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MINIGRID INVESTMENT REPORT

SCALING THE NIGERIAN MARKET

2018

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Authors

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Authors

Abdulmumini Yakubu	Nigerian Economic Summit Group
Ebun Ayandele	Rocky Mountain Institute
James Sherwood	Rocky Mountain Institute
Olu Aruike Olu	Rocky Mountain Institute
Sachiko Graber	Rocky Mountain Institute

Authors listed alphabetically

Contributors

Emeka Okpukpara	Nextier Power Nigeria
Fatima Ademoh	Waste-2-Watt Limited
Hannah Kabir	Creeds Energy
Maria Yetano	Wuppertal Institute for Climate, Environment and Energy

Contacts

Sachiko Graber	sgraber@rmi.org
James Sherwood	jsherwood@rmi.org
Tayo Aduloju	tayo.aduloju@nesgroup.org
Abdulmumini Yakubu	abdul.yakubu@nesgroup.org

Design

Noah Olatoye	Nigerian Economic Summit Group

About this report

This report is intended to illuminate the current state of the Nigerian minigrid market and the opportunity for investment. It offers an in-depth look at current minigrid projects throughout the country and provides perspectives on the current opportunities and challenges to scaling the market.
The report represents the outcome of a collaborative process through which information on the minigrid sector was collected and synthesised. Data and perspectives pertaining to the current state of the market and the potential for scaling were collected from a vast array of sources—including minigrid developers, customers, investors, and policymakers. This report is intended for a wide range of readers who may have an interest in minigrids and energy access issues in Nigeria.

Executive Summary

Nigeria continues to focus on electrifying rural areas of the country, where as much as 55% of the population remains without electricity access. Recently, the emergence of minigrids as a cost-effective option for electricity provision has created an exciting opportunity to rapidly increase electrification. For policymakers, minigrids fill an important gap between expensive grid extension projects and low-power solutions like solar home systems, and can help provide power to millions of people. For commercial investors, Nigeria's large population and strong economy make it an attractive place to build the sector; the vast but underdeveloped minigrid market offers revenue potential of ₦2.8 trillion (US$8 billion) annually in Nigeria alone.

The Nigerian minigrid market today has reached an inflection point - costs are competitive with alternatives like diesel and petrol generators, and projects are moving away from grant funding to commercial investment. At the same time, minigrid costs can be reduced by more than 50% over the next three years, unlocking market scale to tens of thousands of sites within Nigeria alone.

The market for minigrids in Nigeria is strong, and clear best practices are emerging

NESG and RMI audited a representative set of ten commercial minigrids in Nigeria—those developed with a significant amount of private equity or debt finance—to build a snapshot of the current market **(Figure ES-1)**. This audit, which included site visits, interviews with minigrid customers, and developer interviews, provides a clear picture of existing isolated, rural, commercial minigrids, which are the focus of this report. Interconnected minigrids—developed in collaboration with distribution companies—are another promising market segment, but remain a relatively unexplored option in Nigeria. As **Table ES-1** shows, minigrid costs are higher than the main grid but lower than small generators, which typically cost upward of ₦250 (US$0.70) per kilowatt-hour. Customer satisfaction is very high across most sites and collection rates are near 100%. Most developers have used an owner-operator business model funded through a 70:30 mix of debt and equity supplemented with grant funding.

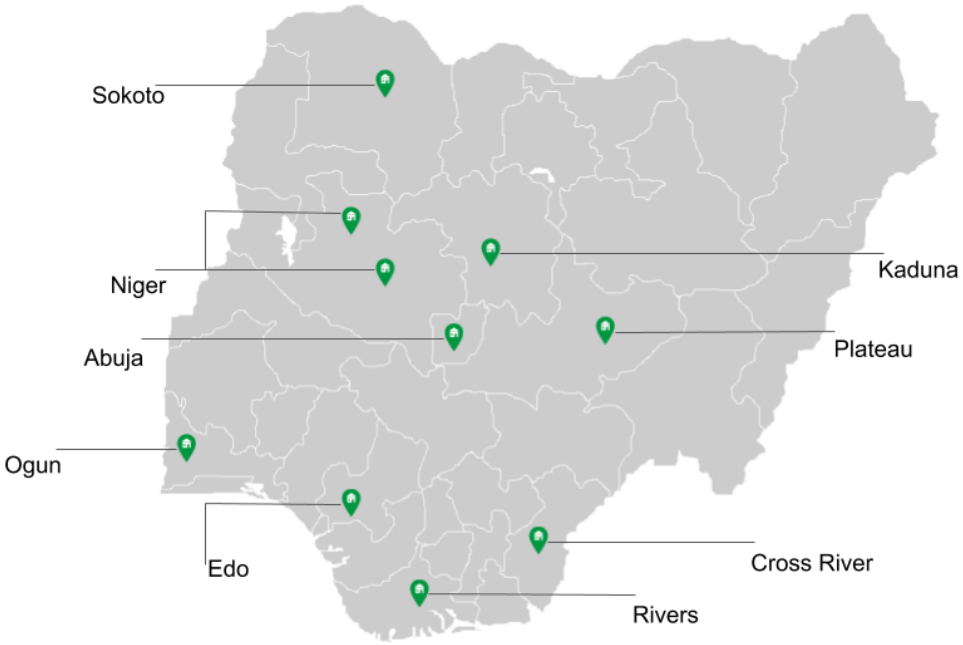


Figure ES-1. Audited commercial minigrid project sites across Nigeria

Metric	Range
Tariff	120–300 /kWh
System size	16–100 kW
Capital expenditure	₦30– ₦100 million
Capacity utilisation	2% – 100%
Collections	98%–100%

