



RENEWABLE ENERGY IN AFRICA:

An opportunity in a time of crisis

Nigeria

State of electricity

Whilst Nigeria is the largest economy in sub-Saharan Africa, insolvency in the power sector limits energy market growth. Nigeria has large oil, gas, hydro and solar resources, and the potential to generate 13 GW of electric power from existing plants. However, on most days the power sector is only able to generate around 4 GW, which is insufficient to meet national need. Of the 13 GW, 15% is large hydro, 0.5% small hydro and 84.4% fossil fuels.¹ Nigeria has privatised its distribution companies, so there is a wide range of tariffs.²

More than 33% of the population is off-grid, including 14.2 million households and four million small-to-medium size enterprises (SMEs). Of the 73% of the population that are connected to the grid, 43% to 45% receive electricity for less than four hours a day, which means that there is great reliance on self-generation via small generators (mostly diesel).

Of the total population 59.8% have access to electricity. In rural areas 40.2% have access, whilst 79.8% of the urban population enjoy access. There are 76.8 million people without access to electricity.

The Nigerian Bulk Electricity Trading Company (NBET) collects payment from distribution companies (DisCos) to pay to generating companies (GenCos). Non-payment, including by government agencies and DisCos, and escalating debt is reportedly in the region of trillions of Nigerian dollars.³

Relevant policy for renewable energy

The federal government has put together a mini-grid regulation that addresses issues like tariffs and compensation for mini-grid developers. The mini-grid regulation only applies to projects with an energy capacity of between 100 KW and 1 MW.⁴ Nigeria's Decentralized Renewable Energy (DRE) Taskforce aims to accelerate modern electricity access initiatives by tackling the most pressing industry challenges.⁵

Potential and ambition

Nigeria has a target of 30 GW of overall power generation capacity by 2030, of which 30% is expected to come from renewables, as set out in the Nigeria Vision 30-30-30 energy policy. By 2030, the country plans to have 5.3 GW of mini-grids and 2.8 GW of solar home systems, up from 1 MW and 30 MW in 2015, respectively. The government wants to reduce diesel self-generation from 13.8 GW to 5 GW between 2015 and 2030.

The Rural Electrification Strategy and Implementation Plan (RESIP), introduced in July 2016 aims to increase access to electricity to 75% and 90% by 2020 and 2030 respectively. Also, the Rural Electrification

¹ <http://global-climatescope.org/results/NG>

² <https://www.usaid.gov/powerafrica/nigeria>

³ <https://www.independent.ng/discos-debt-to-nbet-hits-n859bn/>

⁴ <https://www.nigeriaelectricityhub.com/2018/10/09/renewable-energy-and-sprouting-issues/>

⁵ <https://www.powerforall.org/campaigns/nigeria/nigerias-energy-taskforce-seeks-new-ways-confront-industry-challenges>



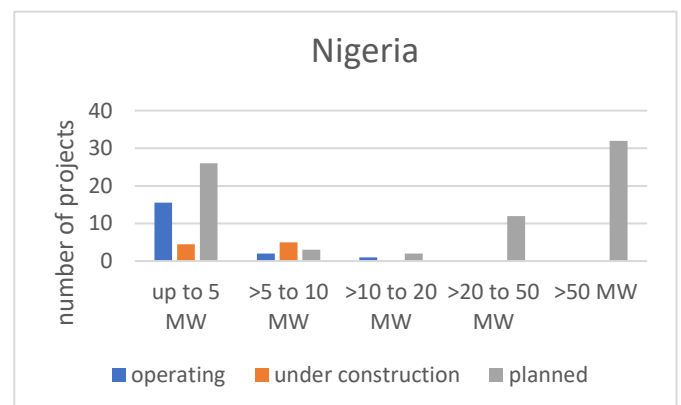
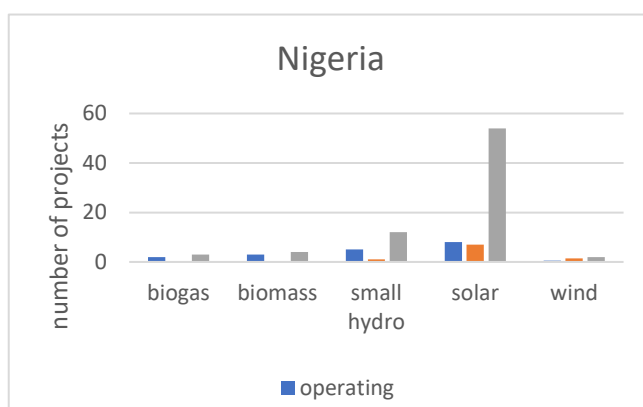
Agency has plans to build 10,000 viable mini-grids, at the same time adding 3 000 MW of decentralised capacity by 2023 as part of its rural electrification strategy.

