG imports to displace oil-fired power generation and to increase power generation capacity in sub-Saharan Africa, particularly where funding can be obtained from multilateral lending agencies or development finance institutions. Although the World Bank has announced that it will no longer finance upstream oil and gas projects (apart from in "exceptional circumstances"),[18] it is expected to continue to finance midstream and downstream natural gas projects.

## Conclusion

There are challenges to gas-to-power projects in sub-Saharan Africa, such as the poor records on collection of power sector revenues in many countries, related problems of creditworthiness of the state utilities who are the natural customers for gas-to-power projects and under investment in electricity distribution infrastructure. But those challenges can be overcome and are present whatever the means of generating electricity.

In countries with domestic reserves, gas can undoubtedly play a major role in the development of power generation capacity. LNG import projects are also foreseeable as countries seek to move away from oil as a power generation fuel. New cross-border gas pipelines may be less likely, but LNG imports or increases in domestic production could well result in an increase in gas-by-wire exports, particularly to land-locked countries in the WAPP.

14 https://www.lngworldnews.com/kenya-puts-lng-import-deal-with-qatar-on-hold/

15 https://tenders.rfpalertservices.com/en/2017-7/20/rfp-tender/rfi-prod-4140-request-for-information-from-potential-developers-for-the-setting-up-of-an-lng-15088299

16 https://tenders.rfpalertservices.com/en/2019-4/19/rfp-tender/technical-consultant-ipp-lng-to-power-seychelles-35663756

17 Fulwood, M (2019); Opportunities for Gas in Sub-Saharan Africa; Oxford Institute for Energy Studies

18 https://www.worldbank.org/en/news/press-release/2017/12/12/world-bank-group-announcements-at-one-planet-summit

# Can AfCFTA solve Africa's energy challenge?

**Rodwyn Peterson**
**Head of Litigation**
Chibesakunda & Co
DLA Piper Africa member
firm in Zambia
rodwyn.peterson@cco.co.zm

**Innocent Sampa**
**Trainee Advocate**
Chibesakunda & Co
DLA Piper Africa member
firm in Zambia
innocent.sampa@cco.co.zm

The African Continental Free Trade Area agreement (AfCFTA), launched on March 21, 2018, creates the largest free trade area in the world and is designed to create a single market for goods and services across the continent. AfCFTA aims to boost intra-African trade by 52% by 2020,[1] and the removal of non-tariff barriers will make it more attractive to invest in African economies. This article will look at how AfCFTA affects intra-African energy investments and projects.

While the developed nations of the world enjoy secure, uninterrupted power supplies using significant levels of renewable energy, many African countries experience acute power shortages related to high demand and underutilization of renewable resources.[2]

This is because most African countries have a weak and unstable electrical network system, i.e. a grid whose power generation cannot meet demand, leading to network component overload and continual or persistent power outages or even severe network damage. Weak and unstable grids are characterized by the following:

- complete loss of power (power blackouts);
- partial loss of power (power brownouts) where the voltage level is below the minimum level specified for the system; and
- rolling blackouts: intentionally engineered electrical power outages caused by insufficient available sources to meet prevailing demand for electricity.[3]

In many African countries, including Zambia, South Africa, Cameroon, Nigeria and the Democratic Republic of Congo, rolling blackouts have become a daily occurrence, resulting from the inadequate electrical supply and ever-expanding demand, coupled with an aging electricity supply infrastructure, non-diversification of energy sources, and overloading of the existing electricity system.[4]

The importance of constant regular electricity supply cannot be overstated. The UN's Sustainable Development Goals[5] state that energy is a vital, integrated element of infrastructure that is critical for reducing poverty and achieving many of the other 16 Sustainable Development Goals.

With up to 90% of national electricity generation across Africa coming from hydropower[6] it is clear that current electricity generation methods will not fulfill this goal. This challenge is compounded by climate change, with analysts

1 The Quest for Africa's Trade Growth: Intra-African Trade and the Proposed African Continental Free Trade Areas (AfCFTA): A Commodification Of Old Practice or Maintenance of New Order?

2 Journal of Renewable and Sustainable Energy 2, 023102 (2010); doi: 10.1063/1.3289733

3 International Institute for Sustainable Development, Understanding Adaptation to Climate Change in Developing Countries 2005, http://www.iisd.org/climate/south/background_va.asp.

4 Journal of Renewable and Sustainable Energy 2, 023102 (2010); doi: 10.1063/1.3289733

5 https://www.undp.org/content/undp/en/home/sustainable-development-goals.html

6 http://www.lse.ac.uk/GranthamInstitute/news/africa-hydropower-new-dams-increase-risk-supply-disruption/

projecting a warming trend, particularly in the inland subtropics characterized by frequent and extreme heat waves, increasing aridity and changes in rainfall, with a particularly pronounced decline in southern Africa.[7]

This serious shortage of electricity in most African countries creates a need for the introduction of power generation from alternative sources. The challenge of electricity supply is being tackled head on and several high-value projects are underway across the continent. Examples include:

- the Noor Solar Complex in Morocco;[8]
- the rehabilitation of the Cahora Bassa hydropower plant in Mozambique;
- a EUR620 million wind farm with 365 turbines in northern Kenya;[9] and
- the Batoka Gorge Hydroelectric power project between Zambia and Zimbabwe.[10]

All these energy projects have an intra-African connection. For instance, the Cahora Bassa plant exports a significant amount of its production to South Africa, Botswana and Zambia. The African Development Bank served as lead arranger for EUR436 million in senior credit facilities towards the Kenyan wind farm's cost of EUR623 million. The Batoka Gorge Hydroelectric power station is expected to generate 2,400 MW of electricity to be shared equally between Zambia and Zimbabwe.

## Intra-African investment in the age of AfCFTA

AfCFTA guarantees potential investors access to information, as parties to the agreement must publish their laws, regulations, procedures and administrative rulings of general application as well as any other commitments under an international agreement relating to any trade matter covered by the agreement. It is hoped that publishing this information will make the interstate market conditions more transparent and appealing.

Part II of the Protocol on Trade in Goods under the AfCFTA provides for Non-Discrimination, which is divided into three parts: the Most Favored Nation (MFN) Treatment, the National Treatment (NT) and the Special and Differential Treatment. The MFN Treatment requires a country to provide any concessions, privileges, or immunities granted in a trade agreement to one nation to all other member countries, for example if a nation reduces tariffs by 10% for one nation, the MFN clause states that all members will have tariffs cut by 10% into that nation.[11]

The NT focuses on treating foreigners and locals equally. Imported and locally produced goods should be treated equally, at least after the foreign goods have entered the market. This should apply to foreign and domestic services, trademarks, copyrights and patents.

In conforming with the objective of the AfCFTA to ensure comprehensive and mutually beneficial trade in goods, state parties must provide flexibilities to other state parties at different levels of economic development or that have individual specificities as recognized by other state parties.

Part III of the Protocol on Goods provides for liberalization of trade, which looks at aspects such as import duties, general elimination of quantitative restrictions, export duties, elimination of non-tariff barriers and rules of origin; all of which are aimed at making it easier and cheaper to trade goods and services, including energy, within Africa.

Under the AfCFTA, expanded markets and free movement of labor, goods, services, capital and people should promote economic diversification, structural transformation, technological development and quality job creation. The full implementation of the AfCFTA will eliminate all tariffs and will be a game-changer for energy producers across the continent, creating a knock-on impact in multiple sectors of the economy.

The AfCFTA has been signed by 54 out of 55 AU Member States, with only Eritrea yet to join. Gabon and Equatorial Guinea[12] recently deposited their instruments of ratification, bringing the number of countries that have ratified the agreement to 27.

There is an undisputed link between global economic growth and energy demand. To grow and prosper, African nations will need more reliable and affordable energy.

7 https://climateanalytics.org/media/ssa_final_published.pdf

8 https://www.climatechangenews.com/2019/01/22/solar-plant-size-3500-football-pitches-powers-moroccos-sunlit-ambitions

9 https://www.afdb.org/en/news-and-events/african-development-bank-helps-power-wind-change-kenya-2823

10 https://constructionreviewonline.com/2019/03/batoka-gorge-hydroelectric-power-project-in-zambia-to-begin-this-year

11 United Nations Conference on Trade and Development. African Continental Free Trade Area: Policy and Negotiations Options for Trade in Goods.