Table ES-1. Cost and collections for audited minigrid projects
Very low capacity utilisation rates reflect new sites that are not yet fully operational

From these ten projects, a clear set of best practices has emerged (**Figure ES-2**). These best practices demonstrate the success and growth of the industry to date, and are particularly important for stakeholders involved in development and operation of specific projects (developers, investors, programme coordinators, etc.). Incorporating them into future projects can help ensure success, both from a business perspective in terms of profitability and from a community perspective in terms of affordability and reliability. **Chapter 2** discusses existing projects and best practices in more detail.

- **Select optimal sites** to maximize financial viability by finding densely populated areas with significant local economic activity and ability to pay for electricity and clustering sites to benefit from economies of scale in construction and operations.
- **Engage the community** through sensitisation and early development, frequent site visits, involvement of local representatives, and other continuous engagement activities in order to build customer interest, collect feedback, and maintain satisfaction.
- **Stimulate demand** by providing appliance financing programmes and energy efficient appliances and machinery, especially for productive uses, to balance minigrid load profiles and increase capacity utilisation.
- **Maximise developer ownership** by using innovative financing techniques and ownership models, such as the split asset model, to implement an owner-operator model and overcome finance constraints.

Figure ES-2. Best practices in minigrid project development and operations

Nigeria's existing policy provides a backbone for minigrid development

The Federal Government of Nigeria has created policy over the past several years to enable minigrid and off-grid development in the country. Beginning with the National Electric Power Policy of 2001, and including more recent policies like the Nigerian Electricity Regulatory Commission's Mini Grid Regulation of 2017, the government has increasingly committed to off-grid development and electrification. This commitment has ranged from enabling regulation and policy to direct investment through budgeted funds and facilitating development partner loans and grants.

While these policies have supported the development of early market growth, going forward they can be improved to enable the next phase of minigrid development. Specifically, there is a need to provide more clarity on policy by addressing overlapping mandates and competing frameworks, as well as to more consistently enforce existing regulation. The government can also continue to improve the ease of doing business, considering customs issues and supporting finance development in particular. These policies and implementation needs are discussed in Chapter 3.

There are opportunities for improvement to accelerate market growth.

Despite the minigrid market's rapid growth, there are opportunities to further accelerate the pace of innovation and implementation. Stakeholders across the industry in Nigeria have identified a set of eight opportunities along each element of the minigrid value chain (Table ES-2). These are described more fully in Chapter 4.

Stakeholders across the value chain can play a critical role in supporting the market

Given the opportunities to accelerate the minigrid market, there are clear next steps for stakeholders to take (Figure ES-3). With this report we have identified actions across four key sets of stakeholders that, taken together, can support deployment of commercial minigrids and unlock investment opportunities across Nigeria. Chapter 5 discusses these next steps in greater detail.

The market forecast for minigrids in Nigeria is promising

Findings from this report show that there is a clear path to scale for minigrids in Nigeria, which builds on the foundation of experience with projects to date; the time is right for investment. The sector is rapidly moving away from grant funding towards private debt and equity capital, and Nigeria has enormous market potential to support such growth. Stakeholders across the value chain in Nigeria can enable and accelerate this growth through a few key actions. Together, minigrids present an exciting investment opportunity that is primed to significantly increase energy access across Nigeria.

Phase 1: Project Development	**Increase data availability** through development industry associations and data sharing platform
	Increase confidence in Distribution Company (DisCo) transparency by improving enforcement of 5-year DisCo extension plans and guaranteeing asset purchase upon DisCo expansion
	Increase affordable project finance by creating a minigrid finance consortium, providing concessional and other appropriate financing instruments, conducting investment trainings, and increasing the limit for minigrid system size
	Reduce Environmental and Social Impact Assessment (ESIA) costs by streamlining the process for minigrids where appropriate
Phase 2: Construction	**Reduce hardware costs** by implementing a business consortium to increase buying power, employing split asset business models, and utilizing existing unelectrified grid extension projects
	Eliminate import barriers by exempting minigrid components from duties and addressing customs delays
Phase 3: Operation	**Bypass mobile limitations** in network service and payment platforms by expanding payment options
	Increase capacity utilisation through demand stimulation progammes and modular system designs

