

# Renewable Energy Advancement in Nigeria: Nuances, Challenges and Solutions



# About BudgIT

BudgIT Foundation is a civic tech organisation raising the standards of transparency, accountability, and service delivery in the Nigerian government and governance. Since its establishment in Nigeria in 2011, BudgIT has utilized innovative technology and data-driven tools to simplify complex public finance information, making it accessible and understandable to citizens. By enabling citizens to track budgets, advocate for policies, and engage in public awareness campaigns, BudgIT empowers communities to hold governments accountable for resource allocation and spending. The organization's work spans key sectors such as health, education, infrastructure, and natural resource governance, ensuring that public funds are effectively utilized for societal development. Over time, BudgIT has evolved its focus to include quality research, advisory support, and innovative approaches to service delivery tracking and health sector reforms.

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## **About Resource Justice Network**

Resource Justice Network (RJN) is a global civil society movement of more than 1,000 member organizations in more than 50 countries around the world. RJN coalitions have contributed to legislative, policy, and corporate behaviour change at local, national, and international levels to advance the open, accountable, equitable, sustainable, and responsive governance of oil, gas, and minerals.



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# Executive Summary

Renewable energy has emerged as a vital component in addressing Nigeria's energy crisis, which is characterized by millions of citizens' lack of access to electricity, a reliance on fossil fuels, and environmental challenges. This research report provides a comprehensive analysis of renewable energy adoption in Nigeria, examining current initiatives, challenges, case studies, and stakeholder dynamics while drawing comparisons with other African nations<sup>1</sup>.

Nigeria has made notable strides in the adoption of renewable energy, however significant challenges still persist. Despite considerable potential in solar, wind, hydro, and biomass energy, Nigeria's renewable energy sector faces numerous obstacles, including regulatory inconsistencies, inadequate infrastructure, limited financing options, and limited community engagement. The existing policy frameworks, such as the Renewable Energy Master Plan (REMP) and the National

Renewable Energy Policy (NREP), have not yet translated into widespread implementation, leading to gaps in energy access.

A stakeholder analysis reveals the diverse actors involved in Nigeria's renewable energy landscape, including government agencies, renewable energy associations, private sector entities, NGOs, local communities, and international organizations. Collaborating with these stakeholders is crucial in shaping sustainable energy solutions.

While Nigeria possesses vast renewable energy resources and growth potential, realizing a sustainable energy future depends on addressing existing challenges, enhancing policy frameworks, fostering collaboration among stakeholders, and adopting best practices from successful initiatives to address its pressing energy needs and also contribute to socio-economic development and environmental sustainability.

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<sup>1</sup> <https://rean.org.ng/bridging-the-gap-addressing-energy-poverty-inequality-through-renewable-energy/#:~:text=Bridging%20the%20energy%20gap%20through%20renewable%20energy&text=According%20to%20a%20recent%20IRENA,their%20health%20and%20environmental%20hazards.>





# Introduction

## 1.1 Background and context

Nigeria, the largest economy in Africa, is blessed with abundant energy resources, but despite the availability of these resources, Nigeria still faces an acute energy crisis. Nigeria's energy landscape is characterized by a heavy reliance on fossil fuels, particularly oil and gas, used for electricity generation.

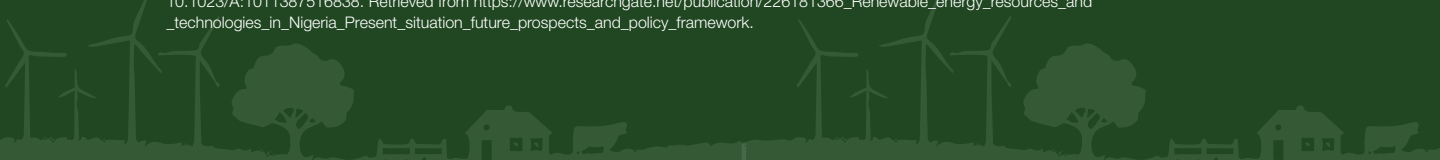
Nigeria's electrification rate is at 24.6% rurally and 83.9% in urban areas<sup>2</sup>. Currently, the electricity sector in Nigeria consists of generation, transmission, and distribution. The majority of the generation companies in Nigeria utilise fossil fuels in electricity production, which is not sustainable. Despite the numerous environmental issues associated with the use of fossil fuels, they are still a major energy source in Nigeria. The key to a substantial reduction of poverty for any modern nation is enormous energy use, as nations with more significant revenues and higher human development indices are associated with higher energy consumption.

Furthermore, the global shift in energy transition underscores the urgency for Nigeria to transition to sustainable energy sources. Climate change poses a significant threat to Nigeria, with its impacts becoming increasingly evident, from rising temperatures, erratic rainfall patterns, and extreme weather events, which adversely affect critical sectors such as agriculture, water resources, and public health<sup>3</sup>.

**Nigeria is endowed with abundant renewable resources, such as solar energy, wind energy, hydropower, bioenergy, and thermal energy, which have been utilized in various sectors for transportation, agriculture, and electricity generation.**



<sup>2</sup> <https://www.africa-energyexpo.com/en/visit/why-visit/nigeria-energy-landscape.html#:~:text=Attributes,significant%20progress%20in%20recent%20years.>  
<sup>3</sup> Akinbami, J.-F. K. (2001). Renewable Energy Resources and Technologies in Nigeria: Present Situation, Future Prospects, and Policy Framework. DOI: 10.1023/A:1011387516838. Retrieved from [https://www.researchgate.net/publication/226181366\\_Renewable\\_energy\\_resources\\_and\\_technologies\\_in\\_Nigeria\\_Present\\_situation\\_future\\_prospects\\_and\\_policy\\_framework](https://www.researchgate.net/publication/226181366_Renewable_energy_resources_and_technologies_in_Nigeria_Present_situation_future_prospects_and_policy_framework).