12 https://allafrica.com/stories/201907080063.html

Free trade and strong investment protections support energy security by encouraging access to diverse energy supplies and production sufficient to meet growing demand. Trade policies and protections also enable effective supply chains and the efficient movement of capital, people, information and all products.

Free Trade Agreements are one of the best ways to open up markets by enhancing rules of trade law, reducing tariff and non-tariff barriers and by creating a more stable and transparent trading and investment environment. The free flow of commerce is essential to maximizing global economic growth and prosperity, and even has implications for national security. By enabling energy supplies to flow more smoothly between nations, the AfCFTA will, in theory at least, make it possible for suppliers to meet the energy need efficiently and affordably.

But there are several obstacles to the AfCFTA's success. Key among them is the fact that critical parts of the agreement have yet to be finalized before countries commence trading under the AfCFTA on July 1, 2020.

These outstanding sections include details on schedules of tariff concessions and services commitments, and policies around investment, intellectual property and competition. Until these sections are concluded and the AfCFTA is truly fully operational, investors may likely find that they have to trade on pre-AfCFTA terms.

Investment promotion and protection strengthen successful regional integration arrangements. However, unlike the common practice of protecting foreign investments by building investment protective rights into investment treaties and agreements, the AfCFTA does not guarantee individual investors any rights as regards their investments. This means that while it will be easier to get into a country to trade, an investor must look to multilateral or bilateral agreements that coexist with the AfCFTA, such as the Investment Agreement for COMESA Common Investment Area and the ECOWAS Supplementary Act on Investments, for investment protection.

## Conclusion

AfCFTA opens Africa up to African investors. Its potential to change Africa by making energy cheaper is remarkable but its promise of continental success comes with the risk of investing without inbuilt investor protections. While trade in the AfCFTA age will be easy and bring benefits aplenty for both investors and consumers, investors will still have to look outside of AfCFTA for protection against unlawful state action.

# Leveraging private investment in power transmission infrastructure in West Africa

**Joseph Lam**
**Legal Director**
DLA Piper
joseph.lam@dlapiper.com

Earlier this year, the Economic Community of West African States (ECOWAS) presented its updated Master Plan for Regional Power Generation and Transmission Infrastructure 2019–2033 (the Master Plan). The Master Plan is part of ECOWAS's drive to develop the West Africa Power Pool (WAPP) – a cooperative power pooling mechanism for integrating national power system operations into a unified electricity market in the West African region.

Like in the rest of sub-Saharan Africa, a vast proportion of the population in West Africa is without access to electricity, despite the region's ample natural resources. The lack of reliable and affordable electricity has hindered economic development and job creation. Given the small size of the power markets in most of the ECOWAS countries, increasing regional integration can lower the average cost of supply through economies of scale. It can also promote diversification of electricity sources, including renewables, enhancing system reliability and grid stability.

This will however require significant investment in a stable and interconnected transmission network with minimal transmission losses that can support load increase, more flexible cross-border trade flows and the intermittent output of renewable power sources. The Master Plan has identified 28 priority transmission line projects with a total length of approximately 22,932 km at an estimated cost of USD10.48 billion. The majority of them are cross-border interconnectors although some are national projects with regional significance. In this article I will focus on interconnection infrastructure.

Government ownership (including through public utilities) has been the dominant approach to financing interconnection projects in Africa. Poor financial health of national utility companies in general and fiscal constraints of most governments in the region limit their ability to invest, even in financially viable projects. Private involvement in these projects could help ease the financing constraints and bring experience in project implementation and operation as well as better organizational and financial discipline.

This article will look at the possible models for private investment in transmission infrastructure in the region, identify some potential challenges and consider how they may be addressed.

## Investment models

In the context of cross-border interconnections, private investment may take the form of merchant investment or independent power transmission (IPT). Neither model has been adopted in Africa to date.

### MERCHANT INVESTMENT

Most interconnection projects in the world have used the merchant investment model. Under this model, the merchant investors build and operate a transmission line. The owner of the line sets the terms and conditions for its access and generates revenue based on the amount of energy flowing along the line and the price differences between the two ends of the line. Access to merchant lines is usually proprietary rather than open to all transmission users.

Many power utility companies in sub-Saharan Africa are vertically integrated, state-owned monopolies. In many cases, their tariffs are set at artificially low levels due to the income level of their customers and political considerations. The resulting lack of flexibility and dynamics in the relevant wholesale electricity markets could undermine the basis of the business case and revenue model for merchant investment, which is closely linked to the projected price differentials between two markets. Furthermore, viability of a merchant line often depends on its ability to maintain a monopolistic position to serve as a link between two markets based on proprietary access. This model does not seem consistent with the stated aim for the West Africa Power Pool, which is, to develop an integrated unified electricity market.

## INDEPENDENT POWER TRANSMISSION (IPT)

Another model is to finance, build and maintain the transmission line by way of independent power transmission (IPT). The IPT model has been identified by the World Bank as the "business model best suited to the conditions in Africa."[1] In essence, it involves the government (or the state-owned utility) tendering a long-term contract whereby the IPT (the winning bidder) will be responsible for building and operating a transmission line in exchange for contractually defined payments dependent upon the availability of the line.

IPT projects have been adopted in many countries, though mostly in the context of in-country transmission. Adopting the model for interconnection between countries is, however, likely to be more complex, not least due to the need to coordinate between the governments of the relevant countries.

In West Africa, the Côte d'Ivoire-Liberia-Sierra Leone-Guinea (CLSG) interconnection project may point to a way forward. This USD508.2 million project involves the construction of a high voltage (225 kV) transmission line of over 1,300 km and associated substations connecting the four participating countries' energy systems into the WAPP. The project is implemented through a regional transmission company (TRANSCO CLSG) which is responsible for the financing, construction, ownership and operation of the project.

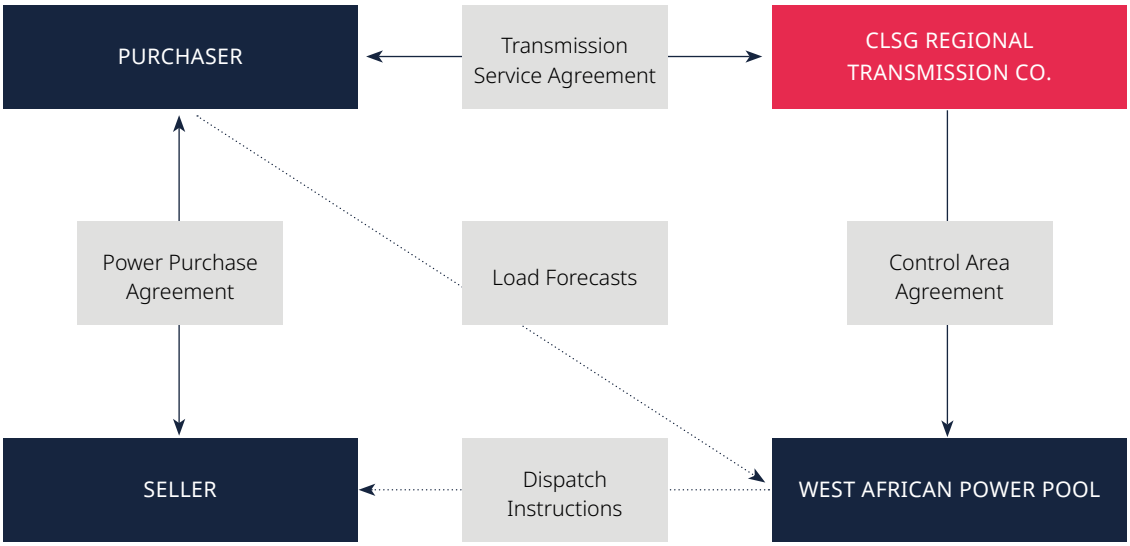



Diagram: Illustrative contractual structure for the CLSG transmission line.[2]

1 World Bank Group. 2017. Linking Up: Public-Private Partnerships in Power Transmission in Africa. World Bank, Washington, DC. © World Bank. https://openknowledge.worldbank.org/handle/10986/26842 License: CC BY 3.0 IGO.

2 Diagram acknowledgment: World Bank. 2012. *Africa – West Africa Power Pool Fourth Adaptable Program Loan (WAPP APL4) for First Phase of the Cote d'Ivoire, Sierra Leone, Liberia, and Guinea Power System Re-development Project (English).* Washington, DC: World Bank. http://documents.worldbank.org/curated/en/116431468006606003/Africa-West-Africa-Power-Pool-Fourth-Adaptable-Program-Loan-WAPP-APL4-for-First-Phase-of-the-Cote-dIvoire-Sierra-Leone-Liberia-and-Guinea-Power-System-Re-development-Project

TRANSCO CLSG is a special purpose vehicle (SPV) owned equally by the national utilities of the CLSG countries.