Table ES-2. Opportunities across the minigrid value chain

POLICYMAKERS

- Allow tax and duty exemptions and reduce import delays
- Clarify current regulations and implement additional enabling policies
- Increase state and local government involvement
- Review the ESIA process

BUSINESS COMMUNITY

- Create a minigrid business community consortium
- Design standardised, modular minigrid systems
- Improve telecom service reliability

INVESTORS AND DEVELOPMENT PARTNERS

- Support efforts to increase affordability and availability of finance
- Provide partial grants and operational subsidies
- Create a minigrid finance consortium
- Create cross-sectoral implementation

MINIGRID DEVELOPERS

- Improve customer engagement strategies
- Implement cost-reduction strategies
- Develop a data-sharing platform

Figure ES-3. Recommended next steps for stakeholders

Operational minigrid systems in Cross River State (top) and Niger State (bottom) of Nigeria (Source: NESG/RMI site visits, 2018)

Chapter 1: Electricity Access and the Nigerian Electricity Sector

Electricity access continues to be a challenge in Nigeria. Approximately 55% of Nigeria's population lacks access to electricity;[1] a rate that has not improved over the last five years.[2] Meanwhile, Nigeria's average daily generating capacity of 4 GW is insufficient to meet the country's energy demands, and delivers electricity at a highly regulated tariff ranging between ₦4 and ₦50 per kWh that is neither cost-reflective nor sustainable. As a result of an inadequate supply of electricity, domestic and commercial consumers spend an estimated ₦4.9 trillion (US$14 billion) annually to power 14 GW of small-scale diesel and petrol generating sets.[3]

Rural electrification is especially complicated—only 36% of the population has access to electricity—because rural communities have lower economic activity and energy demand compared to their urban counterparts.[i] Grid extension to rural areas is problematic due to the generation shortfall, the non-commercial viability of many rural grids, and high technical and non-technical losses; so rural communities experience limited economic growth. Despite the challenges with grid extension, off-grid alternatives such as minigrids and solar home systems have not fully penetrated the rural market.

The insufficiency of grid-supplied power hinders business productivity, profitability, and growth throughout Nigeria—particularly for small- and medium-scale enterprises. Over 80% of Nigerian business owners cite electrification challenges as the most significant obstacle to doing business, as they experience an average monthly power outage of 239 hours.[4] Nigeria's Power Sector Recovery Programme (PSRP) estimates that the erratic supply of power results in an annual economic loss in excess of US$25 billion.[5] Additionally, unreliable power supply creates social challenges such as lack of access to food, potable water, lighting, healthcare, education, information, and other basic amenities.

Minigrids offer an alternative to costly grid extension and an emerging solution to rural electrification challenges in Nigeria that can rapidly become cost-effective, presenting an opportunity for investment and economic development. Nigeria's large population of 186 million,[6] large economy, and growing energy needs make it an ideal market to spearhead minigrid development in sub-Saharan Africa.

Rural consumers commonly spend a significant amount on energy alternatives, and are able to pay for minigrid services. Despite this huge potential, minigrid penetration remains relatively low—Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) estimates 30 solar minigrids with a total installed capacity of 1 MW, serving 6,000 customers.[7] Scaling the Nigerian minigrid market to ten thousand 100 kW sites by 2023 would power 14% of the population with capacity up to 3,000 MW and create a ₦7 trillion (US$20 billion) investment opportunity generating over ₦1.05 trillion (US$3 billion) in annual revenue.[8] In total, the minigrid market in Nigeria offers potential annual revenue of ₦2.8 trillion (US$8 billion). In order to realise this potential for market growth and investment, government, development partners, and the private sector must work together to accelerate minigrid development.

This report is intended to provide a snapshot of the minigrid market in Nigeria as well as to identify opportunities for increasing investment. To that end, **Chapter 2** provides an overview of the minigrid value chain, presents a detailed assessment of existing and operational minigrid systems, and shares best practices in minigrid deployment. In **Chapter 3**, we evaluate the policy landscape enabling off-grid electrification and discuss institutional mandates, policy effectiveness, and barriers to scaling the market. **Chapter 4** recounts opportunities to grow the minigrid market, which were expressed by financial institutions, industry experts, policymakers, and project developers through personal interviews, workshop settings, and project audits. **Chapter 5** provides recommendations to achieve a market-driven approach to scaling investment in the sector, including next steps for policymakers, the business community, investors and development partners, and project developers. Finally, **Chapter 6** offers concluding thoughts.

i Current installed capacity is 12.5 GW, but less than half of this is typically available at any given time.

Chapter 2: Minigrids in Nigeria Today

In recent years, support for minigrid development has increased due to improved commercial viability and recognition of the co-benefits of electrification, such as local economic development. The nascent minigrid market is expanding rapidly both globally and in Nigeria, where the number of developers in the market has increased significantly. The minigrid value chain is complex and spans several sectors, encompassing a variety of companies, skills, and areas of expertise. In this chapter, we provide a definition of minigrids, explore the value chain, review existing project characteristics, and discuss factors contributing to project success.