Despite these abundant resources, Nigeria's transition to renewable energy has been constrained by several challenges, such as governance structures, coupled with inconsistent policy operationalization, have hindered the development of a clear and stable regulatory framework for renewable energy investments<sup>4</sup>.

Access to electricity remains a pressing concern, with approximately 40% of the population lacking reliable power<sup>5</sup>. This inadequate access negatively impacts economic development, education, and overall quality of life. In response, off-grid solutions such as solar home systems and mini-grids are gaining traction, particularly in rural areas, offering more reliable alternatives to traditional power sources.



**The Nigerian government has implemented several policies aimed at promoting energy efficiency and the adoption of renewable energy, including the Renewable Energy Master Plan and the National Energy Policy. However, regulatory challenges, bureaucratic inefficiencies continue to impede progress in the energy sector<sup>6</sup>.**

Despite these obstacles, there is growing interest from both local and international investors in Nigeria's renewable energy market, particularly in solar and wind projects. The government has introduced various incentives for renewable energy investments, such as tax exemptions and grants, to foster the development of sustainable energy

resources<sup>7</sup>.

The Federal Government of Nigeria is targeting 100% electrification by 2030 using a least-cost technology mix approach. This approach consists of a mix of 28% grid, 46% mini-grids, and 26% SHS connections. However, decentralised solutions like the mini-grids are shown to be the least-cost option for most new connections in densely populated rural settlements by 2030, estimated to reach 51 million people, mostly in rural off-grid locations. This has been orchestrated in the latest Energy Transition Plan, which is the most recent policy driving the energy sector<sup>8</sup>.

While Nigeria possesses rich energy resources and significant potential for expanding its renewable energy sector, achieving a robust and sustainable energy landscape will require comprehensive reforms, substantial investment, and innovative approaches to overcome the existing challenges.

## 1.2 Background and Context

In 2022, Nigeria's electricity demand reached 32.1 terawatt-hours. However, a significant portion of the population remains without access to electricity, with just over 60% of Nigerians connected to the grid, leaving about 40% in the dark. The country's electricity generation landscape is dominated by thermal power, primarily from gas-fired plants, which account for over 80% of the total energy mix<sup>9</sup>.

One of the critical challenges affecting this landscape is the worsening gas supply constraints, which have severely impacted the operational performance of gas-fired power plants. By 2024, gas is projected to contribute 77% of the country's electricity generation,

<sup>4</sup> Oyedepo, S. O. (2012). Energy and sustainable development in Nigeria: The way forward. *Energy, Sustainability and Society*, 2(15). <https://doi.org/10.1186/2192-0567-2-15>. Resimić, M. (2023). Corruption and Anti-Corruption Efforts in Nigeria's Electricity Sector. Retrieved from <https://knowledgehub.transparency.org/assets/uploads/kproducts/Corruption-and-anticorruption-efforts-in-Nigeria%E2%80%99s-electricity-sector-for-publication.pdf>.  
<sup>5</sup> <https://data.worldbank.org/indicator/eg.elc.accs.zs>  
<sup>6</sup> <https://www.sciencedirect.com/science/article/abs/pii/S0301421519302320>  
<sup>7</sup> <https://ao2law.com/a-review-of-tax-incentives-for-renewable-energy-projects-in-nigeria/>  
<sup>8</sup> <https://nep.rea.gov.ng/resource-hub.html>  
<sup>9</sup> <https://www.irena.org/Publications/2023/Jan/Renewable-Energy-Roadmap-Nigeria>



and it is expected to maintain its dominant position in the energy mix, with an estimated annual growth rate of 2.4% from 2025 to 2027. Despite this, persistent gas shortages remain a significant bottleneck.

Renewable energy sources, hydropower also accounts for energy-mix for on-grid generation. However, solar photovoltaic (PV) technology is experiencing rapid growth, especially as a distributed generation solution in rural areas. This shift is crucial for enhancing energy access where traditional grid connections are lacking<sup>10</sup>.

Recent reforms in the Nigerian gas and power sectors, particularly the adoption of the Electricity Act 2023, aim to decentralize power generation and distribution. This legislation empowers states to create local markets for power generation and transmission, fostering greater autonomy in energy management.

In line with these reforms, Lagos State is taking proactive measures to establish a distinct Lagos Electricity Market that would operate independently of the national grid. Other states, including Enugu, Osun, Akwa Ibom, Rivers, Delta, and Kogi, are also pursuing similar initiatives to improve local energy solutions.

While hydropower remains the dominant renewable energy source, solar PV is gaining traction, particularly in rural areas where it plays a vital role in providing distributed energy solutions. Looking ahead, if associated costs with renewable energy technologies are reduced and planned energy policies are effectively implemented, renewable energy is projected to meet nearly 60% of Nigeria's energy demand by 2050.

### 1.3 Overview of Renewable Energy Resources in Nigeria

Nigeria's renewable energy landscape is rich and diverse, consisting of solar, wind, hydropower, bioenergy, and geothermal energy.

Among the most promising resources is solar energy, which is particularly appealing given the country's abundant sunlight.

**With an average of 6-7 hours of sunshine a day, solar power has become a beacon of hope, especially for rural communities that often struggle with unreliable electricity.**

Many households are now turning to solar home systems and mini-grids, which offer clean and sustainable energy solutions, helping to improve daily life and economic opportunities<sup>11</sup>.

Wind energy is another resource that Nigeria is beginning to explore, particularly in northern states, where wind speeds are favorable, there's a growing interest in establishing wind farms. Although the infrastructure is still in its early stages, the potential for harnessing wind energy is promising, and the government and private investors are increasingly considering it as a viable option for the future.

Biomass is also significant, as it comes from agricultural waste and organic materials that are in abundance in Nigeria. This renewable resource can be used for cooking, heating, and even power generation. However, there



<sup>10</sup> <https://energyinafrica.com/insight/five-key-details-on-nigerias-electricity-sector/>

<sup>11</sup> Eweka, E. E., Lopez-Arroyo, E., Medupin, C. O., Oladipo, A., & Campos, L. C. (2022). Energy Landscape and Renewable Energy Resources in Nigeria: A Review. *Energies*, 15(15), 5514.



are concerns about sustainable practices, since improper management can lead to environmental harm.