To encourage its usage, the CLSG transmission line will have an open access policy. Power purchase agreements have been signed between Côte d'Ivoire's national utility and those of the other three countries. Each of them has entered into a transmission service agreement with TRANSCO CLSG. The transmission tariff is set using the postage-stamp methodology[3] so that transmission costs are effectively charged to the power purchasers based on their relative shares of the trade through the transmission line. To mitigate against the risk of funding shortfall due to low trading volumes, the shareholders of TRANSCO CLSG undertake to pay for any shortfall from trading revenue. This pricing methodology both ensures cost recovery and facilitates trade through the transmission line. The CLSG project is currently under construction and is expected to be commissioned in late 2019 or early 2020.

While the CLSG project structure does not involve any private ownership of the project company, it is conceivable that a similar structure may be adopted to implement the IPT model; for example, by replacing government-owned shareholders of the transmission SPV with private sector project sponsors.

This was in part the structure adopted by the Central American Electricity Interconnection System (SIEPAC) which had been taken into account in the design of the CLSG project.[4] In SIEPAC, the transmission company, EPR, owns the 1,793 km interconnector (230 kV) which links the power grids of six Central American countries. EPR is owned by eight national utilities or transmission companies together with a private company (ENDESA of Spain) which is responsible for managing EPR. During the project design stage, the option of relying entirely on private sector investment was considered. However, it was decided that there may not be sufficient interest from the private sector for such structure due to the perceived project risks and natural monopoly nature of transmission.[5]

However, there seems no reason why, through proper risk management and with adequate financial incentives, such a structure cannot be adopted with entirely private ownership.

## Challenges

The challenges faced by the power sector in sub-Saharan Africa are well documented. There are two challenges in particular to highlight in the context of introducing private investment in interconnection projects, especially IPTs: the regulatory framework and financial viability.

### REGULATORY FRAMEWORK

As reported in the Master Plan, in most of the countries in West Africa, the electricity sector remains vertically integrated with monopoly networks. Although full-unbundling is not a necessary pre-condition for IPT, existing legislation and regulation will need to be reviewed to enable the IPT to operate alongside the national utility. The grid code will need to be established or revised to provide operating procedures and principles. In the context of an interconnection project, this will need to be done for each country it connects and could be cumbersome and result in a long development lead time.

This issue is highlighted in the ongoing North Core Interconnector Project (a 330 kV transmission line connecting Nigeria, Niger, Benin and Burkina Faso). According to the Master Plan, the SPV structure adopted in the CLSG project had

3 This means that transmission tariff is charged at a fixed charge per unit of power transmitted within a particular zone irrespective of the distance travelled.

4 World Bank, *Africa – West Africa Power Pool Fourth Adaptable Program Loan (WAPP APL4) for First Phase of the Cote d'Ivoire, Sierra Leone, Liberia, and Guinea Power System Re-development Project (English)*

5 World Bank. 2010. *Regional power sector integration : lessons from global case studies and a literature review (Vol. 10) : Central American Electric Interconnection System (SIEPAC) : transmission and trading case study (English).* Energy Sector Management Assistance Program (ESMAP) ; Brief note 004/10. Washington DC ; World Bank. http://documents.worldbank.org/curated/en/117791468337281999/Central-American-Electric-Interconnection-System-SIEPAC-transmission-and-trading-case-study

originally been envisaged for the North Core project but was not adopted in the end in view of the considerable delay that necessary adjustments to the national legal frameworks would cause.[6]

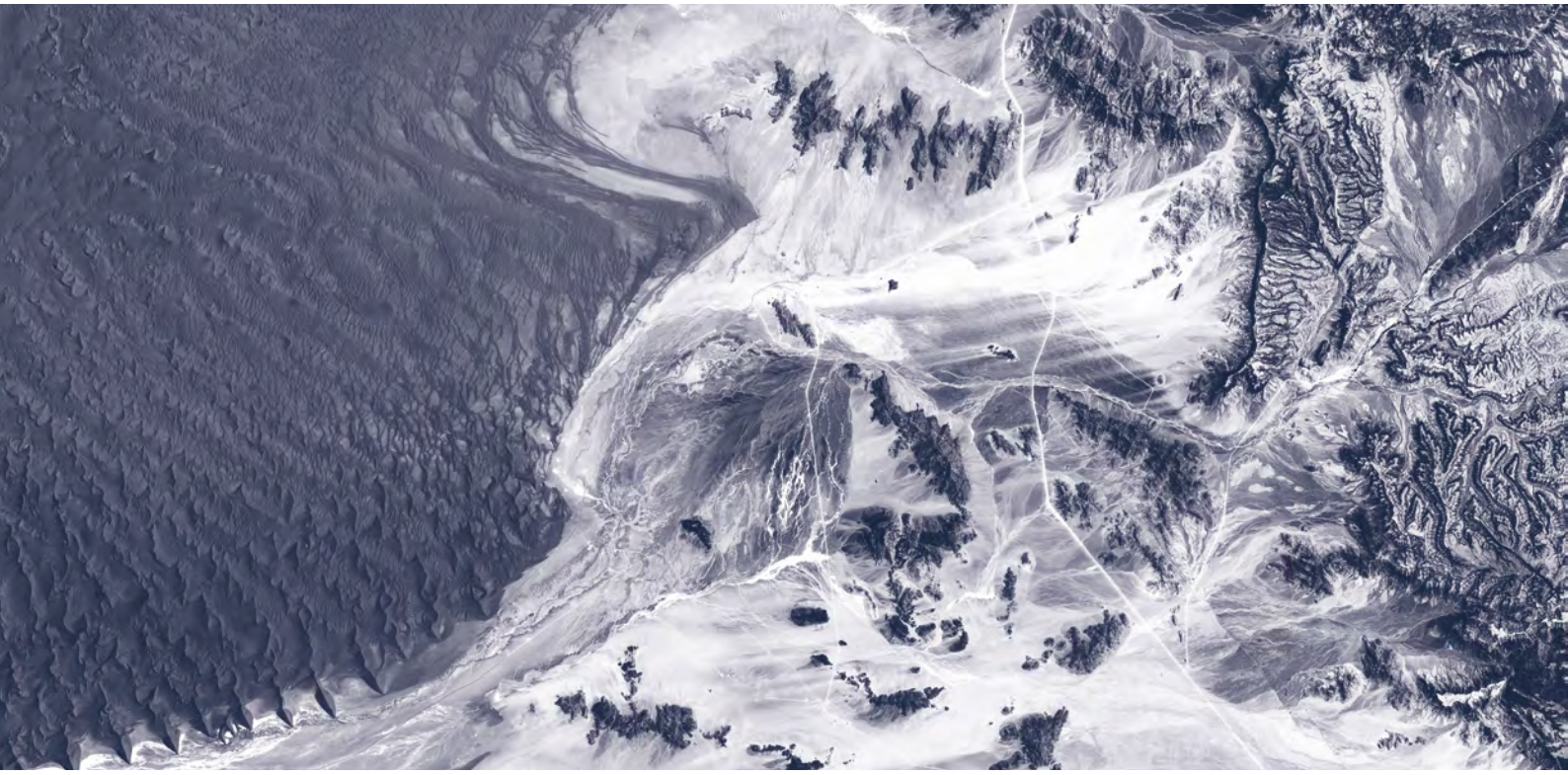
### FINANCIAL VIABILITY

The CLSG project above has provided an example of how transmission tariffs may be set to meet any minimum revenue requirement. Investors will, however, need confidence that the contractual payments will be received from the transmission line users, which are likely to be national utilities. The general poor financial health of the national utilities in the region is likely to be a concern in this regard. It is instructive in this context to note that many countries in the region have experience in addressing this same issue in independent power projects (IPP), which may provide valuable lessons for developing IPT projects. For example, possible credit support may be provided through the use of escrow accounts to prioritize payments to private sector market participants. Where this is insufficient, governments may provide sovereign guarantees (or other government support) for payment obligations to IPTs. Additional security may also be provided by development finance institutions (DFIs).