2.1 Defining Minigrids

Minigrids are stand-alone power generation systems of up to 1 MW capacity that provide electricity to multiple consumers through a distribution network.[9] They may remain isolated, convert to an interconnected minigrid by connecting to the distribution company's network, or be developed as an intentionally interconnected system. Minigrids differ from embedded generation, which are independent power plants connected to the centralised grid at the distribution level. Minigrids tend to be smaller in capacity compared to embedded generation, and are also intended to operate independently from the local distribution licensee. **Figure 1** provides an illustration of several minigrid projects currently operational in Nigeria.

Minigrids are often deployed in remote rural areas as a more cost-effective means of electrification than traditional extension of the main grid. They offer more reliable power than the main grid in many settings, including much of rural Nigeria. One GIZ assessment of the minigrid opportunity suggests that over 26 million Nigerians can be most effectively provided with electricity via nearly 8,000 isolated minigrid systems providing 4.4 GWh per year.[10]

Although minigrids may be developed as either isolated or interconnected systems, this report focuses on isolated, rural, commercial minigrids. Isolated commercial systems address many challenges of rural electrification and close the access gap in remote regions of Nigeria, where national grid infrastructure is limited or non-existent. There is also a large potential for the development of interconnected 'undergrid' systems, and the mapping of communities appropriate for undergrid development provides scope for future research.

2.1.1 The Minigrid Value Chain

Developing and operating minigrids is a complex process that involves a wide range of stakeholders and requires a skilled workforce. **Figure 2** illustrates the minigrid value chain, which includes three primary phases: project development, construction, and operations. Each activity within the minigrid value chain contributes to the final quality and cost of service provided to consumers. The project development phase, which is typically completed in one to three months, involves site identification and assessment, system design and planning, and customer acquisition. The construction phase, which can take two to 12 months, includes equipment procurement, system installation, and commissioning.[ii] Finally, the operations phase can continue indefinitely (depending on reinvestment—although minigrid project lifetime is typically estimated at 20–25 years) and comprises ongoing maintenance, metering, billing, and collections, and decommissioning or grid integration.

It is possible for a single, vertically integrated company to complete all components within the value chain; but projects more frequently require several companies each specializing in different areas of the value chain. **Appendix 1** provides additional detail on each component of the value chain. Ongoing community engagement, training and capacity building, and other opportunities to improve operations throughout the value chain are discussed in **Chapter 4**.

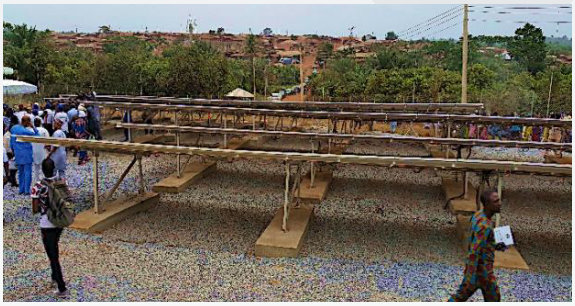
ii. The wide variation in project completion timeline within the construction phase is due to factors such as equipment importation and logistics, which can cause delays.

COMMERCIAL MINIGRID PROJECT-SITES IN NIGERIA

Tungan Jika, Magama LGA of Niger State (100 kW)

Angwan Rina, Shendam LGA of Plateau State (50 kW)

Bisanti, Katcha LGA of Niger State (37 kW)



Gbamu Gbamu, Ijebu East LGA of Ogun State (85 kW)

Umon Island, Biase LGA of Cross River State (50 kW)

Kurdula, Gudu LGA of Sokoto State (80 kW)

Egbeke, Etche LGA of Rivers State (10 kW)

Obayantor, Ikpoba-Okha LGA of Edo State (40 kW)

Figure 1. Commercial minigrid sites across Nigeria (Source: NESG/RMI site visits, 2018)

Figure 2. The minigrid value chain

2.2 Existing Minigrids in Nigeria

The Nigerian minigrid market is rapidly evolving. Over the past decade, minigrids have transitioned from government-contracted and humanitarian to a commercial model, through which developers and operators rely relatively less on grants and government funding. Since 2010, the number of commercial developers has grown to at least nine active members of the Nigerian chapter of the Africa Mini-Grid Developers Association (AMDA); and commercial minigrid projects are increasing in number as well. The success of these projects, which have implemented cost-reflective tariffs and generated customer demand, demonstrates the potential profitability of commercial minigrid projects.

