

# ALL ON NIGERIA

## OFF GRID ENERGY BUSINESS REPORT

Mini Quarterly Report (First Quarter, 2024)



# Content Summary

Nigerian Energy Space Overview

Off-Grid Market Overview

Current Off-Grid Projects In Nigeria

Current Regulatory And Policy Framework

Investment Opportunities

Current Challenges

Recommendations

Conclusion

References

# Status of Nigeria Energy Space



Nigeria is Africa's most populous nation and the largest economy on the continent but still suffers from limitations in the power sector which constrains economic growth.



Nigeria's installed power generating capacity still stands at about 14000 MW. However, for the first quarter of 2024, Nigeria's electricity grid performance has been dwindling to around 3500 MW.



Electricity supply is worsening in Nigeria as the generation is currently at a meagre average of 3000 MW, which is insufficient to serve a growing population of over 229 million, depicting a 2.39% increase from 2023.

Source: Nigeria Electricity Systems Operational Report (March); [www.nsong.org/Library.aspx](http://www.nsong.org/Library.aspx)  
[www.punchng.com/fg-grows-national-grid-power-capacity-to-14000mw/](http://www.punchng.com/fg-grows-national-grid-power-capacity-to-14000mw/)  
[www.vanguardngr.com/2024/02/power-grid-drops-to-3530mw-as-rationing-persists-nationwide-2/](http://www.vanguardngr.com/2024/02/power-grid-drops-to-3530mw-as-rationing-persists-nationwide-2/)  
Nigeria Population Growth Rate 2024; [www.macrotrends.net/global-metrics/countries/NGA/nigeria/population](http://www.macrotrends.net/global-metrics/countries/NGA/nigeria/population)

# Electricity Market Overview

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Electricity access remains a crucial challenge in Nigeria, considerably impacting the country's economic development, education, healthcare, and overall quality of life.

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It is estimated that 600 million people risk continued power shortages in Africa, as the continent may continue to grapple with electricity deprivation by 2030. This is the result of increased population, poor infrastructure, and insufficient generation capacity to meet the growing demands of citizens.

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The national grid, which has collapsed on numerous occasions, plunging the country into darkness, struggles to reach remote and underserved areas.

Source: BusinessDay: <https://businessday.ng/editorial/article/can-mini-gridssolve-nigerias-electricity-access-problem/>  
[www.nairametrics.com/2024/02/08/almost-600-million-africans-may-remain-without-electricity-by-2030-world-bank/](http://www.nairametrics.com/2024/02/08/almost-600-million-africans-may-remain-without-electricity-by-2030-world-bank/)

# Off-Grid Market Overview

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Electricity, which contributes significantly to a country's economic growth and development, has a very deplorable supply rate in Nigeria, adversely affecting businesses.

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According to a report by the World Bank, Nigerian businesses lose an estimated \$29 billion annually due to unreliable electricity.

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Mini-grids have emerged as potential catalysts, offering improved and reliable power supply and providing decentralized and sustainable solutions to the country's electricity crisis.

Source: World Bank Press Release: <https://www.worldbank.org/en/news/press-release/2021/02/05/nigeria-to-improve-electricity-access-and-services-to-citizens>

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Section 3 of the Mini-Grid Regulations, 2023, defines Mini-Grid as any electricity supply system with its generation capacity, supplying electricity to more than one customer, and which can either operate in isolation from a Distribution Licensee's network or be connected to the network.

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Mini-grids have also been described as small-scale electricity generators and possibly energy storage systems interconnected to a distribution network that supplies electricity to a small, localized group of customers, operates independently of the national transmission grid, and ranges from a few kilowatts up to 10 megawatts in size.

Source: NERC Mini-grid Regulations 2023: <https://nerc.gov.ng/wp-content/uploads/2024/01/MINIGRIDREGULATIONS.pdf>  
[www.greenminigrad.afdb.org/how-it-works/help-desk-developers-and-operators/introduction-mini-grids](http://www.greenminigrad.afdb.org/how-it-works/help-desk-developers-and-operators/introduction-mini-grids)

## Mini-Grids (Contd.)

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The Rural Electrification Agency (REA) has successfully deployed 103 mini-grids across Nigeria under the Performance Based Grant (PBG) subcomponent of the Nigeria Electrification Project (NEP), signaling a crucial advancement in enhancing electricity access for households, micro, small, and medium enterprises (MSMEs), as well as public facilities in rural and underserved regions of Nigeria.

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Through the NEP, over 80 mini-grids have been completed and commissioned, connecting about 32,000 households, MSMEs, and public facilities and providing clean and reliable electricity.

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Currently, Nigeria has just two interconnected mini-grids in operation: the Mokoloki mini-grid located in Ogun State and the Toto mini-grid situated in Nasarawa State.