Hydropower has long been part of Nigeria's energy mix, with existing dams contributing to electricity generation. The country has numerous rivers that could support additional hydropower projects, but challenges remain, including securing funding and maintaining existing facilities in an environmentally friendly way.

There is also geothermal energy, a less-explored option that is capable of providing reliable energy, particularly in Nigeria's Middle Belt region. While studies into its feasibility are still needed, there's hope that it could emerge as a stable energy source down the line.

Nevertheless, despite the wealth of renewable resources available, Nigeria faces several hurdles in fully tapping into them. Issues such as the lack of infrastructure, regulatory complexities, limited financial support, and the need for technical expertise can slow progress. The established oil and gas sector also casts a long shadow over the transition to renewables, making it a complex journey.

Recognizing the importance of renewable energy for a secure and sustainable future, the Nigerian government has started taking steps to promote investment in these resources. Initiatives like the Renewable Energy Master Plan and the National Renewable Energy Action Plan aim to foster growth in the sector. However, achieving the full potential of renewable energy in Nigeria will require a united effort from both the public and private sectors, along with continuous advocacy and innovation.

In essence, Nigeria's renewable energy resources, particularly solar, wind, biomass, and hydropower, hold significant promise for transforming the energy landscape. The journey to harness this potential is filled with challenges, but with determination and collaboration, there is a bright, sustainable future ahead for Nigeria's energy sector.

## 1.4 Objectives of the Study

The primary objectives of this study are thoughtfully crafted to guide our exploration of the challenges hindering the adoption of renewable energy in Nigeria and proffer possible options to promote uptake. Through comprehensive research, including desk research, surveys, and interviews, the aim is to:

1. Systematically identify and analyze the main challenges hindering the adoption of renewable energy technologies in Nigeria, focusing on infrastructure, regulatory frameworks, financing, and public acceptance.
2. Gather insights from various stakeholders, including policymakers, industry experts, and community members, regarding their views on the current state of renewable energy adoption and the barriers faced.
3. Provide data-driven recommendations aimed at policymakers, industry leaders, and community organizations, facilitating the development of strategies that promote renewable energy adoption and address identified bottlenecks.





# Methodology

This study employs a mixed-methods approach to gain a comprehensive understanding of the bottlenecks hindering the adoption of renewable energy in Nigeria. The research was conducted through a combination of desk research, surveys, and stakeholder engagement, each serving a distinct purpose in our investigation.

Extensive desk research was conducted to review existing literature on renewable energy in Nigeria. This included government reports, academic papers, policy documents, and industry assessments. Through this review, we identified previously documented challenges and opportunities, as well as understanding the current state of the renewable energy landscape in the country.

A structured survey aimed at capturing quantitative data from a diverse pool of respondents complemented the desk research. The survey targeted a wide range of stakeholders, including energy industry

professionals, policymakers, and members of local communities. Questions were carefully crafted to garner insights into perceptions of renewable energy, experiences with energy access, and views on the barriers to adoption. The surveys were distributed electronically, allowing for broad participation and ensuring a representative sample.

The data collected were analyzed using both qualitative and quantitative methods. This multi-faceted analysis enabled us to construct a nuanced picture of the barriers to renewable energy adoption in Nigeria.

Finally, the findings from the desk research, surveys, and stakeholder roundtable engagement were synthesized to provide a holistic overview of the bottlenecks identified. This synthesis served as the foundation for our recommendations and conclusions, ensuring that they are grounded in robust evidence and diverse perspectives.