Today's minigrids demonstrate greater availability, reliability, and customer value compared to current alternatives in most rural areas. Although today's minigrid tariffs are high relative to distribution companies and the central grid, they fall within the ability and willingness of customers to pay for electricity (see **Box 1**). Today's cost-reflective minigrid tariffs are typically near ₦200/kWh (US$0.57/kWh), which is less expensive than the cost to run a small diesel or petrol generator set. Although this cost reflects the small scale and risk of a nascent market, minigrid tariffs are expected to continue falling and can be reduced by 60% by 2020.[iii]

BOX 1

Gbenga Akanji owns an electronics repair shop in Araromi-Ososun community in Ogun State (Figure 3). Gbenga spends ₦302/kWh (US$0.86/kWh) to run his 0.75 kVA generator for his business. Our interview with him revealed an eagerness and willingness to transition to minigrid service, which would be a cost-effective alternative to replace the high costs incurred to run his generator.

Figure 3. The owner of Sharp Sharp Electronics business at his shop (Source: RMI site visit, 2018)

iii. In March 2018, RMI and the Nigerian REA convened leading global experts from across the minigrid and investment community to identify a pathway to achieving minigrid tariffs of N70/kWh by 2020. These experts agreed that this is feasible through achievable cost reductions across six categories (hardware, load management, customer engagement, project development and O&M, finance, and policy). (RMI and REA, "20 By 20: A Design Charrette to Achieve 20c/kWh by 2020")

The remainder of this section provides a summary of existing commercial minigrids in Nigeria, factors affecting their success, and lessons learned from audited projects. Data were collected through minigrid audits, which involved visits to a representative sample of ten minigrid projects operated by eight private developers, customer and staff interviews, and data collection on system operations. Projects visited were selected as representative commercial projects, indicating that they were financed at least in part through debt and equity.[iv] Site locations are shown in **Figure 4**. In addition to project audits, personal interviews of the eight minigrid developers were conducted to collect information on minigrid company practices and project financial and operational information.

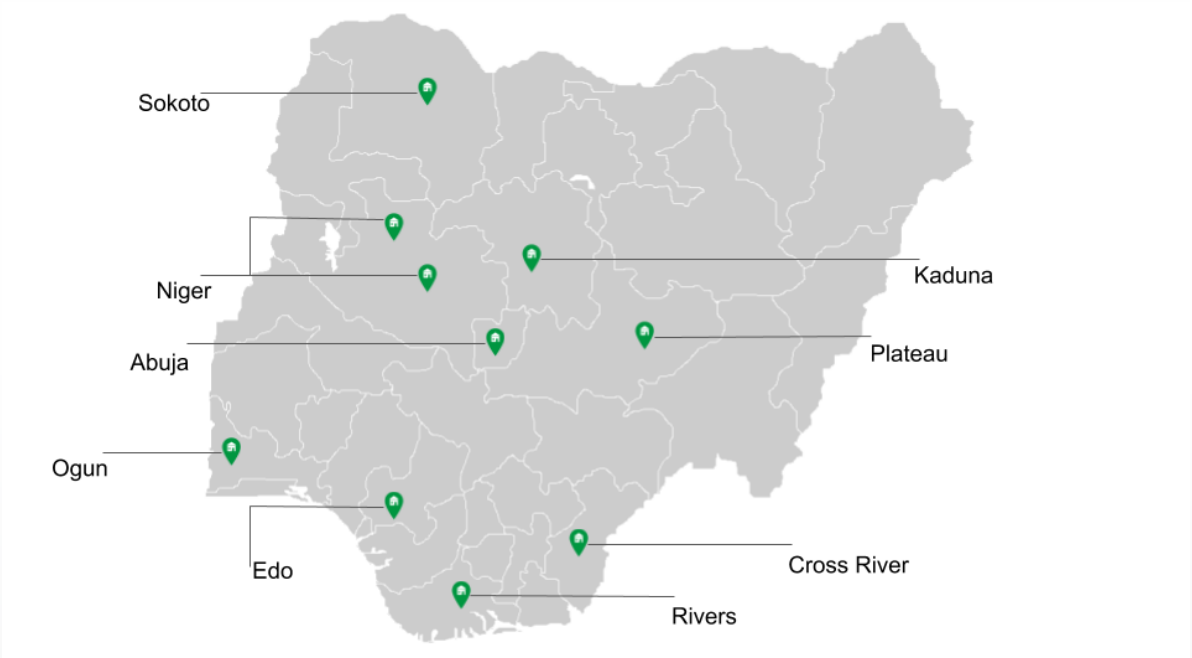


Figure 4. Audited commercial minigrid project sites across Nigeria

2.2.1 Summary of Existing Minigrid Projects

Most minigrid projects today are situated in densely populated agrarian communities, typically with a population of around 2,500 distributed among 300–500 households. Prior to the arrival of the minigrid, community members used kerosene lamps, candles, torchlights, and generators as non-cooking energy sources. The main economic activities in audited communities are farming and fishing, and income is primarily obtained through the sale of cash and food crops like maize, millet, sorghum, yam, cocoa, and cocoyam. Other common commercial activities include retail, welding, grain milling, and barbing. **Table 1** summarises the characteristics of a typical host community, and **Appendix 2** and **Appendix 3** include additional information on audited projects.

