1.0 INTRODUCTION:

The Nigerian population is estimated to be close to about two hundred million (200, 000, 000) by size and projected to exceed the population of the United States of America (U.S.A) by 2050. Average electricity consumption requirement for Africa and developing economies is estimated to be 1000 MW per million persons, which means for Nigeria to be self-sufficient, its current electricity needs, will be on average about 200, 000MW.

Yet Nigeria’s generation capacity hovered around 4, 810MW by December 2015 despite its installed capacity of about 12, 522MW.

Part of the challenges plaguing the power sector besides the regulatory mismatch within the Nigeria Electricity Supply Industry (NESI) stem from the distortions with on-grid supply fraught with a myriad of issues, ranging from constraints in gas feedstock (most of the power plants in Nigeria are fuelled by gas), weak and obsolete transmission infrastructure, inadequate metering infrastructure and unwillingness of consumers to pay for electricity consumed hinged on limited power availability, etc.

These on-grid issues amongst other factors have plunged the NESI into a liquidity crisis, thus making the industry less attractive for investment.

Going forward, off-grid and mini-grid solutions provide a variety of options that can be explored to meet the growing electricity needs of both the underserved and unserved population of Nigeria in urban and rural areas respectively. This report analyses the various off-grid and mini-grid options available from a legal and regulatory perspective.

2.0 CONCEPT AND APPLICATIONS OF OFF-GRID AND MINI-GRID SOLUTIONS:

2.1 OFF-GRID SOLUTIONS

Off-grid solutions are usually small scale, stand-alone power generation systems (usually ranging from up to 100kw and 5MW) usually not connected to the national grid network for supply.

2.2 MINI-GRIDS

Mini-Grids involve small-scale electricity generation (from 10Kw to 10MW), and the distribution of electricity to a limited number of customers via a distribution grid that can operate in isolation from national electricity transmission networks and supply relatively concentrated settlements with electricity at grid quality level.
3.0 POTENTIALS OF OFF-GRID AND MINI-GRID SOLUTIONS

3.1 Growth of Industrial Clusters and Small Industries:
Off-grid and mini-grid solutions have the potential to grow small businesses and drive growth of industrial clusters within the area of supply, where grid supply is unreliable and not sufficient. The constraints from grid supply arising from gas issues and grid collapse are circumvented with off-grid and mini-grid solutions for small businesses that depend on uninterrupted power supply.

3.2 Opportunities for Expanding the Energy Mix:
Nigeria has huge renewable energy potentials. Off-grid and mini-grid projects provide a veritable opportunity to drive the expansion of the energy mix through increased deployment of renewables, such as solar, biomass, wind and other forms of energy applications that are environmentally friendly.

3.3 Opportunity for State Participation:
Many state governments can partner with investors to develop off-grid and mini-grid projects in order to serve areas that were hitherto unserved within the state due to the lack of on-grid supply in those unserved areas, usually hinterlands or isolated communities.

3.4 Insulation from On-Grid Issues:
Off-grid and isolated mini-grid solutions have the potential of avoiding the rigorous regulatory constraints and liquidity issues currently blighting the NESI when carefully deployed.

4.0 THE LEGAL AND REGULATORY CONTEXT

4.1 Constitution of the Federal Republic of Nigeria, 1999 as amended (CFRN)
The CFRN provides the legal framework for the Nigerian Electricity Supply Industry (NESI) from which all other laws derive their existence.

By virtue of para. 14 of the Concurrent Legislative list, State Governments in Nigeria have been empowered to make legislations in respect of electricity in areas not covered by a national grid system within that State.

Significantly, having regard to the constitutional provision, in para.14, State Governments in Nigeria can actively participate in the setting up of any authority for the promotion and management of electric power stations established by the State to engage in generation, transmission and distribution of off-grid electricity (or even set up state grid systems).
However, the current governance structure of the Nigerian Electricity Supply Industry (NESI) reflects a domination of the Federal government underpinned by the enactment of the Electric Power Sector Reform Act, 2005 (EPSRA, 2005) to govern the Nigerian Electric Supply Industry (NESI).

4.2 Electric Power Sector Reform Act, 2005 (EPSRA)

The EPSRA, 2005 established a regulator (Nigerian Electricity Regulatory Commission, NERC) for the NESI and empowered same to enact regulatory instruments for shaping the NESI. The regulatory instruments of NERC cover both on-grid, off-grid and mini-grid electricity structures within the NESI.

In particular, section 62 (2) of the EPSRA provides that an undertaking for power generation not exceeding 1 MW will not require a generation license from NERC. Similarly, an undertaking for electricity distribution with a capacity not exceeding 100 Kilowatt (KW) will also not require a distribution license from NERC.

It follows from the above analysis that a NERC license will not be required for an undertaking with a generation capacity of 1MW and below and a distribution capacity of 100 KW in aggregate at a site. Thus off-grid generation with a capacity of 1MW or less will invariably not require a generation license from NERC.

5.0 ANALYSIS OF THE REGULATORY FRAMEWORK FOR OFF-GRID AND MINI-GRID STRUCTURES IN NIGERIA

5.1 NERC (Permits for Captive Power Generation) Regulation 2008

The regulation defines captive power generation to mean:

“generation of electricity exceeding 1MW for purpose of consumption by the generator, and which is consumed by the generator itself and not sold to a third-party”.

Regulation 3 provides that an intending captive generator shall apply for, and obtain, a permit before engaging in self-generation. Where the permit-holder intends to supply a surplus not exceeding 1MW to a third party, the written consent of NERC must be obtained.