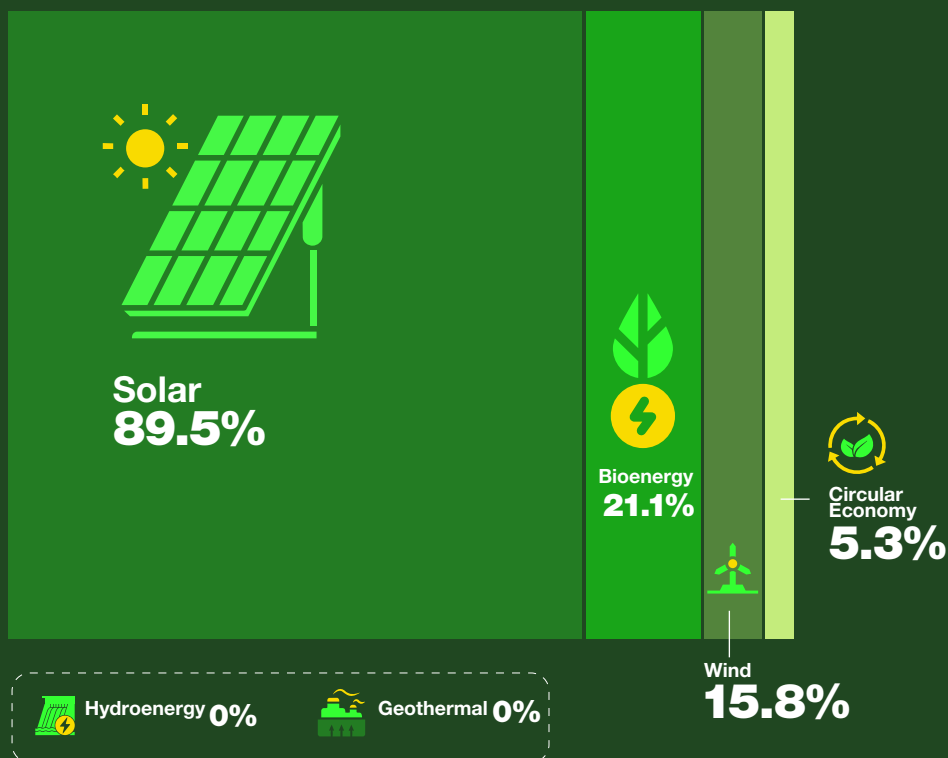




# Results and Findings

## 3.1 Survey Analysis

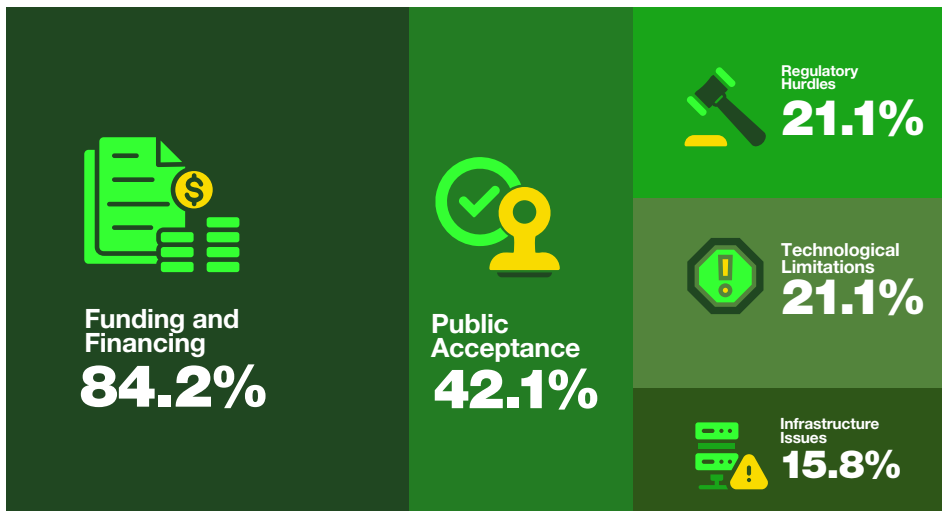
What type of renewable energy projects have you been involved in?



Survey results indicated that solar technology took the lead as the renewable energy source that has been widely accepted in Nigeria.



What are the main challenges you face in implementing renewable energy projects?



The data reveals that high upfront costs (e.g., solar installation expenses) emerged as the most significant bottleneck, cited by 82.4% of respondents, followed by regulatory hurdles (21.1%), such as delays in permits and licensing, as critical barriers. Qualitative survey responses further contextualize these findings, emphasizing systemic governance issues and technological limitations (21.1%).

This aligns with existing literature<sup>12</sup> highlighting Nigeria's reliance on fossil fuel subsidies and fragmented renewable energy policies. Notably, developers disproportionately emphasized limited financing mechanisms underscoring disparities in access to credit and investment. Meanwhile, awareness gaps about renewable technologies (e.g., biomass, solar) were cited by some respondents, suggesting a need for public education campaigns.

These results show that financial and policy barriers dominate Nigeria's renewable energy transition challenges. The dominance of "high upfront costs" mirrors global trends in developing economies but is exacerbated by Nigeria's unique socioeconomic and macroeconomic contexts, including low

electrification rates and currency instability. In 2nd July, 2025, during the round table on renewable energy organised by BudgIT, The MD of the Rural Electrification Agency (REA) - Abba Aliyu represented by Mr Waziri mentioned that Nigeria needs at least \$20 billion to meet its renewable energy target. The Rural Electrification Agency (REA) is actively pursuing a strategy of diversified funding channels and innovative financing solutions to address the nation's energy challenges. This approach aims to reduce reliance on foreign loans and promote the development of the national capital market. The REA is implementing this potentially through:

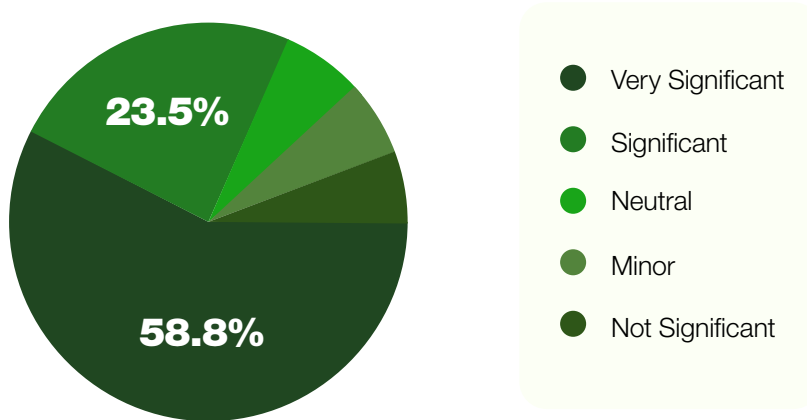
- Mobilization of both global and local financing instruments whilst prioritizing financial credibility and strong balance sheets.
- Crystallization of \$1.4bn private sector financing through the REA Funding Profile.
- Finalize acquisition of additional funding pipeline to the tune of \$900mn and N500bn.
- Implementation of the N500bn Green Bond instrument for the NPSSI Phase 1.

<sup>12</sup> Payel, Spandan Basak, et al. "Exploring the barriers to implementing solar energy in an emerging economy: implications for sustainability." Proceedings of the international conference on industrial engineering and operations management manila, philippines. 2023.



## Role of Imports in Renewable Energy Adoption

How significant is the role of imported equipment in your renewable projects?



83.3% of respondents rated the role of imported equipment as “Very Significant” and “Significant,” underscoring systemic issues such as high costs, supply chain vulnerabilities, and limited domestic innovation. For instance, imported equipment often incurs additional expenses due to tariffs, logistics, and foreign exchange volatility, a recurring theme in Nigeria’s energy transition challenges. One respondent noted: “Without imported inverters, our solar projects would stall entirely,” highlighting the sector’s precarious dependence on foreign supply chains.

This reliance also exposes projects to risks such as geopolitical disruptions, delays in procurement, and mismatches between imported technologies and local conditions. For example, solar panels designed for temperate climates may underperform in Nigeria’s dusty and humid environment, necessitating frequent replacements or maintenance. Such challenges compound project costs and timelines, further hindering the scalability of renewable energy solutions.