Indices	Range of site characteristics
Population	1,200–5,000
Economic activities	Farming: maize, millet, sorghum, cocoa, oil palm, rubber, yam, cassava, plantain, bananas Fish farming
Commercial activities	Welding, retail, grain milling, oil palm processing, cassava grinding, barbing
Commercial energy use	Welding, barbing, retail/provision stores, grinding
Household energy use	Electric bulbs, electric fans, television sets, radio sets, cell phones, refrigerators
Local cost of petrol	₦145–₦300 (US$0.41–$0.86) per litre
Local cost of diesel	₦160–₦300 (US$0.46–$0.86) per litre

Table 1. Typical community characteristics for audited minigrid projects

iv. One project was entirely grant funded, but was included in the audit because the current operator did not install the system.

The audited minigrid projects share common technologies and operating practices. All systems audited are solar projects; nine of the ten projects use 100% solar generation with battery storage, while one project is a solar-diesel-battery hybrid. The hardware for these projects was generally imported from China or Europe. Most projects utilised local labour for construction and installation, and employ local (community) representatives for site management, security, sales, and business development activities.

The ten audited projects are still expanding; but together, they already serve about 2,000 households (65% of local homes) and over 250 commercial connections. The combined system capacity of 364 kW supplies electricity to at least 10,000 individuals.

2.2.2 The Minigrid Business Model

Most existing commercial minigrids use an owner-operator business model funded through a mix of debt, equity, and grant funding. The most common debt to equity ratio is around 70:30, with an additional variable grant component. Commercial debt for audited projects was obtained primarily through concessional loans and impact investment. Some developers used unique approaches to raising a portion of both debt and equity, such as crowdfunding. Minigrid developers report 15%–20% returns on successful projects.

Tariff rates vary from site to site, but a flat tariff structure (a single fixed price per unit of electricity) for all customers was implemented in nine of ten sites. At the last site, residential and commercial users were charged using different tariffs. For most projects, tariffs were developed in agreement with the host community. In each community, the majority of residents report spending less on electricity from the minigrid now than they did on energy alternatives before the minigrid's installation. For instance, the levelised cost of electricity (LCOE) from a small diesel generator is at least ₦250/kWh (US$0.71/kWh).

The cost structure of audited minigrid projects is summarised in Table 2.[v] Reported capacity utilisation rates span a wide range, due in part to varying success with customer enumeration and demand assessment. Higher capacity utilisation figures indicate systems that were either right-sized or slightly undersized, while lower numbers were often reported for projects that are less than one year old, where developers are still acquiring customers and stimulating demand. For example, one site operating at 100% capacity was undersized due to an underestimate of customers, while the site with the lowest capacity utilisation is yet to be fully operational.

2.2.3 Future Project Pipeline

The eight minigrid developers interviewed for this report expressed plans to begin work on an additional 200 minigrid projects by the end of 2018. Some of these projects would participate in REA and development partner programmes, but many are expected to be independently financed. Based on current project statistics, these 200 projects would yield approximately an additional 10 MW installed capacity throughout Nigeria and, at current costs for minigrid development, would require a ₦10 billion (US$28 million) investment. Through these projects, many developers are broadening the geographic focus of their work—those retaining a regional focus plan to extend operations to nearby states, while some developers will operate projects across several regions of Nigeria.

Metric	Range	Median
Tariff	₦120–₦300 /kWh (US$0.34–0.86/kWh)	₦200/kWh (US$0.578/kWh)
System size	16–100 kW	45 kW
Capital expenditure	₦30–₦100 million (US$90,000–$300,000)	₦50 million (US$140,000)
Operating expenditure (per annum)	₦300,000–₦2.4 million (US$900–$6,900)	₦690,000 (US$2,000)
Load	16–300 kWh/day	218 kWh/day
Capacity utilisation■	2%–100%	19%
Collections■■	98%–100%	99%

Table 2. Cost and collections for audited minigrid projects

v. Tools such as the NESP Mini-grid Due Diligence Guidelines can be used for additional benchmarking of minigrid cost structures: https://energypedia.info/images/2/24/Due_Diligence_Guidelines_for_Mini-grid_Investors_in_Nigeria.pdf

■ Capacity utilisation as reported by minigrid developers is shown here—assumed to be calculated as peak demand/system capacity. A capacity utilisation rate was not included for one project that is currently in the commissioning stage and not fully operational. ■■ In all projects audited, collections were conducted through a pay-as-you-go model.

The interest in rapid minigrid deployment demonstrates high confidence in effective business models and the ability to identify viable off-grid sites with demand for minigrid solutions.

2.3 Minigrid Success Factors and Best Practices

Analysis of minigrid audits and developer interviews indicates that the success of today's minigrid projects depends on many factors, the majority of which are within the locus of developer influence. Factors for success include site selection, community engagement, demand stimulation, ownership, and regulatory support. Based on these factors, developers are already implementing best practices to lower costs, improve customer satisfaction, and achieve economic viability in new projects. This section explores the features of successful projects and the emerging best practices associated with them.