## Last but not least – political commitment

On a more general note, getting any large-scale infrastructure project off the ground will require political support, government commitment and strong public governance. For transmission projects, these factors are key in enabling inter-country negotiations, prioritization of regional projects, effective deployment of state resources and coordination of stakeholders such as regulators and utilities. This will require national governments to take a long-term view of the benefit that these projects will bring through regional energy trade, in terms of energy security, economic efficiency and ultimately the welfare and quality of life of their electorates.

6 Under the agreed structure, project assets will be turned over to the respective national utilities upon project completion. See Djibril Amadaou MAILELE. 2019. *Western Africa – AFRICA- P162933- North Core Dorsale Nord Regional Power Interconnector Project – Procurement Plan (English)*. Washington, D.C. : World Bank Group. http://documents.worldbank.org/curated/en/873421561068201815/Western-Africa-AFRICA-P162933-North-Core-Dorsale-Nord-Regional-Power-Interconnector-Project-Procurement-Plan



# Power reforms in West Africa: Challenges, prospects and opportunities

**Ogechi Onuoha**
**Associate**
Olajide Oyewole LLP
DLA Piper Africa member firm in Nigeria
oonuoha@olajideoyewole.com

Limited access to electric power and endemic electricity shortages are hindering the socio-economic development of West African countries, which are dependent on expensive fossil fuels. Nigeria and Mali have initiated and implemented some remarkable reforms in their power sectors in recent years that illustrate the developmental trends in the region's power sector.

In 2017, the total installed capacity in West Africa was 18 GW,[1] excluding Nigeria. Electricity trading in West Africa accounts for only 5% of the gross demand, while countries like Togo, Benin and Niger are largely dependent on imports to meet demand.

Nigeria is endowed with large quantities of high-quality energy sources, including natural gas deposits, oil, hydro and solar. The country has the potential to generate 12,533 MW of electric power from its existing plants, but is currently only able to generate 4,000 MW, which is insufficient for its power needs.[2] Although Mali has a high potential for solar, hydro and bagasse-based power generation, the country only has about 310 MW of on-grid installed generation capacity to serve its population of almost 18 million people.[3] Mali imports another 27 MW and has approximately 70 MW of off-grid production.

## Innovations and recent developments

### NIGERIA

In addressing the challenges evident in Nigeria's power sector and relating infrastructure, liquidity and governance, the government of Nigeria in 2001 launched a set of power reforms in the country which subsequently led to the unbundling and privatization of electricity generation and distribution companies. Prior to the privatization of the power sector, the National Electric Power Authority (NEPA) was the government regulatory body solely responsible for the generation, transmission and distribution of electricity in Nigeria. NEPA was, however, characterized by infrastructural decay, lack of sustained investment, inadequate funding, government monopoly, corruption and an underskilled workforce.

The government of Nigeria then inaugurated the Electric Power Implementation Committee (EPIC), which drafted the National Electric Power Policy (NEPP) in 2001 and, in turn, led to the enactment of the Electric Power Sector Reform Act (ESPR Act) in 2005. As part of the ESPR Act, the Nigerian Electricity Regulatory Commission (NERC) was established as an independent electricity regulatory body while the Power Holding Company of Nigeria (PHCN) was incorporated as the initial transitional holding company of the 18 successor companies (including 6 generation companies, 11 distribution companies and 1 transmission

1. Solar Development in Sub-Saharan Africa – Phase 1 (Sahel) (P162580), http://documents.worldbank.org/curated/en/582771524090483609/pdf/Concept-Project-Information-Document-Integrated-Safeguards-Data-Sheet-Solar-Development-in-Sub-Saharan-Africa-Phase-1-Sahel-P162580.pdf
2. https://www.usaid.gov/powerafrica/nigeria
3. USAID, Ibid

company) created from the defunct NEPA.[4] Subsequently, between November 2013 and November 2014, the privatization of all the generation and distribution companies was successfully completed, while the government retained ownership of the transmission company.[5]

The reforms were designed to be implemented through four stages of development, including:[6]

- the interim period, which began in November 2013 and involved the allocation of sector cash deficits across all market participants before expected tariff reviews;
- the Transitional Electricity Market (TEM), when the Nigerian Bulk Electricity Trading (NBET) actively traded bulk power – as a buyer from generation companies (GenCos)/Independent Power Producers (IPPs) and resellers to distribution companies (DisCos);
- the medium-term electricity market, which involved the cessation of NBET and the novation of contracts between NBET and GenCos/IPPs to DisCos. At this stage, the DisCos will commence direct purchase of power from the GenCos/IPPs for onward sale to the consumers; and
- the final market, with bilateral contracts between electricity buyers and sellers at all levels, and a central balancing mechanism through the creation of a spot electricity market.

Although the TEM was effectively declared by NERC in 2015, the reforms have not gone beyond the interim period because some predetermined requisites for the TEM stage have not been met.

In 2017, the Nigerian government further initiated the Nigerian Power Sector Recovery Program (PSRP) to be implemented between 2017 and 2021. The PSRP, which was developed with the support of the World Bank, consists of a series of policies on the regulatory, operational, governance and financial interventions to be implemented by the Nigerian government over the identified period. The aim of the PSRP is to:

- accelerate a recovery path for Nigeria's power sector by improving the financial capacity of the NBET;
- improve the viability of distribution companies; strengthening the sector's institutional framework;
- implement clear policies that promote and encourage investor confidence in the sector; and
- establish a contract-based electricity market or TEM which will ensure that electricity trading is done through contracts entered into between participants in the electricity market value chain.

## MALI

Since 1998, the government of Mali has implemented a series of reforms through a host of legislative and statutory instruments formulated to redefine the role of the government in the energy sector and open it up to the private sector. Some of the key policies relating to the power sector include:[7]

- The *Stratégie Nationale pour le Développement des Energies Renouvelables* was adopted in 2006 and aimed at promoting the widespread use of renewable energy technologies and equipment in order to increase the share of renewable energy in national electricity generation up to 10% by 2015; developing the biofuel subsector for various uses including electricity generation; and searching for sustainable and suitable financing mechanisms for renewable energy.
- The *Lettre de Politique Sectorielle de l'Énergie* was initiated for the period between 2009 and 2012 with the goal of completing the restructuring of *Énergie du Mali SA* (EDM) and tariff reforms and taking steps to ensure that there is a wide access to rural electricity, at affordable cost.
- The *Programme d'Urgences Sociales d'Accès à l'Énergie* was developed as an emergency program by the EDM for implementation from 2017-2021. The main objective of the program is to improve the quality of electricity supply and, subsequently, to create wider access to electricity in both urban and rural areas.

4. https://nerc.gov.ng/index.php/home/nesi/401-history

5. Ibid

6 Nigerian Power Sector Recovery Programme: 2017 – 2021 documentation, https://mypower.ng/wp-content/uploads/2018/02/PSRP-Master-Document-January-2018.pdf

7. Ministry of Energy and Water Resources, Republic of Mali, 'Renewable Energy Mali: *Achievements, Challenges and Opportunities*', https://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/RE%20Mali%20exec%20summary%20final.pdf

The emergency program includes the following activities:[8]

- rehabilitation of existing power plants;
- rehabilitation and upgrade of existing transmission and distribution systems;
- improvement of billing and revenue collection; and
- increasing the capacity of the existing interconnections with Côte d'Ivoire, Senegal and Mauritania.

The following successes have been recorded since the implementation of the emergency program:9

- USD56 million revenue collected from overdue electricity bills issued before January 1, 2017, representing 58% of overdue bills;
- a collection rate of 72% for bills issued after January 1, 2017, an 18% increase from 2016;
- the securitization of illegal connections generating about USD12 million; and
- the EDM has signed a contract for the rehabilitation of the Darsalam power plant (33 MW) and is currently negotiating to rehabilitate the generation units of the Sirakoro power plant (56 MW).

The government of Mali is also creating an enabling environment for private investors in the energy sector through several mechanisms such as the *Fonds d'Électrification Rurale*, established in May 2005 and managed by the *Agence Malienne pour le Développement de l'Énergie Domestique et de l'Électrification Rurale* (AMADER), which has the objective of providing funds for studies, strengthening the management capabilities of private operators and providing co-financing for rural electrification investments.[10]

## Challenges in the implementation of reforms

The implementation of these reforms has not been without challenges. These challenges can be summarized as follows:

### NIGERIA

Despite the establishment of the Multi-Year Tariff Order (MTYO) in 2015 as a tariff model for an incentive-based regulation of electricity prices from time to time over a 15-year period, the end user tariff has not been cost reflective. The MYTO was established as part of the drive for privatization and to ensure that prices charged by licensees are fair to customers and sufficient to allow the licensees to finance their activities and to allow for reasonable earnings for efficient operation. The lack of cost-reflective tariffs has led to a huge sector cash deficit,[11] which does not provide any investment incentive to private sector owners. This situation is further worsened by the inability of the NERC to implement reviews in order to alleviate the volumetric risks associated with the MYTO generation assumptions.