The survey findings resonate with existing literature on the energy sector, which identifies import dependency as a structural bottleneck.

Findings<sup>13</sup> show that while renewable energy adoption is technically feasible, financial and infrastructural barriers exacerbated by reliance on imports, slow progress. The data also hints at regional disparities: urban developers, who often manage grid-tied projects, may prioritize imported equipment for its perceived reliability, while rural off-grid initiatives face even steeper challenges due to logistical barriers and limited access to financing.

**To address these issues, policymakers and industry stakeholders in Nigeria must prioritize strategies to reduce import dependency. Incentivizing local manufacturing through tax breaks, subsidies, or public-private partnerships could spur domestic production of renewable energy components.**

Collaborations with international firms will facilitate technology transfer, enabling Nigerian manufacturers to produce high-quality,



<sup>13</sup> <https://www.getricity.com/blog-2-1/solar-geopolitics-supply-chain-disruptions-and-other-risks>



context-appropriate equipment. Additionally, lowering tariffs on critical renewable energy imports will help reduce project costs as local capacity is developed<sup>14</sup>.

Nigeria has made notable progress in this area, exemplified by the launch of the renewable energy handbook by the Nigeria Customs, which offers guidance on advancing the sector. However, despite the Federal Government's attempt to promote local production by banning the importation of solar panels, the country currently lacks the capacity to meet the demand for these panels.

Addressing this import dependency requires coordinated efforts to strengthen local industries, streamline policies, and foster innovation. By doing so, Nigeria can mitigate costs, enhance energy security, and accelerate its transition toward sustainable energy systems.

### 3.2 Case Studies

The exploration of renewable energy adoption in Nigeria is incomplete without examining specific case studies that highlight successful initiatives and innovative practices. These case studies serve as valuable illustrations of how various projects have navigated challenges and contributed to advancing the use of renewable energy in the country. Below, we present several notable case studies that exemplify best practices in the Nigerian context.

One of the prominent examples is the Nigeria Electrification Project, NEP initiative implemented by the Nigerian government in partnership with the African Development Bank through the Rural Electrification Agency, REA. This program provides solar power to unserved and underserved communities across the country. The program provides subsidies to developers enabling them to

deploy clean energy solutions and productive use equipment to communities. The success of this initiative lies in its ability to combine renewable energy technology with innovative financing models, making energy more accessible to vulnerable populations. The Nigeria Electrification Programme (NEP) initiative has transformed the lives of many families, providing them with consistent electricity for lighting, communication, and small-scale enterprises<sup>15</sup>.

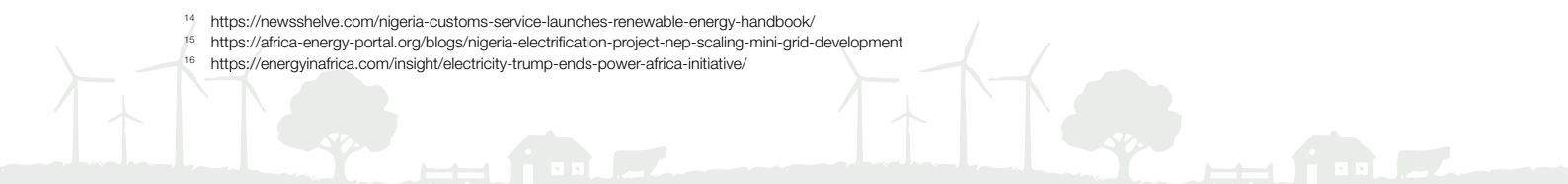
The Power Africa Initiative, led by the U.S. government, also represents a significant effort to enhance renewable energy adoption in Nigeria. This initiative seeks to increase electricity access by supporting the integration of renewable energy sources into the national grid. Through partnerships with local governments, businesses, and international organizations, Power Africa facilitated investments in renewable energy projects, such as solar farms and wind power installations. This collaborative approach not only accelerated the deployment of renewable energy technologies but has also improved policy frameworks to support sustainable energy development in Nigeria. Although, this initiative has ended<sup>16</sup>, but is one of the most successful renewable energy initiatives that provided energy access to vulnerable communities in addition to capacity building for the renewable energy sector.

Lastly, the Rural Electrification Agency (REA) has been instrumental in advancing renewable energy in Nigeria. Their focus on developing mini-grids powered by solar has empowered rural communities by providing a reliable electricity supply. The REA's partnership with private sector actors and community stakeholders illustrates a successful model for collaborative efforts in expanding renewable energy access in remote areas. The DARES initiative is one of the initiatives of the REA, supported by the World Bank to provide

<sup>14</sup> <https://newshelve.com/nigeria-customs-service-launches-renewable-energy-handbook/>

<sup>15</sup> <https://africa-energy-portal.org/blogs/nigeria-electrification-project-nep-scaling-mini-grid-development>

<sup>16</sup> <https://energyinfrica.com/insight/electricity-trump-ends-power-africa-initiative/>



cost-effective renewable energy solutions to communities<sup>17</sup>.

These case studies highlight a variety of approaches to renewable energy adoption in Nigeria, illustrating the potential for innovation and collaboration in overcoming barriers. They also provide tangible evidence of how renewable energy initiatives contribute to socio-economic development while addressing pressing energy needs.

### 3.3 Successful Renewable Energy Projects in Nigeria

Nigeria has made significant strides in the development and implementation of renewable energy projects, showcasing innovative solutions to address the country's energy challenges. Here are some successful renewable energy projects that exemplify this progress:

1. **Azura-Edo Independent Power Project:** Azura-Edo IPP is a 461MW Open Cycle Gas Turbine power station. This project represents one of Nigeria's most ambitious efforts to increase electricity generation through natural gas and renewable sources. Although primarily powered by natural gas, Azura has incorporated significant renewable energy components and aims to achieve grid stability. The project is notable for its large-scale capacity and its role in enhancing the overall energy mix in Nigeria. Azura-Edo also employs innovative financing mechanisms and provides a model for future power projects that integrate renewables.<sup>18</sup>
2. **Solar Power Naija:** The program was initiated by the Federal Government of Nigeria to support economic recovery in response to the COVID-19 pandemic and was launched as part of the Economic

Sustainability Plan (ESP) to achieve the rollout of 5 million new solar connections in off-grid communities<sup>19</sup>.

