



### Solving Nigeria's electricity crisis through alternative energy sources

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#### **Recommendations**

*Nigeria's government should pursue more targeted steps to grow alternative power sources such as renewables and to increase overall electricity supply.*

*Diverse stakeholders need closer cooperation to anchor full deregulation of the gas sector, paving the way for an attractive pricing regime and increased investments in power generation.*

*Regulators must accelerate efforts on universal metering of customers, including through pre-paid meters to enhance transparency in revenue collection.*

#### **Introduction**

Nigeria is in a dire energy situation with 60-70% of its population of almost 200 million people living without regular access to electricity. The majority of rural homes are also not connected to the national grid. With this, Nigeria's industrial development and economic diversification plans are severely constrained. Experts estimate annual economic loss through power outages at about N126 billion (US\$ 984.38 million). Though millions of households and businesses rely on self-generated electricity through power generating sets, this represents a major source of waste, severe health and environmental costs, as well as other inefficiencies.

Electricity generation began in Nigeria in 1896 with the installation of a 2MW plant to provide electricity for Lagos. The first electric utility company known as the Nigerian Electricity Supply Company was established in 1929. By the year 2000, a Federal government owned monopoly, the National Electric Power Authority (NEPA), was in

charge of the generation, transmission and distribution of electricity. Reform efforts include the passing of the Power Sector Reform Act of 2005, which paved the way for the National Electric Power Policy aimed at establishing an efficient electricity market in Nigeria.

Following the return to civilian rule in 1999, the policy emphasis shifted to the transfer of ownership and management of power infrastructure and assets to the private sector. This led to the creation of structures required to create and underpin an electricity market in Nigeria<sup>1</sup>. The Power Holding Company of Nigeria (PHCN) was established to replace NEPA in 2005. PHCN comprised of 18 successor companies, including six generation companies, eleven distribution companies and one transmission company. By November 2013, the privatization of all the generation plants and ten distribution companies (*Yola DisCo is currently managed by the government due to the insurgency*) was completed. However, the Federal Government presently retains the ownership of the transmission company.

#### **Incomplete reform**

Reliable power supply is a prerequisite for the development of any nation. Consumers in Nigeria require safe, reliable and affordable power to create prosperity and lead a more fulfilling life. According to an analysis by the United States Aid for International Development (USAID), Nigeria's electricity output currently stands at an average of 5,000 MW, which is far below the installed capacity of 12,522 MW. These figures are grossly inadequate relative to the population size and the need of the economy.

Many consumers and businesses generate additional power through generating sets. In 2017, the country spent about \$5billion on fuelling generating sets<sup>2</sup>. Yet, insufficient

<sup>1</sup> <http://www.nercng.org/index.php/home/nesi/401-history>

<sup>2</sup> <https://www.vanguardngr.com/2017/07/5bn-spent-fuel-generators-annually-unacceptable-dogara/>



electricity generation is not the only problem. Most domestic and industrial consumers of electricity find it impossible to “predict when power from the national grid will be available for their consumption.”<sup>3</sup>

Clearly, the reform measures introduced by the Nigerian government to support the power sector have not achieved the desired end result. Consumers across the country who are connected to the national grid are yet to experience permanent improvement in power supply. Businesses have failed sometimes because they cannot afford to operate diesel-powered generators.

At all levels of the power value chain, power loss is recorded, sometimes as high as fifty per cent of electricity generated.<sup>4</sup> There is also the challenge attributed to the constant sabotage of gas pipelines, leading to gas shortages for generating plants. Inadequate transmission infrastructure similarly contributes to power loss at the transmission level.

The regulatory body, the Nigerian Electricity Regulatory Commission (NERC), affirmed that the current transmission grid faces significant technical constraints once electricity generation reaches 5000-5500 MW. Recently, the government’s emphasis has shifted to improving transmission infrastructure in order to minimise losses at the distribution level. Security around gas pipelines has also been stepped up to protect them from sabotage. Beyond these, more needs to be done to scale up existing power sources such as gas and hydro, whilst

enabling innovative, cleaner energy sources that can augment overall output and help diversify the energy mix.

### Gas supply and pricing constraints

Presently Nigeria generates much of its power from thermal power plants, gas-fired plants and hydroelectric turbines. The government has stated that 74% of the electricity generated are from gas-fired plants.<sup>5</sup> This invariably means that the country’s natural gas reserves can provide a way out of the extant power crisis. Nigeria sits on the biggest natural gas reserve on the continent and ranks 9th globally<sup>6</sup> with an estimated 180 trillion-cubic feet and a production span of about 60 years.<sup>7</sup>

However, most of the gas produced in the country is largely as a result of oil exploration and is flared for the most part. Nigeria flares about 17.2 billion m<sup>3</sup> of natural gas per year<sup>8</sup>. This is because major oil marketers and investor are reluctant to invest in facilities for gas production and processing. Investors have pointed to the fact that the gas industry remains highly regulated. Under the current regime, gas producers have quotas to be supplied for domestic consumption and this is usually at a fixed price.