On the other hand, where the surplus exceeds 1MW, a generation licence must be obtained from NERC in compliance with s.62 (2) of EPSRA, 2005. It is advisable for the regulator to enable an easier licensing process for captive permit holders with excess power (over 1MW) to sell to potential off-takers including distribution companies or eligible customers.

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1 See sections 32 and 96 of the EPSRA, 2005.
2 See Reg. 2.
3 See Reg.8 (a) and (b).
Captive power generation is about the most widely used form of off-grid structure in Nigeria, deployed by companies and large organizations in driving industrial processes\(^4\).

In total, about 1,300 MW of Captive Power permits have been issued. 78% of the issued permits are in three states such as Akwa Ibom (22%), Ogun (25%) and Rivers (31%); the major industrialised and oil and gas states. Interestingly, no permits or licenses have been issued for renewable captive power\(^5\).

5.2 NERC (Embedded Generation) Regulation 2012 and NERC (Independent Electricity Distribution Network) Regulation 2012.

Embedded Power is a form of distributed generation. Regulation 35 of the NERC (Embedded Generation) Regulation 2012, otherwise the EG regulation provides that:

> "Embedded Generation or ‘EG’ means the generation of electricity that is directly connected to and evacuated through a distribution system."

The EG regulation was also enacted along with the NERC (Independent Electricity Distribution Network) Regulation 2012, otherwise known as the IEDN regulation. Both regulations are to be read together to understand the regulatory context of embedded generation and distribution of embedded power as it relates to off-grid solutions on the basis that an embedded generator may generate electricity for the purpose of connecting and evacuating same via an independent electricity distribution system not operated by a Distribution Company of Nigeria which is regarded as an isolated off-grid IEDN not connected to an existing distribution network.

The IEDN regulation governs isolated independent electricity distribution networks (IEDN) within urban and rural areas and in particular empowers NERC to license off-grid IEDN\(^6\).

Where the generation capacity is 6MW and above, under the EG regulation, such must comply with the applicable provisions of the grid code\(^7\). Generation capacity of 20MW and above must be centrally despatched by the system operator in accordance with the provisions of the National Electric Power Policy (NEPP).

Although as at the date of this report, the first embedded power project (Aba IPP) is yet to become commercially operational in the NESI, other embedded power projects have kicked off given the potential of such projects to address on-grid power shortages or underserved customers as it


\(^6\) Regulation 12(a) of Application for Licences Regulation, 2010 and reg.28 (1) and (2) of EG Regulation.

\(^7\) See EG reg.5 (4). See also s.71 (11) of EPSRA 2005, which provides: “Every licence shall be deemed to contain a provision that the licence shall comply with the Market Rules to the extent applicable to the licence.” By virtue of r.1 of subr.1.4.1 of the Market Rules 2010, s.71 (11) of EPSRA 2005 is incorporated.
relates to isolated IEDN’s. On the other hand, embedded power projects relating to power sold by an embedded generator to a distribution company intending to sell same via retail sale to end users have not been very fortunate as a result of regulatory bottlenecks that have plagued such transactions, specifically the fact that although it is supposed to be a bilateral arrangement between the embedded generator and the distribution company, the tariffs that the distribution company can charge to end users must be tariffs as set out in the Multi Year Tariff Order (MYTO). It is hoped that this regulatory bottleneck amongst others will be addressed under the ongoing Power Sector Recovery Programme.

5.3 NERC Regulation for Mini-Grid, 2016

According to the regulation, a Mini-Grid means:

“any electricity supply system with its own power Generation Capacity, supplying electricity to more than one customer and which can operate in isolation from or be connected to a Distribution Licencee’s network. Within these Regulations, the term Mini-Grid is used for any Isolated or Interconnected Mini-Grid generating between 0kW and 1MW of Generation Capacity”

Thus, from the above regulation, mini-grids can be isolated or interconnected to serve either a delineated unserved area or an underserved area and cannot exceed 1MW of generation capacity.

Section 5(1) of the regulation provides for the structure of mini-grids in Nigeria as follows:

1. Isolated Mini-Grid; and
2. Interconnected Mini-Grid.

An Isolated Mini-Grid: “means a Mini-Grid which is not connected to any Distribution Licensee’s network”. Technically this structure of grid depicts an off-grid system, which is a standalone system. A permit from NERC will be required for generation capacity up to 1MW and distributed power of 100KW and above for isolated mini-grids, but capacity less than the forgoing may require registration with NERC.

An Interconnected Mini-Grid: “means a Mini-Grid which is connected to a Distribution Licensee’s network”. Under this structure, the mini-grid developer will be required to enter into a tripartite contract with the community and the distribution licensee and the contract must be approved by NERC.
Whilst the regulation is a welcome development in promoting avenues for increased power generation capacity particularly for unserved and underserved areas, the gaps in the regulation still leaves room for debate and suggested improvements based on its structure and provisions, which will be analysed in a subsequent report.

6.0 CONCLUSION

The privatised electricity industry in Nigeria affords huge opportunities for investment in off-grid and mini-grid solutions, particularly with the challenges associated with on-grid solutions.

Off-grid and mini-grid solutions, where carefully planned and designed, can obviate the issues surrounding the current on-grid regulatory challenges, thus providing opportunities for investors to tap into huge market potential which can invariably contribute towards increased generation capacity within the NESI.

We are available to provide further clarification(s) regarding the content of this report and other issues as may be connected with the subject matter of the report; which we are well equipped to advise on owing to our industry experience spanning over 30 (Thirty) years in the energy sector.