The lack of cost-reflective tariffs has also adversely affected the performance ratio of DisCos in recent years. There has also been a lack of effective governance and enforcement of rules and policies in Nigeria's power sector, which has led to a mismanagement of funds, poor revenue generation and inefficient collection.

Nigeria's power sector is faced with a lack of proper funding and dwindling income, which may be due to the collapse of global oil prices. The sector is also facing myriad structural problems that continue to hamper growth such as a shortage of gas supply for thermal plants, a high level of unpaid electricity bills and the country's outdated and poorly maintained transmission network, which the government still owns but has put under private management. Also, the existing transmission network cannot handle more load than current peak electricity production. Furthermore, many of the new power operators have struggled to make progress, especially as they have had to contend with aging facilities requiring substantial investment to upgrade and expand.

### MALI

Mali's power sector has experienced poor management of its state-owned electricity utilities, relying on subsidies from government and multinational banks. The sector has huge financing needs and requires strong partnerships with investors, mostly from the private sector, in order

8 The World Bank Mali Electricity Sector Emergency Project (MESEP) (P166796) http://documents.worldbank.org/curated/en/864571522875815839/pdf/Concept-Project-Information-Document-Integrated-Safeguards-Data-Sheet-Mali-Electricity-Sector-Improvement-Project-MESIP-P166796.pdf

9 Ibid

10 Renewable Energy Mali: Achievements, Challenges and Opportunities, Ibid

11 According to the Nigerian PSRP: 2017 – 2021 documentation, "between February 2015 and December 2016, the market shortfall (amount owed by discos to the rest of the market) is estimated at NGN473 billion (USD1.5 billion), while the tariff shortfall (amount owed by consumers in aggregate to the power sector) is estimated at NGN458 billion (USD1.4 billion)." https://mypower.ng/wp-content/uploads/2018/02/PSRP-Master-Document-January-2018.pdf

to meet these needs. In addition to the investments needed for power generation, the transmission and distribution segments of the power sector will require approximately USD1.4 billion by 2034 and an average of USD27 million per year in investment, respectively.[12]

## Prospects and opportunities for growth

West Africa will continue to be an attractive investment destination given its abundant natural resources for power. The power and energy sector is a critical driver for growth and development across the continent and it is important that the sector reaches its full potential and addresses the energy needs of its consumers.

West Africa is highly dependent on fossil fuel powered plants, which – besides the environmental implications – create a problem for supply and price variability. There is an increasing need for the region to focus on low-fuel, low-carbon power systems for electricity generation which will help to alleviate the problem of access to energy, especially in rural areas of the region where the cost of transporting electricity from large-scale power plants is high. The International Renewable Energy Agency (IRENA)[13] predicts that renewables, including hydro, will account for more than 50% of the power generation share by 2030 in West Africa, rising from the current level of 22%. Across the region, renewable technologies are a path to diversification of energy sources. Hydropower is a significant source in Côte d'Ivoire, Guinea-Bissau, Liberia, Nigeria, Sierra Leone and Ghana. Solar PV, wind and biomass-based electricity generation remain a small part of the overall regional electricity generation mix in some countries. The three technologies together account for more than 90% of domestically produced, grid-connected electricity in Burkina Faso, Togo and Benin and more than 60% in Gambia, Guinea-Bissau and Senegal. By 2030, West Africa could benefit from importing more than 30 TWh of hydroelectricity via DRC and Cameroon, but Guinea also has the potential to become an electricity exporter by sending more than 4 TWh of electricity to neighboring countries such as Guinea-Bissau, Mali, Senegal and Sierra Leone, as well as to Côte d'Ivoire through Liberia. Côte d'Ivoire would in turn, export to Mali, Burkina Faso and Ghana.

In order to tap into the immense potential for growth in the power sector of West Africa, governments of the region need to design power policies which will address:

- the maintenance of existing power infrastructure;
- the periodic institutional reform of utilities and service providers; and
- improved subsidy policies and practices that could help save a substantial percentage of the annual cost required to fill infrastructural gaps.

Investment in off-grid renewable energy presents an attractive option for investors in countries where most of the population either have no access to the grid or are unable to afford a connection to the grid. Off-grid solar energy can provide access to lighting and, in some cases, mini renewable-based electricity generators. Furthermore, in order to encourage local sourcing and consequently reduce cost, West African countries can venture into the production of manufacturing materials and components required for power generation plants and distribution lines. More indigenous companies should also be encouraged to venture into the construction, operation and maintenance stream for power projects.

The role of the private sector in addressing the region's power deficit is crucial. In view of the increasing electricity demand and lack of adequate financial resources, more public-private partnerships (PPPs) should be encouraged in order to address the power deficit situations in the respective countries of the region. However, to achieve the level of investment required in the sector, there is a need to improve the investment conditions for electricity access-related projects. This can be achieved by providing more clarity on the investment framework, ensuring market transparency and encouraging consultations over the pace of grid extension in West Africa. Closer cooperation should also be built between investment promotion agencies in the region in order to enhance access to information on investment opportunities across the region.

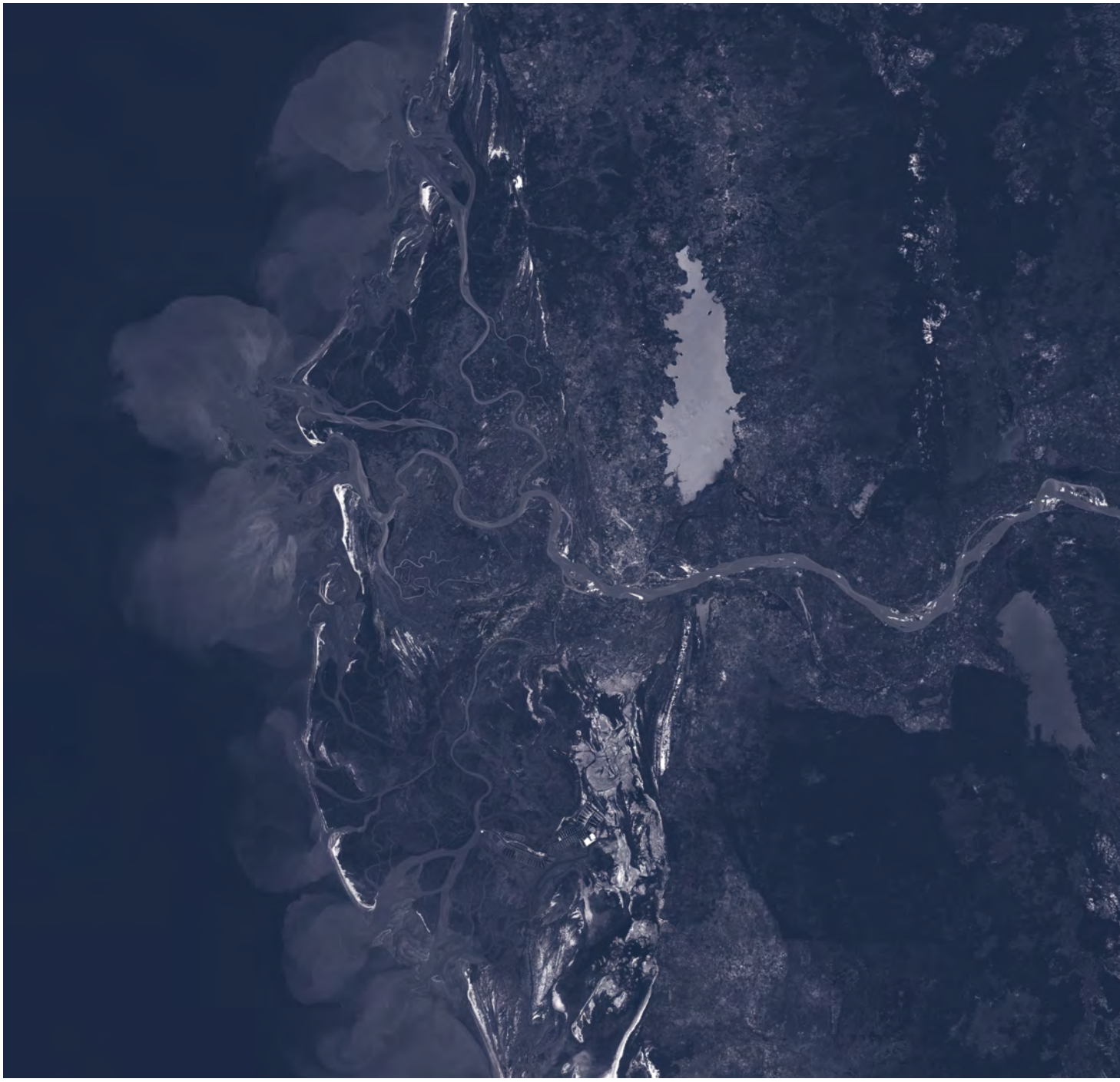
12 As per the Masterplan contained in: *'Étude de la demande et du plan directeur d'investissements optimaux pour le secteur de l'électricité au Mali, Artelia Eau and Environnement'*, March 2015