These goals seem ambitious in the light of insolvency within the energy sector.

Renewable energy projects

The government has signed 14 solar PPAs, however by the end of 2019, none of the 14 proposed projects with 1,125 MW capacity had been constructed. This is largely attributed to delays on the part of the NBET and due to concerns about an acceptable framework that satisfies financial houses and investors.⁶ NBET will buy power from generators via U.S. dollar-denominated power purchase agreements and sell that power to the distributors. In order to reach financial close, lenders require developers to obtain a so-called put-call option agreement (PCOA), a Ministry of Finance document guaranteeing that if a project defaults (due to the developer or NBET) the government will pay lenders the outstanding principal in full. In March 2018, the former Minister of Finance, Kemi Adeosun, said the PPA tariff agreed with NBET of 11.5 U.S. cents/kWh was too high and developers should accept 7.5 U.S. cents, so no PCOAs have been signed or approved yet. Some developers have reported to researchers at the research company, Bloomberg New Energy Finance (BNEF), that since PV capex has fallen drastically, they may accept the lower tariff.⁷

One of the first rural micro-grids under Nigeria's support program has been commissioned, according to a February 2018 report in Nigeria's *Guardian*. It serves approximately 490 households and is a private enterprise. They add that micro-grid technology companies have significantly expanded their product portfolio for small-scale projects in the last months, enabling their customers to integrate multiple energy sources more easily, while they are also actively involved in large-scale projects.⁸ There are reports of rapid growth of stand-alone solar solutions in recent years, but a dearth of evidence. The graphs below show the renewable energy projects at different stages of development, with small and large-scale solar being planned.



Distribution of renewable energy projects in Nigeria by technology and scale, by stage of development ('operating', 'under construction', or 'planned'). Source: Authors' estimates from African Energy Live database, September 2019.

In northern Nigeria, a woman entrepreneur, Habiba Ali, who had attended renewable energy workshops and technical trainings under the Promoting a Sustainable Solar PV Market in ECOWAS (ProSPER) Programme, was inspired to pilot the introduction of solar lighting for a number of food stall operators. Habiba's work expanded to implementing 10-kilowatt (kW) solar micro-grids,

⁶ <http://nbet.com.ng/our-customers/generation/process-for-competitive-procurement/>

⁷ <https://www.esi-africa.com/industry-sectors/renewable-energy/nigerian-gov-continues-to-battle-tariff-structure-with-14-solar-ipp/>

⁸ <https://guardian.ng/energy/amosun-commissions-85kw-solar-power-plant-for-rural-dwellers/>



providing electricity to over 800 individuals through a pay-as-you-go model. Through Sosai, Habiba also created Women of the North for Excellence (the MASI), an initiative where women can become entrepreneurs through leadership in commission-based projects. One project involves renting out solar dryers for drying peppers and other crops.⁹

CASE STUDY: Off-grid solar generation in Nigeria – The Sabon Gari Market

In line with Nigeria's Nationally Determined Contributions to the United Nations Framework Convention on Climate Change (UNFCCC), the EEI has committed to provide 70% of off-grid power from renewable sources. The EEI identified 340 'economic clusters', such as markets, shopping complexes and agricultural/industrial areas as key targets. It is estimated that these clusters demand between 3-4 GW of power and present a combined market opportunity for off-grid applications approaching USD 1 billion annually. With guidance and support coming from the REA and USAID, and with finance coming from private banks in the form of public private partnerships, the initiative hopes to reduce carbon emissions by 25,000 metric tonnes per year.