Source: Rural Electrification Agency, 2023. [www.rea.gov.ng/nep-solar-hybrid-mini-grid-component-reaches-milestone-103-mini-grids-successfully-deployed-across-nigeria/](http://www.rea.gov.ng/nep-solar-hybrid-mini-grid-component-reaches-milestone-103-mini-grids-successfully-deployed-across-nigeria/)  
[Rocky Mountain Institute \(RMI\). www.rmi.org/insight/mokoloki/](http://Rocky Mountain Institute (RMI). www.rmi.org/insight/mokoloki/)  
[www.rea.gov.ng/press-release-nigerias-first-interconnected-hybrid-solar-mini-grid-plant-commissioned-toto-community-nasarawa-state/](http://www.rea.gov.ng/press-release-nigerias-first-interconnected-hybrid-solar-mini-grid-plant-commissioned-toto-community-nasarawa-state/)

## Solar

Nigeria, situated within the tropical belt between latitudes 4° and 14°, encompasses a land area of 924,000 square kilometers. The country benefits from an abundance of sunlight, with daily sunshine durations averaging from 3.15 hours along the coastlines to 9.0 hours at its northern extremity. As a result, Nigeria receives approximately 4.851 trillion kilowatt-hours of solar energy each day.

Annually, Nigeria receives an average of 1.804 quadrillion kilowatt-hours (kWh) of incident solar energy. This indicates that Nigeria possesses vast opportunities to harness the power of the sun for energy generation.

The Renewable Energy Master Plan aims to achieve a target of 500 megawatts (MW) of installed capacity for solar photovoltaic (PV) by 2025. The anticipated potential for concentrated solar power and photovoltaic generation combined is estimated to be approximately 427,000 MW.

The projected revenue potential from Solar Home Systems (SHS) in Nigeria is estimated to be over \$2 billion annually.



# Renewable Power Generation Sources (Contd)

## Hydropower

Nigeria currently has six hydropower stations, although not all of them are fully operational. Among the operational plants, three major ones include Kainji , with a capacity of 760 megawatts (MW); Jebba, with 578 MW; and Shiroro, with 600 MW.

Additionally, there is the Mambilla Power project, anticipated to have an installed capacity of 3,050 MW upon completion, and the 40MW Kashimbila Multipurpose Dam

The Zungeru Hydroelectric Project is the second largest hydro project in Nigeria, with a 700MW generation capacity. The project is located in Niger State with an estimated yearly generation capacity of 2.64 billion kWh which is expected to meet 10% of Nigeria's domestic energy needs.

Currently, the total installed capacity of hydropower is 2,062MW.

## Wind

In Nigeria, the average wind speed is estimated to be between 4 to 5 meters per second at a height of 30 meters, which implies speeds of 5 to 6 meters per second at a height of 80 meters.

Although the potential for large-scale wind power generation may be limited to select locations, the off-grid potential of wind power remains largely unexplored, especially in isolated areas such as the coastal regions of the Niger Delta.

# Renewable Power Generation Sources (Contd)

## **Biomass**

Nigeria possesses a significant biomass potential, estimated at approximately 144 million tonnes annually. Biomass constitutes roughly 80% of Nigeria's total primary energy consumption, with the majority utilized for heating, lighting, and cooking purposes in rural areas.

This biomass consists of solid biofuels and renewable waste such as charcoal, wood residues and by-products, bagasse, animal waste, other vegetal materials and residue, and, the renewable fraction of industrial waste.

## **Petrol/Diesel Generators**

More than 75% of electricity consumed in Nigeria is generated from diesel and petrol-powered generators, making them the most commonly used sources of non-grid power generation in the country.

The cost of running diesel generators in Nigeria is four times the cost of electricity tariff per kilowatt hour.

Nigeria gets approximately 40,000 MW of electricity from generators fueled by petrol and diesel and spends approximately \$14 billion annually on generating electric power using these alternative backup supplies for their businesses.

## Current Off-Grid Projects In Nigeria

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A 60kWp Hybrid Solar PV mini-grid by Acob Lighting is currently in development for Sule and Abapanu Communities in Edo, illuminating a path towards sustainable community development.

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The solar mini-grid project by Darway Coast, featuring a 500kWp installation in Ogun, is set to catalyze a transition to renewable energy for the Ibaragun communities.

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Nigeria Distributed Access through Renewable Energy Scale-up (DARES) project approved by the World Bank.

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100 kWp and 90kWp REA-NEP solar hybrid mini-grid projects at Iwajon and Orire LGA, respectively, in Oyo State.

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REA-NEP Off-Grid Power Generation in Jigawa and Nasarawa States with ACOB Lighting Tech. Ltd and Offgrid Electric Ltd.

