

Detail

OPPORTUNITIES FOR OFF-GRID SOLUTIONS IN THE NIGERIAN POWER SECTOR

INTRODUCTION

The Nigerian population is above one hundred and eighty three million, and about 55% of the population have no access to grid-connected electricity. Access to electricity in the rural areas is about 35% and in the urban areas, about 55%.

The Federal Government recently projected that by the year 2019, the country's generation capacity would be 10,000MW, and this is expected to consist of a mix of gas, hydro and renewable sources.

THE ON-GRID CHALLENGE

On-grid generation refers to a system of power generation evacuated through the national grid to off-takers which may be the bulk trader, (Nigerian Bulk Electricity Trading Company Plc.) who through vesting contracts supplies the power to Distribution Companies; or directly to Distribution Companies through bilateral contracts; or directly to Eligible Customers, as may be declared by the Minister of Power.

Presently, the installed power generation capacity in Nigeria is 12,522MW; out of which 10,592MW is gas fired; and 1,930MW is from hydro. It is worth noting that out of the total installed capacity, the peak generation by power plants as at the week of 12th June, 2016, is 2,591MW; while the maximum peak generation recorded so far in Nigeria is 5,074MW (recorded on 2nd February, 2016).

Most of the power received by Nigerian electricity consumers is on-grid power, through Distribution Companies (DISCOs). On-grid power generation has, however, had its constraints over the years, some of which are identified below:

- a) **Unavailability of gas:** About 85% of installed generation capacity is thermal. Although Nigeria has the world's 9th largest gas reserves measuring 180,105Bscf (Billion standard cubic feet); the country's gas production is significantly low. Gas constraint was reported to reduce power generation capacity by 4,274MW on 16th June, 2016.
- b) **Inadequate transmission infrastructure:** The existing transmission system is only capable of delivering about 5,000MW (out of the total installed capacity of 12,522MW) of power to DISCO trading points. Although, the Transmission Company of Nigeria plans to upgrade the transmission system to a capacity of 11,000MW by 2020 (subject to adequate funding and completion of planned projects); the transmission infrastructure in its current state, without an upgrade and improved technology, is unable to accommodate the estimated increase in generation by 2019.
- c) **Liquidity issues in the Nigerian Electricity Supply Industry (NESI):** The NESI has since the handover of the PHCN Generation Companies (GENCOs) and DISCOs to private investors in November, 2013, been faced with liquidity issues resulting from non-cost

reflective tariffs. The DISCOs, being the cash collectors in the power value chain were unable to collect sufficient revenue to pay their power bills which should sustain the rest of the value chain (GENCOs, gas suppliers and service providers). As a result, all the market participants in the power value chain are unable get their revenues in full and this has led to a cash crunch in the market. Although the new Multi Year Tariff Order, 2015 is perceived to be cost-reflective, the liquidity issues cannot fall away overnight, but should ease off over the next few years as DISCOs become more credit worthy.

- d) **Nigerian Integrated Power Project (NIPP) Privatisation:** Closely related to the liquidity issues highlighted above are the issues affecting the completion of the NIPP Privatisation. The privatization process of NIPP Power Plants has been fraught with issues including the liquidity issues in the NESI, non-availability of gas; and inadequate gas and transmission infrastructure.

Given the above, it is imperative that whilst the issues above are being resolved, we should look at viable solutions for increasing generation that would be somewhat be isolated from some of the issues raised above.

THE OFF-GRID SOLUTION

Off-grid generation can be described as stand-alone power generation systems or mini-grids, which typically provide smaller communities (e.g. rural areas; industrial clusters or residential estates) with electricity through independent electricity distribution network systems. The total off-grid electricity generation capacity as currently approved by the Nigerian Electricity Regulatory Commission (NERC) is less than 500MW (<http://www.punchng.com> November 6, 2015). There is, therefore, a need for significant investments in off-grid generation.