13 IRENA, *Africa Power Sector: Planning and Prospects for Renewable Energy*, https://www.irena.org/documentdownloads/Publications/IRENA_Africa_Power_Sector_synethesis_2015.pdf

## Conclusion

The World Bank estimates that integrated power trade in West Africa could lead to cost savings of between USD5 billion and USD8 billion per year by enabling countries to import cheaper sources of electricity and increase access to affordable, reliable and modern energy. The integration of electricity grids is expected to create more sustainable sources for power generation by replacing oil-fired baseload power generation with renewable sources. The integration is also expected to ensure that there are fewer energy shortages and that the West African market becomes more attractive to private sector investment in power generation.

A well-functioning power market requires the right infrastructure as well as strong collaboration among the key players at all levels in the sector. For the regional power market to achieve its full potential, there must be improvement in the creditworthiness of the sector, contracts must be strengthened and guarantees provided, in order to boost investor confidence in the market.



# The rise of alternative energy in Africa: Geothermal power generation

**Lisa Dutiro**
**Candidate Attorney**
Manokore Attorneys
DLA Piper Africa member firm in Zimbabwe
ldutiro@manokore.com

While climate conditions threaten the hydropower industry, solar and wind power continue to offer commercial viability. But much of Africa's renewable energy potential remains untapped and the scope for growth could create investment opportunities across the continent. Could geothermal energy be the solution to Africa's energy crisis?

## The current state of Africa's power supply

Africa is undergoing a period of accelerated economic growth and transformation in response to global pressures and demands. The availability of energy is a fundamental requirement for Africa to be able to foster and harness its sustained growth and achieve economic and social development. It has been estimated by the International Renewable Energy Agency[1] that by 2050 the continent will be home to at least 2 billion people – almost double its current population. The rapidly increasing populace has led to power production capacities in Africa failing to meet current levels of consumption and demand. The deficiency in the supply of power across African nations is likely to hinder the continent's drive to achieve its economic growth projections.

The lack of power supply in various African countries can be attributed to the poor management of power utilities, the high costs involved in processing fossil fuels, and the large losses that are experienced from the aged electrical grids, as well as high tariffs. With the lowest electricity generation capacity and the most acute form of energy poverty in the world, Africa is in crisis because of the failure of traditional methods of power generation.

## A move towards renewable energy

As Africa labors for sustainability through dependency on costly and polluting energy generation, global efforts to eradicate reliance on finite fossil fuels have ushered renewable sources of energy into the spotlight.

The use of renewable energy allows countries to enhance their self-sufficiency and limit dependency on costly imports. Renewable energy is clean, nondepletable and has a much lower environmental impact than conventional energy sources. It guarantees sustainable future energy supplies and could help Africa achieve its economic objectives. The growth of the use of renewable resources on a global scale has led the cost of associated technology to fall dramatically. According to statistics provided by the African Development Bank in 2017,[2] Africa's untapped renewable energy potential is estimated at 350 GW for hydroelectric energy, 110 GW for wind energy, 15 GW for geothermal energy and 1,000 GW for solar. If this large reserve of renewables is exploited, its effect could potentially alter the economies of many African countries, making it a key priority of sustainable development.

Historically, hydropower has been the most commonly used renewable source of energy in Africa. However, given climate change, hydropower generation has become very unpredictable as droughts continue to sweep across the continent. More recently, wind

1 Africa's Renewable Future, The Path to Sustainable Growth, International Renewable Energy Agency,2013.

2 M. Hafner et al., *Energy in Africa*, Springer, Briefs in Energy, https://doi.org/10.1007/978-3-319-92219-5_3, page 47.

and solar power have become commercially viable, and although they are similarly reliant on weather conditions, solar energy potential in Africa remains high due to the continent's location. Options for power generation from solar energy include utility-scale conventional or concentrated photovoltaic (PV) and concentrated solar thermal power (CSP), as well as small-scale PV systems suitable for off-grid power generation. Solar energy can also be used to produce heat for domestic users or non-intensive industrial users. Top ranking solar markets are South Africa and North African countries due to their strong policies and commitment to investment. The Ouarzazate Noor solar complex in Morocco is one of the largest concentrated solar plants in the world; the plant aims to produce 2,000 MW by 2020, 680 MW of which has already been successful launched.

Wind turbines are widely used in most countries and are central assets for many rural communities. Factors determining the potential of wind power are wind speed, pressure gradients and the geography of the landscape. The presence of deserts, coastlines and natural channels also make for favorable wind speeds. Consequently, the best regions in Africa for wind farms are in the rugged regions of the Sahara, along coasts and in the Southern African mountains and the Horn of Africa. Wind power production in sub-Saharan Africa is currently booming, and East Africa is leading the way with Kenya's recently unveiled wind power project – the Lake Turkana Wind Power Farm, which is the largest wind farm in Africa. It has 365 turbines and a capacity to dispense 310 MW of reliable, low-cost energy to the national grid.

Much like wind and solar power, geothermal energy has the potential to support the African power sector as it moves away from being overreliant on hydropower and toward becoming drought resilient. Africa's known geothermal potential is predominantly present in the geologically active area of the Great Rift Valley, which extends from Djibouti to Mozambique. The valley is known to have over 30 active volcanoes and countless hot springs. With only 0.6% of Africa's known geothermal potential being exploited, this energy source has been described as a hidden gem in sub-Saharan electricity production.

Although countries around the continent are exploring renewable energy potential and engaging in many notable projects, few countries have specific renewable energy laws or investment incentives. This creates difficulties in attracting foreign investment into the sector, and into less-developed energy sources such as geothermal energy, despite its abundant potential.

## The untapped potential of geothermal energy

Geothermal energy is a form of renewable energy that can produce sustainable electricity using the Earth's own resources. It is generated and stored in the earth and can be captured from hot water springs or reservoirs located near the surface. These hot springs are found where water percolates into areas of volcanic activity in the Earth's crust and becomes superheated before forcing its way back to the surface. Heat derived from the hot water can be converted into electricity through electromagnetic induction. Geothermal heat can provide electrical power that is not dependent on weather conditions, making it a reliable renewable source of energy. The three most known types of geothermal power plants that convert thermal energy to mechanical energy and finally to electrical energy are binary plants, dry steam plants and flash plants. Binary plants can exploit low temperatures and do not release geothermal fluids or environmental hazards into the environment, making them a preferable mechanism for geothermal power generation. Other innovative ways in which geothermal power can be generated are through the conversion of waste heat from industrial processes, power stations and transportation into electricity through engineering that permits the thermal energy produced from the waste to drive a turbine. Although the necessary technology is not widespread in Africa, geothermal energy can also be used in industries that need heat at low temperatures.

Kenya is currently the largest geothermal energy producer in Africa, with its power production contributing to over 40% of the country's electricity generation. The East African nation has successfully harnessed its geothermal capabilities, generating an estimated 630 MW, with nearly 400 MW of that production coming online since 2014. Kenya began exploring geothermal power in the late 1970s, and according to the Geothermal Council Resource

3 L. *Dutiro, The Power of the unknown: Geothermal energy in Zimbabwe*, The Chronicle published 11 June 2019.

(a US industry association), the rise of Kenya's geothermal industry ranks ninth in the world.[3]

The Infrastructure Consortium for Africa and the United Nations Environment Program has estimated a potential of 20,000 MW of geothermal energy across Eastern Africa, and nations such as Tanzania, Uganda, Rwanda, Djibouti, Eritrea and Comoros have undertaken preliminary exploration for geothermal potential. Ethiopia is currently harnessing its geothermal capacity, and according to Reuters, is aiming to reach 1 GW by 2021.[4] Burundi, Zambia and Uganda are also currently operating small-scale geothermal plants.

