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A Case for Solar Home Systems and Mini-Grids


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According to a CrossBoundary Research, an estimated 81 million people are without access to power in Nigeria. Another 40 million are without access to reliable power. These statistics indicate that Nigeria is home to one-in-five of the 560 million people without electricity in sub-Saharan Africa as of 2019, according to the Africa Energy Outlook Report of the International Energy Agency.

The stark reality of the large Nigerian population without electricity access has hitherto been readily compared to India and Ethiopia. India, Nigeria, and Ethiopia are the top three countries with the most population without electricity access. However, this is changing very quickly, and at the current pace of connections among these top three, India is primed to pass the baton to Nigeria in short order.

The fraction of India's 1.3 billion people without access to electricity is rapidly declining. The country has, so far, achieved 95 percent electricity access. Remarkably, India delivered electricity access to 100 million of its citizens (about 25 million households) in new connections in 2018 alone!

The Imperative of Electricity Access

Nigeria has a large population, with a significant fraction in rural and dispersed, remote locations. The national electrification rate is 55 percent, and it falls to 39 in rural areas. For more context, the Nigeria power sector is now largely private sector-driven following its unbundling, with the critical power transmission national grid remaining a government-owned monopoly. In reality, the power sector is under significant strain from a combination of high technical and commercial losses and poor cost recovery. These issues have hitherto hindered investments for enhancing capacity or delivering new connections. It is against this reality that Nigeria aspires to achieve universal access to electricity for its people by 2030.

Attaining this target calls for new elec[illegible]tion of 500,000 to 800,000 households [illegible]. The connections are expected to be a mix of the extension of the national grid, mini-grids and solar home systems. However, with operators in the Nigerian electricity service industry under the current strain, the focus has been more on reducing losses and improving collections that in new connections by way of grid extension as the traditional means of delivery access to our communities. It stands to reason; therefore, that alternative means of delivering access will have to be explored. Therein lies the case for mini-grids and solar homes systems, especially if Nigeria must make progress in bringing down the proportion of its people without access to electricity, the majority of which are in the rural communities.

A further justification for such an approach will be a consideration for least-cost technology. Given the remote locations and lack of proximity to the grid, it is often disproportionately expensive to electrify majority of our communities using the traditional grid extension methods. Grid extension is even less feasible when the population is relatively small, or the existing economic activities within the target communities do not support the viability of such investments for a private investor.

The prevalence of these scenarios in many locations across the country sets the tone for a deliberate and more aggressive focus on off-grid solutions, while the perennial issues of the national grid find a resolution. The case for off-grid systems is more so as the growing Nigerian population continues to outpace the electrification rate at 2.6 percent annually (according to the World Bank).

The India-Nigeria Comparative

India is a credible and relatable example of a country that has succeeded in driving accelerated access-to-electricity programmes. India and Nigeria used to be similar in terms of the relatively large fraction of the population without electricity access. Both countries also have remote, dispersed settlements across large landmasses. Nigeria's reality is similar to the Indian context, of which the latter has now rolled back and made a success of, to global acclaim.

India has achieved massive rapid electrification of its population through the "Saughagya Scheme", which is implemented by India's Rural Electricity Corporation. It is a $1 billion programme with a focus on s[illegible]e renewable generation that targets last [illegible]tions for poor and rural communities. Unde[illegible]d by a large government grant, the programme also provides connections either for free or a nominal fee to qualifying and deserving households.

Nigeria has a similar programme of its own. The Nigeria Electrification Project (NEP) is now gaining momentum. NEP is financed by aggregate $550 million World Bank and African Development Bank (AfDB) facilities, and implemented by the Nigerian Rural Electrification Agency (REA). The Project is also in line with the Rural Electrification Strategy and Implementation Plan (RESIP). It goes further to facilitate and incentivise the participation of the private sector through capital grant funding upon qualification. The NEP has a target of 3.1 million people (600,000 households) and about 100,000 SMEs; overall enhancing electricity access by 25 percent under the programme.

The NEP is designed around mini-grids and solar home systems. The programme is adjudged to lead the way to deliver on target for rural electrification and overall, reduce the population without electricity access in Nigeria. Setting off now in its initial years, NEP has already achieved connection for 854 households and 58 small and medium enterprises (SMEs) under the mini-grid component. In comparison, the standalone solar home systems have delivered access for about 70,000 households and about 600 SMEs. Many more connections are pending registration, notwithstanding the impact of the COVID-19 pandemic.

Geospatial tools, government data on population clusters and load centres estimate that up to 8,000 communities or about 14% of the population can be effectively served with mini-grids. Even more exciting is the ease and speed of deployment of such mini-grids (and its lower capacity comparative- solar home systems) in these locations relative to the grid extension. Also, because the mini-grids are located and generate power next to load points, they provide that immediate power and for which reliability can be readily sustained with effective ownership and good operations and maintenance practices. Receiving reliable power is hardly the case today in a lot of communities that do not receive electricity supply for months continuously, even though they are connected to the national grid, due to transmission and distribution equipment challenges.

Policies and Regulations

The Rural Electrification Strategy and Implementation Plan (RESIP) of the federal government was approved in 2016 in furtherance of the National Rural Electrification Policy "to expand access as rapidly as possible in a cost-effective manner." The RESIP, which is the guiding policy document of the REA, envisages "full use of both grid and off-grid approaches."

The sector regulator, the Nigerian Electricity Regulatory Commission (NERC), made significant efforts to issue the regulatory framework for mini-grids. The Mini-Grid Regulations 2016 proactively addresses potential conflict[illegible]velopers and electricity distributio[illegible] These provisions have enabled the development of mini-grids in the country.

In Essence

Overall, the electrification gap in Nigeria remains a critical agenda item of government. Government is demonstrating its commitment through its policy and funding support via the respective policy documents and funding programmes across the potential grid-connected and off-grid programmes. However, the grid problems remain with us, and the Nigerian population continues to grow with many more realising the unfavourable deal of lack of electricity access. The mini-grid and solar home systems options as viable and complementary alternatives are with us and now gaining momentum. At this point, relevant stakeholders should not just discuss them, but direct more resources and policy considerations in that direction.

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