3. **Lagos Solar Project:** In Lagos State, the government has initiated a solar project aimed at providing reliable electricity to public schools, health facilities, and street lighting. The project involves the installation of solar panels and energy storage systems, enhancing sustainability and reducing operational costs for essential services. The Lagos Solar Project serves as a model for urban renewable energy initiatives, demonstrating how cities can leverage solar technology to meet energy demands<sup>20</sup>.
4. **Rural Electrification Agency (REA) Solar Hybrid Mini-Grids:** At the roundtable discussion organised by BudGIT on 2 July 2025, the MD of REA, Aliyu Abba, represented by Mr Waziri, stated that the REA has undertaken several successful initiatives that power schools, showcasing the potential of decentralized energy solutions for unserved and underserved communities. One notable project is the e-heart initiative, designed to power various sectors, including health, transportation, and e-mobility, providing not just energy access but also energy security to unserved and underserved communities in partnership with subnational entities.

Their financing models feature sector-led initiatives like the Distributed Access through Renewable Energy Scale-up (DARES) program, which supports mini-grids and solar home systems through performance-based grants. Additional programs, such as the National Public Sector Solarisation Initiative (NPSSI) and the African Mini-Grid Program, target public institutions and agricultural clusters, respectively.

<sup>17</sup> [https://nep.rea.gov.ng/posts/Press\\_Release\\_First\\_DARES\\_Signing.html](https://nep.rea.gov.ng/posts/Press_Release_First_DARES_Signing.html)

<sup>18</sup> <https://azuraedo.com/>

<sup>19</sup> <https://rea.gov.ng/wp-content/uploads/2020/12/Press-Release-for-Solar-Power-Naija-5M.pdf>

<sup>20</sup> <https://www.c40.org/news/new-solar-project-expected-to-provide-power-to-critical-public-sectors-across-lagos/>



In the past five years, the REA has deployed over 94 MW of PV capacity and disbursed over \$400 million in grants, with another \$900 million in the pipeline. These efforts aim to stimulate demand and ensure sustainability by linking energy access to productive uses, such as powering small businesses and agricultural activities. Furthermore, the REA has begun deploying solar hybrid mini-grids throughout rural Nigeria, to provide a reliable electricity supply to off-grid communities. These projects not only enhance local energy access but also contribute to economic development, improved healthcare, and educational opportunities. The REA's initiatives have successfully attracted private investments and fostered public-private partnerships.

5. **Private Developers:** Renewable energy companies focus on deploying renewable energy solutions in unserved and underserved areas through the use of solar mini-grids and interconnected mini-grids, including the use of energy-efficient productive-use equipment to promote not just energy access but also improve the socio-economic well-being of communities. These projects have successfully powered schools, health facilities, and businesses, creating sustainable energy access in communities that previously relied on expensive and less reliable sources.

These successful renewable energy projects in Nigeria represent significant steps towards achieving sustainable energy access, improving socio-economic conditions, and fostering environmental sustainability. They demonstrate the potential of renewable energy to address the pressing energy needs of the country while paving the way for future innovations and investments in the sector.

### 3.4 Comparative Analysis with Other African Countries

Nigeria, as one of the largest economies in Africa, has significant potential for renewable energy development. However, its progress in this sector shows both similarities and contrasts when compared to other African nations. This comparative analysis examines Nigeria's renewable energy landscape in relation to countries like Kenya, South Africa, and Ethiopia, focusing on policies, project implementation, and overall commitment to renewable energy.

#### 3.4.1 Policy Framework and Commitment

- **Nigeria:** The Nigerian government has established various policies aimed at promoting renewable energy, such as the Renewable Energy Master Plan (REMP) and the National Renewable Energy Policy (NREP). However, the implementation of these policies has faced challenges, including bureaucratic hurdles, lack of consistent funding, and inadequate regulatory frameworks.
- **Kenya:** Kenya stands out for its strong regulatory framework and commitment to renewable energy. The country has a robust feed-in tariff policy that has successfully attracted investments in solar, wind, and geothermal energy. Kenya is also home to the Lake Turkana Wind Power Project, one of the largest wind farms in Africa, which has significantly increased its energy capacity<sup>21</sup>.
- **South Africa:** South Africa's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) has been highly successful in promoting private investment in renewable energy. This program has facilitated the integration

<sup>21</sup> [https://www.inforse.org/africa/pdfs/PUB\\_KENYA\\_100\\_Renewable\\_Scenario\\_PolicyBrief\\_March\\_2023.pdf](https://www.inforse.org/africa/pdfs/PUB_KENYA_100_Renewable_Scenario_PolicyBrief_March_2023.pdf)



of solar and wind power into the national grid and has established South Africa as a leader in renewable energy procurement in Africa<sup>22</sup>.

- **Ethiopia:** With a strong commitment to renewable energy, Ethiopia has made significant investments in hydropower, contributing to about 90% of its energy mix. The government has set ambitious targets for expanding renewable energy generation, which includes not only hydropower but also wind and solar energy initiatives.

energy capacity, encouraging a diverse range of independent power producers. South Africa has also developed a strong local manufacturing sector for renewable energy technologies, increasing job creation and economic growth.

- **Ethiopia:** Ethiopia’s Grand Renaissance Dam represents a significant investment in hydropower, expected to generate 6,450 MW of electricity once completed. The project aims to boost both domestic energy access and regional power export, showcasing successful project implementation aligned with national development goals<sup>23</sup>.