Geothermal exploration can be expensive and risky. Much like oil and gas exploration, the exact potential of a site can be assessed and known only after drilling has taken place. Further impediments to the harnessing of geothermal potential in Africa are the lack of funding and technical expertise and poor governance. Many governments are still developing knowledge capacity for the sector. Countries that have not included geothermal production in their legal frameworks need to amend existing frameworks or craft legislation regulating investment schemes, development activities, the generation and distribution of electricity and the rights and obligations of holders of different kinds of licenses (exploration, development, use and selling) for geothermal exploration and production. Various incentive schemes that apply to renewable energy projects or projects that are likely to have national and economic impact tend to draw investor interest. However, a lack of regulatory frameworks specifically pertaining to geothermal production has the potential to ward off prospective investors, emphasizing the need for legislative development in this area.

## What's next for Africa?

In order for Africa to remain economically competitive and succeed in the rapidly growing global economy, its future energy needs will need to be considered and addressed at a legislative, technological and commercial level. Reliance on costly fossil fuels has failed to meet current power demand across the continent and there is a need for further engagement of alternative energy sources by African governments, FDIs and regulators. Renewable sources of energy will assist in the eradication of poverty and deprivation among the African population and stimulate economic growth and activity in the region. Further exploration into the mostly untapped potential of geothermal generation should be encouraged due to its reliability and ability to provide long-term, sustainable energy to the continent.

4 Note 2 at 63.

# Rwanda's Lake Kivu: Electricity generation through methane gas

**Colette Bitali**
**Associate**
Equity Juris Chambers
DLA Piper Africa member firm in Rwanda
colette.bitali@equityjuris.com

A hidden gem lies in the west of Rwanda, full of fear and promise. Just a few years ago, its full potential was untapped, its very nature was misunderstood, and it was considered a catastrophe waiting to happen. It is Lake Kivu, located on the border of Rwanda and the Democratic Republic of Congo, and covering an area of 2,700 $km^2$.

The lake contains naturally occurring carbon dioxide and methane gas, making it one of three lakes in the world – the other two are in Cameroon – known to have a deep concentration of naturally dissolved gases.[1]

Lake Kivu, however, has almost 1,000 times more concentrated dissolved gases than its Cameroonian counterparts, which both erupted in the 1980s.[2] Lake Kivu has about 300 billion $m^3$ of carbon dioxide and 60 billion $m^3$ of methane gas, giving it the capacity to produce between 120 million and 250 million $m^3$ of methane gas annually.[3]

The reason for this concentration of gases is that the lake sits in a highly volcanic area; carbon dioxide enters the lake from the volcanic rock beneath it, and is converted into methane gas by the bacteria and fermentation of biogenic sediments in the lake. It has been likened to a bottle of fizzy drink that, when shaken, releases gas.[4]

For many years, Lake Kivu was considered a hazard by nearby residents. After several people drowned, a myth emerged that the methane gas had sinking properties. There were also fears that the water was becoming more acidic and inhospitable for fish – a large source of food and income for residents. And most importantly, there was fear of the lake erupting by methane igniting once it came in contact with air and concern that nearby residents could be asphyxiated from toxic greenhouse gases.

Under Rwanda's transformation agenda, the government wants to address the growing energy deficit by providing access to power to all Rwandans by 2024. So it decided to change the narrative around Lake Kivu by attracting private investors.

In 1963, Union Chimique de Belge began using purified methane gas with a pilot plant in Rubona, a neighborhood on the shore of Lake Kivu. But it was not until 2015 that further methane-to-power projects were implemented.

KivuWatt, a project managed by Contour Global, was the world's first large-scale methane-to-power project. The project extracts methane from Lake Kivu to generate electricity, expanding household access to power, lowering costs, and reducing environmental hazards.[5] The first phase of the project used three gensets to

1 Rwanda Investment Group
2 BBC News
3 Rwandan Ministry of Infrastructure
4 See note 3 above
5 Contour Global

produce 26 MW of electricity for the local grid. The second phase is expected to deploy nine additional gensets at 75 MW, essentially doubling Rwanda's power production. KivuWatt extracts gas from 350 m beneath the lake, and returns carbon dioxide into it to ensure balance and continuity of the ecosystem. The methane gas is separated and used to propel turbines, which then generate electricity.

Separately, the Lake Kivu 56 project plans to generate 56 MW under its 25-year concession with the Rwandan government, which has also entered into a USD400 million concession agreement with Gasmeth.[6] Under this agreement, Gasmeth will process and compress the gas onshore to create compressed natural gas,[7] and create a distribution and retail network for the distribution of this and biofuel replacement across the country.

The methane in Lake Kivu is estimated to have the capacity to generate 700 MW of electricity over a period of 55 years. Rwanda's share of the total generation potential is about 350 MW, with the rest being shared with the Democratic Republic of Congo.[8]

The government has established a supervisory body – the Lake Kivu Monitoring Program – to ensure the safe extraction of methane gas and protection of the surrounding population through preservation of the lake's stability. Gas laws and regulations for methane projects are under review and expected to be gazetted soon.[9] The gas law will establish a framework for the development of gas infrastructure and operations in Rwanda.[10]

Investors have found it challenging to find experts and bring them to the remote area of the lake, and to mobilize the required financing. Despite this, they have managed to explore this natural resource and optimize its use for the benefit of Rwanda and themselves. More challenges lie ahead, but without a doubt Lake Kivu today holds more promise than risk.

6 Bloomberg

7 Gasmeth

8 New Times

9 Rwanda Development Board, *Energy: The Opportunity in Rwanda*

10 Rwandan Draft Gas Law (on EI Source Book)

# Land acquisition in Kenya: The Achilles' heel of the energy sector


**Beatrice Nyabira**
**Partner**
IKM Advocates
DLA Piper Africa member firm in Kenya
bnyabira@ikm.co.ke

**Judy Muigai**
**Director**
IKM Advocates
DLA Piper Africa member firm in Kenya
jmuigai@ikm.co.ke

**Jane Nduati**
**Associate**
IKM Advocates
DLA Piper Africa member firm in Kenya
jnduati@ikm.co.ke


In recent years, Kenya has seen a significant increase in infrastructure-related investments, the majority of which focus on transportation and energy. This, coupled with Kenya's potential for scalable renewable energy projects, positions the country for an instrumental role in the African energy market.

For many of these projects, issues relating to land have proved to be particularly challenging. Land is an integral part of any infrastructure project. The importance of land rights to the bankability of a project cannot be overstated, especially because a good number of the associated risks continue throughout the life of the project.

It is therefore un surprising that investors are wary when it comes to the land-related aspects of a project. This article seeks to analyze some of the pertinent land issues that affect investors in energy infrastructure projects in Kenya.

## Investor concerns

### LAND CONTROL BOARD CONSENT

The Land Control Act (LCA) makes it mandatory for parties to obtain Land Control Board (LCB) consent for transactions involving, among others, the sale, transfer, lease, charge and subdivision of agricultural land, which includes land not within a municipality or township. Given the land-intensive nature of energy infrastructure projects, most project sites are located in rural areas, invariably meaning the land is agricultural.

The LCB is charged with ascertaining that certain conditions are met before granting consent, and it considers, among other things, the effect of the proposed transaction on the economic development of the land. More importantly, the LCB is required to refuse consent where the application is made by a non-citizen or a private company with any non-citizen shareholder. This poses a significant challenge, given the capital intensive nature of infrastructure projects, which in most instances call for some level of foreign investment. Fortuitously, the Land Control Act provides for an exemption from the requirement to obtain LCB consent where presidential exemption has been obtained. However, in a number of cases, project developers have to find innovative ways to navigate the LCB consent requirement, including through the creation of project companies that are initially wholly owned by Kenyan citizens pending approval for change of use of project land to non-agricultural purposes. Another option has been incorporating or converting project companies to public

companies, which curiously are not as limited in terms of ownership of agricultural land. In comparison, countries like South Africa require government consent only when it comes to subdividing agricultural property, rather than in the event of acquisition by a foreigner.