At a glance:

Construction Company: Rensource Distributed Energy, Nigeria and NEoT Offgrid Africa (France)
Operated/owner: Sabon Gari Energy
Technology: Off-grid solar
Size of plant: 50 KVA
Cost of plant: USD 3.5 million
Finance: Private bank funds
Community Ownership Share: 0%
Operational Date: 2018

The Sabon Gari Market, located in Kano State was identified as one such economic cluster. The market, which was built in 1914, covers 22 hectares and is home to over 13,000 shops and supporting institutions such as fire and police stations. Approximately 95% of shops in the market are powered by off-grid sources, the vast majority of which are petrol generators. These generators are noisy and produce fumes which lead to respiratory diseases amongst traders. Of 250 traders interviewed by EEI staff, 85% said that their businesses would be transformed if they could access an uninterrupted power supply.



Map with Sabon Gari Market



Solar panels on stalls of Sabon Gari Market

In 2018, Rensource Distributed Energy raised USD 3.5 million from private sources and initiated phase one of its plan which resulted in the installation of a 50 KVA solar system to power approximately 500 shops. The installation created jobs and gave workers new skills. Reactions from shop owners to this off-grid solution have, however, been somewhat mixed. One complained that he was spending one thousand naira a week on electricity, which he said was more expensive than the petrol generators. Cost appears to be a common concern among traders, and there is evidence to suggest that some traders are returning to generators. Other traders state, however, that they are happy to pay the additional cost because of improved air quality within the market.

Among those traders who complain about the cost, many do, nonetheless, support the project because of its reliability and the environmental benefits it brings. The cost factor is something that the developers clearly need to consider as they approach phase two of the project which plans to add another 6,000 shops.

⁹ <http://irena.org/newsroom/articles/2018/Feb/Empowering-Women-in-Nigeria-with-Solar-Energy>



Local market

Nigeria's Rural Electrification Agency (REA) Director claims that the goal of 3 GW of capacity to reach universal electrification will be met in part by developing 10,000 micro-grids by 2020 and that this is an estimated USD 9.2 billion annual micro-grid opportunity.¹⁰ The Rural Electrification Fund (REF) is providing subsidies and performance-based grants for mini-grid developers and market-based incentives to stand alone solar system providers.¹¹ REA surveys and site visits have by mid-2019 selected more than 100 prioritised sites for mini-grid development.

The lack of adequate public funding has been a major setback in the growth of PV and other renewable energy technologies in Nigeria.¹²

For would be on-grid energy providers, it takes about two years to get the required licenses and to finalise the purchase agreement with NBET, and about a year for off-grid energy generation. The NBET will have difficulties buying the generated power, due to unremitted receipts from the already credit-crunched DisCos.¹³

Due to the restrictions on foreign currency by the Central Bank of Nigeria (CBN), international developers/lenders are worried about investing their money in the Nigerian power sector. Whether denominated in USD or not, energy tariffs in Nigeria are paid in Nigerian naira, so if lenders want to convert large amounts of naira into U.S. dollars for example, they may have to wait. During that time the naira can weaken, eating into or even destroying any profits. As a result, the market is dominated mostly by local players who are more comfortable with owning naira.¹⁴

The challenging conditions to access the government feed-in tariffs and uncertainties around the distribution companies' ability to pay, means that decentralised power generation projects offer arguably the most direct opportunity in Nigeria today.

Visit the report webpage at <https://350africa.org/renewable-energy-report>.

¹⁰ <http://global-climatescope.org/en/off-grid-quarterly/1q-2018/>

¹¹ <https://atainsights.com/wp-content/uploads/2019/06/7.-Suleiman-Babamanu-Nigeria-Rural-Electrification-Agency-1.pdf>

¹² https://www.solarwirtschaft.de/fileadmin/user_upload/enabling_pv_nigeria_study.pdf

¹³ <https://www.dlapiper.com/en/uk/insights/publications/2019/03/the-nigerian-electricity-market-experiment/>

¹⁴ <http://global-climatescope.org/en/country/nigeria/#/enabling-framework>