Operators also complained that giving the high start-up capital required for gas exploration, it would be difficult to recoup investment with the present tariff system. The current tariff is below the international price and this has failed to incentivise needed investment. In as much as the pricing issue remains unresolved, major gas companies

<sup>3</sup> Ohajiana, A. Abumere, O. Owate, I Osarolube, E. (2014) Erratic Power situation in Nigeria: Causes and Solutions. International journal of Engineering Science Invention, Vol. 3, pg 51, available at [www.ijesi.org](http://www.ijesi.org)

<sup>4</sup> Ohajiana, A. Abumere, O. Owate, I Osarolube, E. (2014) Erratic Power situation in Nigeria: Causes and Solutions. International journal of Engineering Science Invention, Vol. 3, pg. 53, available at [www.ijesi.org](http://www.ijesi.org)

<sup>5</sup><https://www.thisdaylive.com/index.php/2017/10/18/fashola-hydro-now-contributes-26-of-nigerias-power-generation/>

<sup>6</sup> <https://www.cia.gov/library/publications/the-world-factbook/rankorder/2253rank.html>

<sup>7</sup> Facts and Figures on NLNG 2017. Available at <http://www.nlng.com/Media-Center>

<sup>8</sup> Dr. Uwem Udok & Enobong Bassey Akpan (2017) Gas flaring in Nigeria: problems and prospects. Global Journal of Politics and Law research.



will remain reluctant to make huge investment in gas production, processing and supply.

The passing of the Nigerian Liquefied Natural Gas Act, which created a joint venture between the Nigerian government and foreign oil companies (Nigerian Liquefied Natural Gas Limited (NLNG)), demonstrates the government's determination to utilize Nigeria's gas resources. However, only about 0.5 billion cubic feet per day is supplied to the domestic power sector<sup>9</sup>. This insufficient quantity remains a challenge to achieving power generation increase in the country.

### Liquidity issues in the sector

In addition to the identified challenges in power generation, the cash flow problem experienced in Nigeria's power sector represents a major factor constraining power supply. As at the end of December 2016, the revenue shortfall in the Nigerian electricity market had reportedly reached a staggering N1 trillion.<sup>10</sup> The debts owed by the sector to commercial bank stood at over US\$12.52 billion as at the last quarter of 2016.<sup>11</sup> One of the reasons for this cash crunch is the tariff regime set for the electricity Distribution Companies (DisCos) by the government. This is not cost reflective and has thus failed to attract investors.

Despite unanimous objection by the DisCos, the government passed the Eligible Customer

Regulation on May 15, 2017,<sup>12</sup> which permits eligible customers to buy power directly from the generation companies (GenCos) at an agreed price. Although the new regulation is expected to tackle the liquidity challenge in the sector by increasing competition along the electricity value chain, one of its consequences is the potential loss of customers by the DisCos. The potential customer loss, which can deter investors, has led to a ministerial directive in July 2018 for compensation to DisCos.

Huge collection loss is also a contributing factor to the cash crunch in the sector. Revenue collection is at the core of the power value chain. DisCos have reportedly generated revenue from only about 50% of end users of electricity already supplied.<sup>13</sup> This is largely due to consumers' refusal to pay for electricity used. Government ministries, departments, agencies and military facilities owe about N93 billion to DisCos and have mostly failed to pay up.<sup>14</sup> Under the privatization agreements, DISCOS have the responsibility to provide meters to consumers across the country, but the reality is that there is a huge metering gap of about 4.09 million customers.<sup>15</sup>

<sup>9</sup> B.O Orogun (2015), Natural Gas to Power in Nigeria, the practices and the way forward for sustainable development

<sup>10</sup> See "Three years after, private sector investors count loses" by Isiwu & Kalejaye; Sweet Crude Reports – A Review of the Nigerian Energy Industry, 9 November 2016 - <http://sweetcrudereports.com/2016/11/09/three-years-after-power-sector-investors-count-losses/>

<sup>11</sup> See '\$14.52bn Loans; Banks go after power sector investors' by Ezekiel Enojota; Financial Watch, October 3, 2016- <http://www.financialwatchngr.com/2016/10/03/14-52bn-loans-banks-go-power-sector-investors>

<sup>12</sup>FG declares eligibility in the power sector.

Available at <http://www.nercng.org/index.php/media-library/press-releases/506-fg-declares-eligibility-in-the-power-sector>

<sup>13</sup> Understanding and overcoming Nigerian gas-to-power challenges by Bolaji Osunsanya, MD, Oando Gas and Power; PWC Annual Power and Utilities Roundtable 2016

<sup>14</sup> <https://guardian.ng/business-services/mdas-n93b-unpaid-debt-threatens-power-sector-reforms/>

<sup>15</sup> Jerry Ehanmo and Ebere Onwuegbule; Bridging the Metering Gap Strategies for Success; PWC Advisory Outlook. Available at <https://www.pwc.com/ng/en/assets/pdf/bridging-the-metering-gap-part-1updated.pdf>



### Alternative energy sources

With an electricity demand of 41,133MW<sup>16</sup>, Nigeria needs to increase its power generation. In order to achieve this increase, alternative sources should be explored more concertedly. Renewable energy sources can help increase both output and efficiency. Today, renewable energy occupies centre stage in energy research and planning. With Nigeria's huge potential in renewable energy, the country can tap multiple energy sources. Hydropower as a renewable form of energy has contributed in no small way, providing according to one source about 32% of Nigeria's electric supply in 2015.<sup>17</sup>

Nevertheless, the development of other renewable energy sources like solar, wind and biomass is still relatively behind. This presents opportunities if the government can act as both enabler and an early adopter. In a bid to enhance development of renewable energy, the government has introduced the renewable energy masterplan. The plan aims at achieving a 10% contribution of renewable energy to Nigeria's total energy consumption by 2025.