Selection of economically viable sites is a key factor to project success. During site selection, developers use demand surveys and customer enumeration to assess local economic activity and ability and willingness to pay for electricity. Sites with high levels of commercial activity and customer willingness to pay maximise system revenue, while sites clustered near each other minimise the cost of ongoing operations and maintenance. Proper site selection results in minigrids sited in communities with high ability and willingness to pay, a high ratio of commercial to residential customers, and minimal concerns of safety or political volatility. Other sites unsuitable for a minigrid are typically better served by lower-cost grid extension, grid repairs, or stand-alone solar home systems.

> *Emerging best practice:* Developers plan to locate new sites in more ***densely populated areas***, which provide sufficient commercial activity for optimised capacity utilisation. Many developers also plan to geographically ***cluster isolated minigrid sites*** to benefit from economies of scale and reduce operational expenses by decreasing labour and time associated with system maintenance. Finally, developers are continuing to ***hone demand assessment accuracy*** through more comprehensive site surveys and improved forecasting methodologies.

Community involvement during site development ensures local buy-in and the sustainability of a minigrid system. A common strategy for this engagement includes sensitisation of the local community to the idea of a solar minigrid system through town hall meetings and engagement with leaders, including local elders, youth leaders, and government officials. Additionally, developers who contract with the community to offtake electricity at an agreed-upon tariff set clear expectations for the minigrid business model and revenue generation, and see greater customer satisfaction and willingness to pay.

> *Emerging best practice:* Developers who ***spend time engaging with the local community*** ahead of project commissioning experience better success with long-term system financial sustainability. Communities that are invested in the project are more likely to recognise the value of the minigrid, increasing both its physical and financial security.

Ongoing community engagement, or continuous interaction of the minigrid operator with the host community, is important for preserving customer interest, collecting feedback, maintaining satisfaction, and quickly identifying operational problems. Strategies for community engagement include appliance financing programmes and ongoing engagement with youth and community leaders across gender lines. Among projects audited, those exhibiting greater developer engagement with the community also demonstrated higher levels of customer satisfaction and willingness to pay.

> *Emerging best practice:* An increasing number of developers ***continuously engage host communities*** to maintain a strong relationship and address customer concerns as they emerge. Best practices during project operation include frequent site visits, siting local representatives within the community, and ongoing activities such as energy efficiency or appliance financing programmes. Continuous community engagement improves acquisition and retention of customers, maintains willingness to pay for power, and ensures the economic viability of the minigrid.

Demand stimulation and appliance financing provide opportunities to balance the load profile of minigrid systems, increase capacity utilisation, and minimise the cost of electricity generation. Since the availability of commercial load is especially vital to minigrid profitability, some developers offer targeted financing of energy efficient equipment, such as milling machines, to commercial customers (see BOX 2). Successful projects improve capacity utilisation through appliance and equipment financing programmes and community engagement on energy efficiency and productive uses.

Emerging best practice: More developers are beginning to implement self-financed ***appliance and equipment financing programmes***, particularly for commercial users. Developers have also found that workshops educating users on the benefits of ***energy efficient appliances*** are effective at balancing community load profiles, and these workshops are being held in more host communities.

Developer ownership increases project sustainability through increased developer buy-in and accountability. The owner-operator model, in which the same company is responsible for the development, operation, and maintenance of a minigrid system, has proven successful in most audited commercial projects. Further, developers who implement finance structures with higher debt and equity relative to grants are more proactive in developing strategies for commercial sustainability. Comparatively, projects that are largely funded through grants (with minimal debt or equity) are less likely to achieve commercial success due to the decreased financial exposure.

BOX 2

Appliance financing programmes have been an effective mechanism to balance load by increasing daytime energy demand and energy efficiency. In Northern Nigeria, a minigrid operator procured and financed an electric-powered milling machine shown in Figure 5. The milling machine is offered to agro-processing businesses in the community on a lease-to-own financing model. This financing scheme helps the minigrid operator to optimise daytime load, electricity demand, and capacity utilisation.

Figure 5. An operator-financed, electric-powered milling machine (Source: Nayo Technologies Ltd)

Emerging best practice: Developers are using ***innovative financing techniques and alternative ownership models*** to implement the owner-operator model despite finance constraints in the young minigrid market. For instance, developers are embracing a split asset model for financing near-term projects, with developers owning the generation asset while the government or a third party owns the distribution asset. This lowers installation and hardware costs to create commercially viable systems while maintaining developer ownership. Other developers are seeking out novel methods of financing, such as crowdfunding, to generate sufficient debt and equity for commercial projects without relying on grant funding.

Regulatory certainty for minigrid projects, while external to developer influence, is vital to project success. Nigeria's supportive Mini Grid Regulation promotes commercial development of minigrid projects. This regulation has particularly increased the ease of implementing projects below 100 kW capacity, and developers are confidently planning project pipelines in rural areas in Nigeria. The regulation also protects the right to set cost-reflective tariffs, supporting project financial viability.

