Power to Africa volume 1: Nigeria (part 1)

BERWIN LEIGHTON PAISNER

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In our first instalment of BLP's Power to Africa series, we will look at the Nigerian power sector. This instalment will be split into two parts: the first looking at the challenges and opportunities facing power generation and distribution in Nigeria; and the second looking at Nigeria's energy policies and anticipated future developments in the country's power sector.

Executive Summary

As the largest country in Africa with 177 million people, it is not surprising that the daily demand for power in Nigeria is estimated at 10 GW.

Nigeria has traditionally relied heavily on its vast gas resources as the main source of its power generation. However, with civil unrest and low gas prices hindering production, and deficiencies with the country's transmission network, power supply only averages approximately 4 GW, with access to power limited to around 40% of the Nigerian population.

Despite these challenges, Nigeria has favourable conditions for alternative energy sources such as hydro, solar and wind which may be key to Nigeria's ability to meet rising demand.

Challenges

There are a number of challenges that the Nigeria power sector is facing. The key ones are explored below:

Transmission

It is estimated that Nigeria's transmission system can currently carry up to 5.3 GW of power, despite the country having an installed capacity of approximately 12 GW.

Nigeria's generation companies and distribution companies warned in 2014 that the operational capacity of the Transmission Company of Nigeria (TCN) was a threat to the safety and efficiency of their operations and equipment, costing them millions of USD each year.

Analysts agree that tackling issues in transmission and distribution is key to unlocking Nigeria's power potential. Accordingly, the TCN has made plans for the rebuilding and expansion of the transmission network. As transmission tariffs alone will not cover the USD 4 billion investment that is required to overhaul the system, the TCN has identified various funding options such as export-import bank financing and equity from multilateral institutions such as the World Bank.

Domestic Gas Supply

Nigeria's power supply is predominantly fueled by gas (85%), taking advantage of one of the largest natural gas deposits in the world, with 180 trillion cubic feet of proven reserves. However, harnessing this gas supply and mobilising it for the domestic market has been the real challenge.

Private companies produce an aggregate of about 8.9 billion cubic feet of gas per day, yet in 2014 supplied only 9% of this to the domestic power sector. Whilst low gas prices have meant that extraction levels are down, other issues such as regulatory uncertainty, limited funding and poor infrastructure (such as roads, railways and pipelines) have all contributed to this domestic issue.

This is vastly below the levels needed to meet current demands and, consequently, over a third of available gas thermal plants are non-operational with a number of planned gas IPP projects struggling to get up and running.

Liquidity

The power sector as a whole is not recovering enough cash from consumers to cover the cost of generating and delivering power. Customers, whether legitimately or not, often avoid paying the full contract price.

Nsika Udi, head of Nigeria's Port Harcourt Electricity Distribution Company revealed that the most critical challenge facing the distribution sector was how to

reduce the technical, commercial and collection losses of energy firms. He also stated that they lose "*238 million Naira from direct energy theft alone.*"

This led to the Central Bank of Nigeria establishing a fund to alleviate the losses incurred by the private sector.

Political unrest

The fractured social structure of Nigeria has long created an unstable political climate.

In July 2016, Nigeria had to completely shut down eight gas-fired thermal power plants in the Niger Delta region because militants continued to attack gas pipelines and cut supplies to the plants. These closures meant that Nigeria's generating capacity fell to 2,984.3 MW.

The Nigerian National Petroleum Corporation has made assurances that it will complete repairs of all vandalised gas pipelines to boost gas supply to the power plants. This promise comes as the TCN disclosed that it had restored power supply to Maiduguri in Borno State, which has been heavily disrupted by insurgency.

Opportunities

The combination of low gas prices and the need to increase the generation of power to meet rising demand, gives Nigeria a real opportunity to consider alternative sources of power:

Solar

On 21 July 2016, the Government of Nigeria (GON) signed power purchase agreements with 14 companies worth USD 1.75 billion to develop 1,125 MW of capacity.

It is no surprise that solar is making such advances; conditions in Nigeria are very favourable for solar power generation, especially in the north east of the country where radiation levels exceed 6500 watt-hours per square metre.

Major developers have also signed PPAs, including Pan Africa Solar for a 75-MW project at Katsina, and Nigerian Solar Capital Partners for a 100-MW project at Ganjuwa. According to the Ministry of Energy, another 38 solar projects have been proposed by various developers, although there are no details of their current application status.

Hydro

For decades, hydropower has been the foundation of grid-powered generation in Nigeria. The country boasts large rivers and natural waterfalls which have helped the relatively small hydro plants across Nigeria reach an estimated total capacity of 3.5 GW. It is thought that Nigeria has the potential to supply exploitable hydropower capacity of approximately 11 GW.

One reason for the shortfall between current and potential capacity is that investing in and establishing significant hydropower projects requires large amounts of funding and lead times.

The GON's aim is to increase hydroelectric generating capacity to 5,690 MW by 2020. One way of meeting this target is to upgrade old hydroelectric plants, but the GON is also keen to develop new sources, such as the proposed hydrodams at Gurara II (360 MW), Zungeru (700 MW) and Mambilla (3,050 MW).

Wind

Wind energy potential in Nigeria is more modest, with annual average wind speeds of about 2.0 m/s in the coastal region and up to 6.0 m/s at heights of 30m in the far north of the country.

The development of two large-scale wind projects in Kano State (30 MW) and Katsina State (10MW) are currently underway. The Katsina State project was awarded to a French firm, Messrs Vergnet SA in 2010 and scheduled for completion in 2012. However, it has been reported that to date not more than five out of a planned 37 wind turbines have been mounted.

When completed, projects such as these will provide first-hand experience on operating conditions and perspectives for grid-level wind power in Nigeria; helping to shape future policy decisions.

Conclusion

In this Part 1, we have explained the significant challenges that the Nigeria power sector is facing which are preventing the country from reaching its full potential. We have also highlighted some of the opportunities available to overcome these, specifically by focussing more efforts on renewable sources of power generation.

In Part 2, we look at Nigeria's energy policies and anticipated future developments in the country's power sector.

For more information please contact:

Segun Osuntokun
Partner – Head of Africa
T: +44 (0)20 3400 4619
Segun.Osuntokun@blplaw.com

Alexander Sarac
Partner - Projects, Energy & Infrastructure Finance
T: +971 (0)4 511 9710
Alexander.Sarac@blplaw.com

Simon Buchler
Associate – Projects, Energy & Infrastructure Finance
T: +44 (0)20 3400 3513
Simon.Buchler@blplaw.com

Dubai

Index Tower (East),
10th Floor (Office 1011)
Dubai International Financial Centre
PO Box 507222
Dubai
United Arab Emirates

London

Adelaide House, London Bridge,
London EC4R 9HA
United Kingdom

Segun Osuntokun
Partner, Head of Africa
T: +44 (0)20 3400 4619
Segun.Osuntokun@blplaw.com

Alexander Sarac
Partner, Projects, Energy & Infrastructure Finance
T: +971 (0) 4 511 9710
Alexander.Sarac@blplaw.com

Simon Buchler
Associate, Projects, Energy & Infrastructure Finance
T: +44 (0) 20 3400 3513
Simon.Buchler@blplaw.com

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