To support investors, the recently enacted Energy Act 2019 requires national and county governments to facilitate acquisition of land for energy infrastructure development. The Energy Act does not, however, elaborate on what form such facilitation would take. One of the suggestions floated by industry stakeholders is that the government could facilitate land acquisition by exempting energy, and indeed all infrastructure projects, from the requirement to obtain LCB consent.

### OWNERSHIP OF LAND BY NON-KENYAN CITIZENS

In Kenya, freehold title over land cannot be held by a non-Kenyan. The law only allows foreigners to hold leasehold interest of a maximum of 99 years. This restriction is common on the continent, and countries such as Uganda and Ghana have similar requirements. This is in contrast to countries such as South Africa and Egypt, where foreigners can hold freehold interest over property without limitation.

The silver lining in Kenya is that the maximum duration of the leasehold interest (99 years) is longer than the expected lifespan of energy projects, which are usually around 20 to 25 years.

### COMMUNITY ENGAGEMENT

As with other countries, inadequate or inconsistent community consultation can be fatal to a project, especially if community members hold a subjective or inflated estimation of what they are entitled to.

It is not unusual for disputes to arise in cases where the community is concerned about what it considers to be poor compensation for land, the effects of projects on the community and the perception of meager benefits from the project. The importance of "social license" was most recently demonstrated in the Kinangop Wind Power Project, which was affected by land and community disputes, thereby underpinning the importance of a proper and continuous community management plan.

Project developers must therefore consult effectively with communities in order to recognize legitimate land rights, assess the impact of the project on local land rights and livelihoods and establish conditions for a productive relationship with the community. There are many success stories, such as the Kipeto Wind Farm, that have successfully negotiated compensation and leasing of land with over 100 landowners by dedicating time and resources to community engagement.

### RIGHTS OF WAY AND EASEMENTS

In addition to acquiring land rights over the main site where the plant will be developed, developers must also consider easements and other similar land rights to cater for the transmission and distribution networks for the power the proposed plant is to generate. This often involves negotiations with and compensation of multiple landowners.

This challenge is not exclusive to the private sector and is also a hurdle for government agencies such as Kenya Electricity Transmission Company. In July 2019, for example, the *Business Daily* newspaper reported that the Company was experiencing delays in completing power lines worth KES38.7 billion (USD387 million) due to, among other issues,
way-leaves acquisition.

In cognizance of this issue, the Energy Act has included provisions aimed at easing the process of acquiring rights of way and easements for energy projects.

### AUTHENTICITY OF TITLE DOCUMENTS

Having a decentralized and somewhat manual land registry system has meant that the validity of title documents can at times not be authoritatively verified. Fortunately, however, significant land reforms designed to counter this problem are being prepared. The move to digitize the land registry records will be particularly helpful in this regard.

## Conclusion

Land acquisition challenges can be a disincentive for investors in infrastructure development in Kenya. Positive moves in the country are already underway to address the concerns set out above.

Although land-related project challenges can be found throughout Africa, Kenya finds itself in a unique situation due to the prevalence of relatively small parcels of land that either are privately owned or constitute community land.

In neighboring Tanzania, all land is vested in the government to hold on behalf of its citizens. Foreign companies can obtain a right of occupancy from the government, provided that they have a Certificate of Incentives issued by the Tanzania Investment Centre. Uganda, on the other hand, has similar land ownership structures to those of Kenya, but the Uganda Investment Authority has a one-stop-shop for investors, which includes an embedded land registry function that assists in the verification of land ownership. Taking this into account, there are some practices that Kenya can borrow from its neighbors in order to reduce the current land acquisition difficulties in the energy sector.

# Renewable Energy in Mozambique

**Isabel Jamaca**
**Associate**
Sal & Caldeira Advogados, Lda.
DLA Piper Africa member firm in Mozambique
ijamaca@salcaldeira.com

Currently, 82% of Mozambique's power generation capacity comes from hydro sources. But the country has a vast diversity of energy resources, of which approximately 88% are renewable, representing an aggregate potential of more than 23,026 GW – sufficient capacity to both meet domestic demand and export to neighboring countries.

The country's 2009 New and Renewable Energy Development Policy aims to promote the use and exploitation of renewable energy resources to both accelerate access to modern forms of energy and create a favorable investment platform.

## The regulatory framework

In the Mozambican legal system, there is no specific legislation on the licensing of power projects from renewable energies, and so they are governed by the general electricity legislation, such as the Electricity Law and Concession Awarding Regulations, which mandate a government-issued concession contract regardless of the generation capacity of the project.

Prior to initiating a project, a renewable power project's sponsor must obtain authorization from the minister of mineral resources and energy to carry out technical studies and any other research related to the project as a precondition for the award of a concession. The only exemption from this requirement is where the project concerns the production of electricity for private consumption (i.e. where it is not supplied to third parties).

As a general statutory rule, concession contracts are granted through a competitive public tender. Depending on the generation capacity of the proposed project, the public tender takes place at either a local government (district) or municipal level, with the Council of Ministers taking responsibility for projects with a capacity of 100 MW or more.

Public tenders are managed by the recently established Energy Regulatory Authority (ARENE), which will, among other things, assess the impact of the project in the internal market so as not to affect the free competition. ARENE will also ensure that project sponsors and developers comply with power generation legislation.

Mozambique's Megaprojects Law provides for an exception to the public tender rule, and allows for a direct award, subject to certain conditions, one of which is prior authorization from the Council of Ministers.

Direct awards have been used in two recent renewable energy projects: the Metoro solar power plant in Cabo Delgado, and the Mocuba solar project in Zambézia. In fact, most power projects are granted through direct awards.

Despite this, the government proposes to use the public tender process as a way of sourcing renewable projects. In October 2017, the minister of mineral resources and energy launched a project aimed at designing an auction mechanism for renewables. The first auction is due in 2020.

## Challenges and reforms

Some of the key challenges to the successful implementation of power projects:

- the need for a government-issued concession contract, the requirements for which are the same regardless of the project's generation capacity;
- protracted concession and PPA negotiations and a lack of timely responses from the relevant authorities;

- issues of currency (in)convertibility;
- the inability of the Mozambique government to provide credit A+ guarantees requested by lenders; and
- the government deciding not to grant certain guarantees, such as a political risk guarantee, that would render the project bankable.

There is a need for simplified procedures for the awarding of concessions or even the licensing of renewable energy projects. The current procedural mechanism under the Electricity Law is being reviewed, and we submit that the government should simplify things and establish a straightforward and quick contracting regime for renewable projects.

Recently, the government has launched several initiatives and supported new platforms for the creation of a safe, sustainable and favorable investment environment for renewables, including:

- the enactment of the Tariff Regime for New and Renewable Energies, which sets the tariff mechanism for such projects with a generation capacity below 10 MW, specifies eligibility requirements and provides the option of sharing gains resulting from the carbon credits with energy producers;
- the development and publication of the Mozambique Renewable Energy Atlas, a comprehensive guide to the renewable energy sector at a national level, and to the market conditions and the challenges that potential investors may encounter;
- the review and improvement of the existing electricity sector legal framework, and the development of an appropriate legal framework for the renewable energy sector; and
- the creation of financial, fiscal and other incentives for the implementation of renewable energy projects, including:
  - fiscal incentives based on the prices and tariffs for the new and renewable energy supply systems;
  - provision of subsidized financing for renewable energy projects through public funds and low-interest loans or government loan guarantees
  - exemption from customs duties and the payment of VAT of any kind on any plants or equipment classified in class K of the customs tariff, and corresponding parts and accessories related to such plants and equipment;
  - tax incentives destined to promote the domestic production of equipment under a special investment regime, such as an industrial free zone; and
  - the reduction of corporate income tax during the first 15 years of the lifetime of a project, with a reduction of up to 80% in the first five fiscal years.

Another issue is the fact that all electricity produced in Mozambique is sold to one single offtaker: Electricidade de Moçambique, the state-owned power company. This has a negative effect on tariff negotiations – not only because of the monopoly, but also because the company manages the national grid, which makes it difficult to negotiate market-related tariffs.

# Our presence in Africa


DLA Piper has established market knowledge and deal experience working across the continent

- DLA Piper Africa
- DLA Piper has experience of working in these jurisdictions

DLA Piper is a global law firm operating through various separate and distinct legal entities. For further information about these entities and DLA Piper's structure, please refer to www.dlapiper.com

DLA Piper Africa is a Swiss Verein whose members are comprised of independent law firms in Africa working with DLA Piper

To find out how we can help you do business in Africa, please get in touch:
africaenquiries@dlapiper.com