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REA joined the Minister of Power and other industry stakeholders to launch the 2024 Nigeria Residential Sector Energy Demand-Side Survey, a critical survey led by the Federal Ministry of Power, with support from the European Union and the International Energy Agency (IEA).

# Regulatory And Policy Framework

The introduction of the Regulations marked a significant turning point in Nigeria's regulatory framework for mini-grid development. By embracing a portfolio approach and simplifying the tariff filing process, investors benefit from increased flexibility and reduced administrative burdens. These regulations not only provide clarity on permits for both isolated and interconnected grids but also expand opportunities for developers, fostering a climate of growth and innovation in the mini-grid sector.

NERC Mini-grid Regulations 2023

Electricity Act 2023

The Act aims to create an enabling environment to attract investments in renewable energy, with the ultimate goal of increasing renewable energy's contribution to the overall energy mix.

The Act imposes an ongoing obligation on the Commission and Promotion of the Independent System Operator (ISO) to actively encourage and promote electricity generation from renewable sources.

Source: Electricity Act, 2023: <https://placng.org/i/wp-content/uploads/2023/06/Electricity-Act-2023.pdf>  
NERC Mini-grid Regulations 2023: <https://nerc.gov.ng/wp-content/uploads/2024/01/MINIGRIDREGULATIONS.pdf>

# Investment Opportunities

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Growing trend of increased investment in the technology utilized by mini-grid operators for the sale of electricity.

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Notable rise in investment directed towards business development support services aimed at assisting small businesses.

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Opportunities for local currency financing are expanding to cover working capital requirements and the procurement of local components.

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The World Bank Distributed Access through Renewable Energy Scale-up (DARES) project, which has the potential to unlock matching capital, including both equity and debt, provided it is administered effectively.

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Noticeable uptick in investment towards standardizing the components of solar PV systems installed in mini-grids.

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Notable increase in investment directed towards the productive utilization of energy.

## Current Challenges

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Limited access to financing remains a significant barrier for off-grid companies, hindering their ability to deploy and scale up operations. Banks are particularly hesitant, either because of a lack of funds or because of the high risk of loss caused by high or uncertain inflation.

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Tariff design is a regularly occurring source of conflict. This is particularly due to the fact that off-grid system developers must charge considerably high tariffs to cover investment and operational costs in comparison with cheaper grid-based electricity. Hence, the challenge for many consumers in rural and underserved areas who cannot afford the tariff, resulting in a loss for the operators.

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Inadequate infrastructure, such as poor road networks and limited access to electricity, hampers the deployment and maintenance of off-grid systems in remote areas.

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The lack of skilled personnel and technical expertise remains a significant challenge for off-grid companies in system design, installation, and maintenance.

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The off-grid market in Nigeria is fragmented, with various players operating independently. This fragmentation can lead to inefficiencies and challenges in coordination and collaboration.

## Recommendations

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The government can facilitate partnerships between off-grid companies and financial institutions to create tailored financing solutions. Off-grid developers should advocate for the establishment of more dedicated investment funds or financing mechanisms to support off-grid projects.

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Off-grid operators should always conduct comprehensive tariff studies to determine the optimal balance between affordability for consumers and financial viability of intended projects. Innovative financing models such as pay-as-you-go systems or community-based ownership should be explored to reduce the upfront cost burden on consumers.

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Off-grid developers can explore collaboration with government agencies and development partners to invest in improving road networks and access to electricity in remote areas.

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The government, in partnership with relevant stakeholders in the off-grid space, should develop training programs and certification schemes to build a skilled workforce capable of designing, installing, and maintaining off-grid systems. Partnerships between industry players and educational institutions to offer practical training and apprenticeship opportunities in off-grid technologies should be explored.

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Addressing market fragmentation requires fostering collaboration among stakeholders, establishing common standards and regulations, and promoting information sharing and knowledge transfer within the industry. By enhancing coordination and cooperation, the off-grid sector can become more efficient, resilient, and impactful in addressing energy access challenges in Nigeria.

## Conclusion

The challenges confronting Nigeria's off-grid sector underscore the intricate landscape of achieving widespread energy access. From financial barriers to infrastructure limitations and market fragmentation, the sector faces daunting hurdles. Yet, within these challenges lie opportunities for transformative solutions.

The recommendations put forward offer a strategic roadmap for surmounting these obstacles and unlocking the sector's full potential. By fostering collaboration, innovative financing, infrastructure development, capacity building, and market coordination, Nigeria can pave the way for sustainable off-grid electrification. This concerted effort not only addresses immediate challenges but also lays the groundwork for long-term resilience and inclusive growth, ushering in a future where electricity is accessible to all, driving socio-economic development and empowering communities nationwide.



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