With Nigeria still lagging behind many developing countries in the use of renewable energy, government initiatives like "light up rural Nigeria" need to be expanded. Incentives for renewable energy investments also must be better targeted. Major infrastructures like renewable projects require huge financial resources. Without the required capital investment and guarantees, sourcing the high start-up capital required will remain a major challenge.

The development of renewable sources also has to contend with inconsistent policy framework in the legal, fiscal and regulatory dimensions. These have failed to incentivise adequate investments required in the sector.

The absence of a transparent and consistent policy regime to support investors in renewable energy is therefore a major barrier to growing renewable energy in the country.

Also, the dearth of technical expertise to harness renewable energy sources has also been a hindrance. Although there are growing numbers of renewable energy projects such as the hydro plants in Mambilla, Zungeru and Gurara, other key sources of renewable energy are relatively new in Nigeria and remain on a modest scale. Examples include solar, biomass and wind.

### Recommendations

Government should refocus its efforts at developing the country's renewable energy potentials, to serve as an alternative source for increase in power generation. To achieve this, steps must be taken to attract the required capital investment in renewables. Government should guarantee returns on investment by putting in place tariffs that are cost-reflective.

The mini-grid regulation by the government is one of such avenues that can help increase electricity generation through renewables. It is designed to provide off grid power to areas without distribution infrastructure. Also, regulatory, fiscal and legal incentives should be formulated and implemented. Such incentives should be designed to augment themselves. For example, the government's mini-grid regulation can enhance investment in renewables if import tariffs on renewable technology can be waived. This will help reduce costs, which is a major constraint on development of renewable energy.

Total deregulation of the gas sector would also go a long way in attracting the required capital to help develop the sector and ensure constant supply of gas to generating

<sup>16</sup><http://www.nigeriaelectricityhub.com/2016/06/28/nigerias-power-demand-to-hit-88282-mw-by-2020/>

<sup>17</sup> M. F. Akorede, O. Ibrahim, S. A. Amuda, A. (2017); Current Status and Outlook of Renewable Energy





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companies. Deregulation would allow gas prices to be determined by the market thereby creating a more cost-reflective tariff regime. An evidence-driven quota system phased in in consultation with investors would help. This system should be designed to ensure a balance between the supply of gas for domestic use and the amount intended for export. In order to guarantee this constant gas supply for domestic use by the power stations, there is the need for increased security around gas infrastructures to help guard against pipeline destruction and vandalism.

Taking adequate steps to solve the liquidity issue in the sector would also help spur the required capital investment. This would guarantee the returns on investment and a better cash flow in the sector. Although the government has opposed proposed hikes in electricity tariff, this would only worsen the liquidity situation. Increase in electricity tariff has the propensity to improve liquidity in the sector as it would allow for better cash flow.

There is also need to ensure efficient revenue collection from consumers. A prepaid billing system should be essentially introduced across the country. Metering would ensure sustainable and transparent revenue collection by DisCos. The NERC's new regulation on metering came into force on April 3, 2018. The new regulation allows consumers to directly purchase meters from accredited meter providers. This shows the government's resolve to close the metering gap.

### Conclusion

To achieve its goal of 30,000MW by 2030, the Nigerian government has to step up its reform efforts in the power sector while also attracting capital investment. To this end, work will be needed on developing a reliable framework for data collection to help understand how much power is generated and utilized. Knowing the exact amount of power required by consumers is the first step in matching power generation to demand. The

availability of this data would likewise guide investment in the sector.

Although the privatisation process is yet to deliver on its expectations, the private sector can play a pivotal role in improving the power situation. By focusing on creating a more enabling environment, the government will help enable greater private sector financing. Creating a policy framework that would ensure returns on investment in the sector would go a long way in assuring potential investors. One way of achieving this is to put measures in place that would encourage lower interest rates for loans to power projects by commercial banks.

Finally, there is the exciting prospect of driving renewable energy growth in Nigeria – especially through decentralised solar, biomass and other projects – which can help to circumvent core challenges such as distribution, revenue collection and the huge upfront capital requirements, etc. that have so far constrained adequate electricity output. In encouraging this abundant, yet little tapped source, Nigeria can simultaneously meet its global climate and clean energy commitments whilst increasing its power generation capacities. This will enhance the much needed electricity access for millions of Nigerian households and businesses.

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