### 3.4.2 Project Implementation and Success Stories

- **Nigeria:** While Nigeria has initiated various renewable energy projects, many have struggled with implementation and sustainability. Challenges include inadequate infrastructure, poor project management, and a lack of community engagement. Successful projects, such as the Solar Nigeria Programme, highlight potential but still face scalability issues.
- **Kenya:** Kenya’s investment in solar energy, epitomized by M-KOPA Solar, has transformed energy access for millions of households. M-KOPA employs a pay-as-you-go model, enabling low-income households to access solar power without upfront costs. The implementation of these projects has been characterized by community involvement and effective financing mechanisms.
- **South Africa:** The successful implementation of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) has led to the rapid expansion of renewable

### 3.4.3 Challenges and Opportunities

**Nigeria:** The primary challenges include regulatory inconsistencies, energy theft, poor infrastructure, and inadequate financing options. However, Nigeria’s vast renewable resources, especially solar potential, present significant opportunities for growth. Establishing partnerships with private investors and fostering local capacity building will enhance these prospects.

**Kenya:** Although Kenya is a leader in renewable energy in Africa, challenges include maintaining infrastructure and ensuring the sustainability of solar projects in rural areas. Continued investment in grid development and public-private partnerships is crucial to sustaining growth.

**South Africa:** South Africa faces challenges such as the need for grid upgrades and the political dynamics surrounding coal dependency. However, the country has an opportunity to diversify its energy sources further by investing in advanced renewable technologies and storage solutions.

<sup>22</sup> [https://en.wikipedia.org/wiki/Renewable\\_Energy\\_Independent\\_Power\\_Producer\\_Procurement\\_Programme](https://en.wikipedia.org/wiki/Renewable_Energy_Independent_Power_Producer_Procurement_Programme)  
<sup>23</sup> <https://ethionegari.com/2025/03/20/ethiopia-to-inaugurate-gerd-africas-largest-dam/>



- **Ethiopia:** Despite its strengths, Ethiopia must address environmental concerns related to large hydropower projects and engage communities effectively to prevent conflicts. Expanding into other renewable sources, such as wind and solar, can complement its hydropower-based energy mix.



## The comparative analysis reveals that while Nigeria has made strides in renewable energy development, it faces significant challenges that hinder its progress.

In contrast, countries like Kenya, South Africa, and Ethiopia have established more robust policies, successful project implementation strategies, and engaged local communities to drive renewable energy adoption. Learning from these countries' experiences will help Nigeria create a more conducive environment for renewable energy investments, enhance energy access, and promote sustainable development across the nation. Addressing these existing challenges and leveraging its vast renewable resources would position Nigeria as a leader in renewable energy in Africa.

### 3.5 Bottlenecks on Renewable Energy Adoption in Nigeria

The adoption of renewable energy in Nigeria is hindered by several specific challenges that must be addressed to fully realize the potential of these sustainable resources. These challenges include:

1. **Infrastructure Deficiencies:** Nigeria's existing energy infrastructure is outdated and insufficient to support the growth of renewable energy systems. Poor road networks, inadequate transmission lines, and a lack of distribution networks impede the deployment of renewable projects, particularly in rural and underserved areas.
2. **Regulatory and Policy Barriers:** While there are efforts to create supportive policies, the regulatory environment is complicated and inconsistent. Bureaucratic inefficiencies, lack of clear guidelines, and unforeseen regulatory changes deter investors and slow the development of renewable energy projects.
3. **Financing Challenges:** Access to financing is a significant barrier to renewable energy adoption. Many local investors lack the capital or financial incentives to invest in renewable technologies, while international investors may be cautious due to perceived risks and uncertainties. High initial capital costs for renewable energy systems can also be a deterrent for both individuals and businesses, although in recent years local developers have been able to access funding from both local and international financiers.
4. **Technical Expertise and Capacity:** There is a shortage of skilled professionals in the renewable energy sector in Nigeria. This skills gap includes a lack of technical training on renewable technologies and limited research and development capabilities, which hinders the growth and sustainability of the sector.
5. **Public Awareness and Acceptance:** Many communities do not fully understand the benefits of renewable energy or may have concerns about its reliability compared to traditional energy sources. This lack of awareness can result in resistance to adopting new technologies, although over the years, the adoption of renewable



- energy has increased due to advocacy and concerted efforts by renewable energy associations and civil society organizations.
6. **Competition with Fossil Fuels:** The established oil and gas sector still dominates the Nigerian energy landscape. As a result, renewable energy often faces competition from fossil fuels that are more entrenched in the economy. Government policies may still prioritize fossil fuel investments due to their economic significance, making it challenging for renewables to gain a foothold.
  7. **Land Ownership Issues:** Securing land for the installation of renewable energy infrastructure can be a complex process in Nigeria, often involving disputes over land ownership and usage rights. This often delays project implementation and increases costs.
  8. **Environmental and Climate Challenges:** While renewable energy technologies are aimed at providing sustainable solutions, environmental concerns related to land use and impacts on local ecosystems can arise. Additionally, Nigeria's climate variability, including extreme weather events, can affect the reliability of certain renewable sources, such as solar and hydropower.
  9. **Energy Storage Limitations:** The lack of adequate energy storage solutions also hinders the effectiveness of renewable energy systems, particularly solar and wind. Without sufficient storage to manage intermittent supply, it can be challenging to provide a consistent energy flow.





# Prospects for Renewable Energy in Nigeria

The prospects for renewable energy in Nigeria shine brightly as the country looks to overcome its energy challenges and move towards a more sustainable future. With an abundance of renewable resources, there is a tremendous opportunity to create a cleaner, more reliable energy landscape for its citizens.