Prospects for off-grid solutions in Nigeria

- a) **Potential to grow industrial clusters and small cottage industries:** Most industrial clusters and some small cottage industries require uninterrupted power supply to function optimally. The power supplied could be generated through fully off-grid power plants or embedded within distribution networks. This could potentially transform the economy of these areas, and breed a crop of customers who are willing to pay for electricity supplied.
- b) **Opportunity to expand and refurbish distribution networks of the DISCOs:** In line with the NERC Regulation for Independent Electricity Distribution Networks, 2012 (IEDN Regulations), off-grid generation plants generally require Independent Electricity Distribution Networks (IEDNs) to supply electricity to end users. The creation of IEDNs in areas that are unserved or underserved by DISCOs provides an opportunity to expand DISCO networks. This presents a win-win situation for the DISCOs who could concession underserved loss making areas within their networks for a wheeling fee, or the DISCOs could compensate IEDN owners for infrastructure built within the IEDNs when the DISCOs decide to take over such areas.
- c) **Opportunity to collaborate with State Governments:** Many state governments in Nigeria are looking to partner with investors to develop off-grid projects to power public facilities such as schools, hospitals, administrative offices, street lights and traffic lights etc. Some others are looking at opportunities for public private partnerships (PPPs) to drive power supply to industrial and residential areas within the state. This strategy is critical for states, given that constitutionally, on grid power is regulated on the Federal level; therefore off-grid solutions present state governments with the opportunity to meet their development goals.

For example, Lagos State has developed (5) power plants through PPPs, and also plans to support industrial growth through the provision of continuous power supply at identified industrial estates.¹

- d) **Access to other fuel alternatives:** Most of the power plants in Nigeria are gas fired thermal plants. Given the current constraints with gas, off-grid power plants are able to take advantage of diverse and hybrid fuel sources like renewables (solar, wind and biomass) and because the power is not generated on-grid, transmission constraints with are eliminated.
- e) **Considerable insulation from the issues within the NESI:** Given Nigeria's considerable power requirements, off-grid solutions within a cluster of customers willing and able to pay present a viable investment opportunity for power developers. This is particularly because their investment would be insulated from the current liquidity issues in the NESI.
- f) **Opportunity for rural electrification:** Off-grid solutions are also useful in Nigeria in view of some topographical or geographical challenges in the rural areas which have made it uneconomical to extend the grid to such areas. A priority for Rural Electrification Agency (REA) should be the sustainable development of rural mini-grids that are targeted towards the economic development of rural communities.

Challenges to off-grid solutions

- a) **Regulatory framework:** Whilst there is the IEDN Regulations and a draft Regulation under consideration for Independent Electricity Transmission Networks; there is still a considerable amount of uncertainty with respect to the regulations as it relates to off-grid projects. Hence, a lot of discretion remains with NERC.
- b) **Resistance or objections from existing monopolies:** There is a likelihood of objections to the grant of off-grid licences from DISCOs over the areas where their DISCO licences currently cover. NERC also maintains a balance to ensure that a DISCO's market share is not eroded by the grant of off-grid licenses.
- c) **Access to gas:** As mentioned above, where gas is the main fuel source, there may be issues with gas supply.
- d) **Requirement for licensing for stranded power:** This is an issue for captive power plants who only have permits to operate, and not licences, when they have stranded power. The captive power plants cannot sell power to willing buyers with their permits, but must obtain generation licence(s) to sell.
- e) **Technology gap:** Due to the fact that many of the off-grid equipment are sophisticated, Nigerians need to develop the adequate technological know-how. It is common to find that many solar photovoltaic installed stop working shortly after installation. Also, renewables such as wind and biomass have not been fully explored in Nigeria, and would require adequate know-how for Nigerians to operate.

¹ <http://www.lseb.gov.ng/content/power-projects> <http://www.projectlightupnigeria.com/the-project.html>

CONCLUSION AND RECOMMENDATIONS

Nigeria can only achieve the desired increase in generation with a balanced blend of on-grid and off-grid power projects; and good utilisation of renewables. This could potentially lead to an accelerated journey to full electrification in Nigeria. In order to achieve this, we recommend the following:

- a) There is a need to create an investor friendly environment for off-grid solutions, which will allow for government support, tax incentives and reliefs to encourage investments;
- b) It is important for Nigeria to intensify efforts in seeking more funding support for the power sector from the World Bank, Development Finance Institutions and NGOs;
- c) The off-grid concept should be decentralised among the federal, state and local governments to allow for faster implementation of projects;
- d) There needs to be regulatory certainty and clarity with respect to the criteria for licensing off-grid projects in urban and industrial clusters;
- e) There is need for a workable compensation formula to create a win-win situation for investors and a DISCO, when such DISCO desires to take over their franchise areas; and
- f) Human capacity development is necessary to achieve adequate technological know-how for off-grid projects, especially for renewables.

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