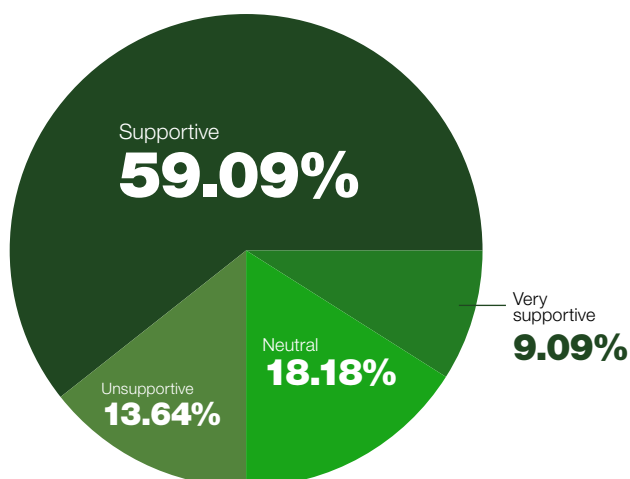
Nigeria's wealth of natural resources positions it well for a renewable energy revolution. The country enjoys abundant sunlight, making solar energy a particularly exciting option. Many states also have favorable wind patterns, along with significant biomass potential from agriculture and untapped hydropower resources. This variety means that Nigeria can explore multiple avenues for generating energy, reducing reliance on any single source.

**Currently, millions of Nigerians do not have access to consistent electricity, especially in rural areas. Embracing renewable energy solutions can be a game changer.**

Off-grid solar projects are already making a notable impact, bringing reliable electricity to homes and businesses that previously relied on expensive and often unreliable diesel generators. This shift allows families to enjoy light for studying, businesses to thrive, and communities to develop further.



How would you rate the current policy environment for renewable energy in Nigeria?



The Nigerian government has started taking steps to prioritize renewable energy through various policies and initiatives. Plans like the Renewable Energy Master Plan show a commitment to fostering a supportive environment for growth in the sector. This governmental backing is crucial for encouraging investment and innovation, offering hope for a renewable future.

Those investments are already seeing interest from both local and international investors. As the world moves toward more sustainable practices, renewable energy in Nigeria is becoming an attractive opportunity. Incentives such as tax breaks and grants are encouraging entrepreneurs and companies to dive into the renewable sector, driving development and job creation.

As the sector grows, it will create new job opportunities in various areas like manufacturing, installation, and maintenance. This could lead to stronger local economies and help lift communities out of poverty.

Another important aspect is energy security. By diversifying its energy mix with renewables, there will be less dependency on oil and gas. This is particularly important considering the fluctuations in global energy markets. A more stable energy supply made up of renewable sources will enhance Nigeria's energy resilience.

Technology is also on the side of renewables. Innovations in energy storage and smart grids are making renewable energy more efficient and reliable. As these technologies continue to advance, they will facilitate the integration of renewable sources into Nigeria's energy systems.



**Speaking of job creation, the transition to renewable energy is not just about producing clean energy; it's also about empowering people.**



As Nigeria commits to tackling climate change and fulfilling international agreements, integrating renewable energy into its National Development Plan becomes even more critical.



**By investing in renewable resources, the carbon footprint of Nigeria will significantly reduce while advancing its National Determined Contributions, NDCs and contributing positively to global environmental efforts.**

The future of renewable energy in Nigeria is promising and filled with possibilities. With rich resources, government support, and growing investment interest, Nigeria stands on the brink of a renewable energy transformation. By mainstreaming these opportunities into the National Development Plan, NDP and addressing existing challenges, will enable the country to create a brighter, more sustainable future for all its citizens.





# Recommendations

To overcome the challenges hindering renewable energy adoption in Nigeria and to foster a vibrant and sustainable energy sector, the following recommendations can be implemented:

**01**

**Strengthen Infrastructure:** Invest in the development and modernization of energy infrastructure, including robust transmission and distribution networks. Prioritize the construction of rural electrification projects that leverage renewable energy, such as mini-grids and solar home systems.

**02**

**Enhance Regulatory Frameworks:** Simplify and clarify regulatory processes for renewable energy projects. Establish clear guidelines and mechanisms for permitting, interconnection, and grid access to create a favorable environment for investment. Consistent policies and regulations will also help in building investor confidence.

**03**

**Facilitate Access to Financing:** Promote financial mechanisms that support renewable energy investments. This could include low-interest loans, grants, subsidies, and tax incentives for developers and consumers investing in renewable technologies. Establish partnerships with international financial institutions to enhance funding availability.

**04**

**Develop Technical Training Programs:** Create and implement training programs to build a skilled workforce capable of supporting the renewable energy sector. Collaborations with academic institutions, vocational training centers, and private sector stakeholders can help in developing training programs tailored to the needs of the industry.



05

**Raise Public Awareness and Acceptance:** Launch campaigns to educate the public about the benefits of renewable energy, including its reliability, cost-effectiveness, and environmental advantages. Engaging local communities in discussions about renewable energy projects can help build trust and acceptance.

06

**Encourage Public-Private Partnerships (PPPs):** Foster collaborations between the government and private sector to drive investment in renewable energy projects. PPPs can effectively leverage resources, share risks, and bring in private sector expertise for successful project implementation.

07

**Promote Research and Development:** Support research initiatives focused on renewable energy technologies that are suitable for Nigeria's unique climate and geographical context. Investing in R&D can lead to innovative solutions that enhance the efficiency and sustainability of renewable energy systems.

08

**Address Land Use Issues:** Streamline the process of acquiring land for renewable energy projects while respecting local land rights and ensuring fair compensation to landowners. Engaging local communities early in the planning process can help mitigate disputes and facilitate smoother project implementation.

09

**Invest in Energy Storage Solutions:** Encourage the development and deployment of energy storage technologies that will help balance supply and demand for renewable sources like solar and wind. This investment is crucial for enhancing the reliability and consistency of renewable energy systems.

10

**Subsidies and Financing:** Address cost barriers through government-backed loans or pay-as-you-go solar schemes (as piloted in Kenya and Rwanda).

11

**Policy Harmonization:** Streamline renewable energy regulations to reduce bureaucratic delays.



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