Emerging best practice: Nigeria's ***supportive and market-oriented minigrid regulation*** offers more freedom and support to developers than similar policies in other countries. As a result, developers are finding that rural Nigeria is an accessible and profitable minigrid market, as demonstrated by the recent influx of developers from India, East Africa, and elsewhere. Despite some concerns that distribution companies may challenge existing policies, this level of regulatory certainty is critical to long-term sustainability and investment, as sudden shifts in policy can derail a young market and increase perceived investment risk.

Chapter 3: Minigrid Policy Environment

Minigrid development in Nigeria is enabled by an active economy coupled with policy and regulatory support. This policy environment is critical, given that the market for minigrids remains young and investment has been restrained. Relevant policy supporting off-grid and rural electrification can be traced back over a decade, but recently there has been an increase in supportive policies, plans, and regulations. New policy development has successfully enabled the development of sites to date and laid the groundwork for new investment. For example, regulation of minigrids in Nigeria is more supportive of market development than in most developing countries, where such policy is either less advanced or non-existent. As discussed in Section 3.2.1, the Nigerian Electricity Regulatory Commission (NERC) Mini Grid Regulation offers an explicit framework for minigrid development in Nigeria and provides a mechanism for developers to more easily recover investments, enables development of underserved communities, and generally allows developers to access more commercially viable sites. While existing policy has successfully enabled initial market development, with more to come, several key opportunities remain to ensure that the industry can continue to scale in the coming years.

3.1 Off-grid Energy Policy in Nigeria

The Federal Government of Nigeria (FGN) is committed to enacting and implementing supportive policies that encourage private sector investments and development of the electricity market. This section provides an assessment of existing power sector policies and implementation plans—encoded in legislation—that support the growth of off-grid and rural electrification.

The minigrid and rural electrification policies are nested within the broader national policies on power and the renewable energy subsector. The Electric Power Sector Reform Act (EPSRA, 2005) empowers the Federal Ministry of Power, Works and Housing (FMPW&H) with the overall responsibility for formulating electric power policies, while the Rural Electrification Agency (REA) is responsible for the coordination and implementation of rural electrification strategies and activities (under the supervision of the FMPW&H). The Nigerian Electricity Regulatory Commission (NERC) independently regulates the entire power sector including off-grid development. **Table 3** describes, in a chronological order, each policy's impact on off-grid rural electrification.

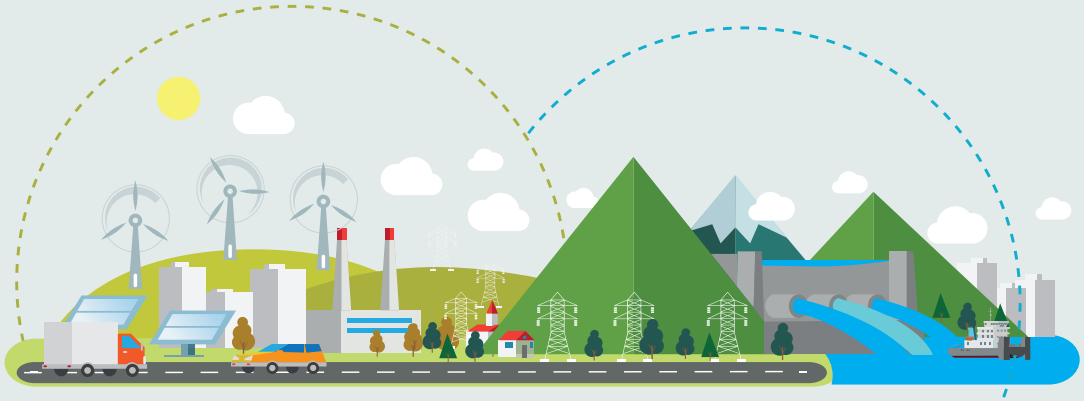
Two early policies provide the underpinning for much of the recent policy and regulatory support of off-grid electrification. The National Electric Power Policy (NEPP), 2001[11] and the Electric Power Sector Reform Act (EPSRA), 2005 provide for the unbundling, privatisation, and development of Nigeria's electricity market. The NEPP is encoded in legislation through the EPSRA, and with the EPSRA, the Nigerian power sector reform achieved institutionalisation and secured the reforms from normal political turbulence to a large extent. Since the 'unbundling' of the power sector in 2013, Nigeria has transitioned from a vertically integrated, publicly owned electricity network to an essentially privately owned and unbundled electricity network, except for the Transmission Company of Nigeria that is owned by the FGN.

For the off-grid electricity market, Section 4.4.2 of the NEPP states that "the clear separation of business activities between generation, transmission, distribution, and sales (marketing) would not apply to off-grid systems. They could continue as vertically integrated systems and without any imposed separation of functions or cross-ownership restrictions." The EPSRA excludes all integrated power systems below 1 MW from NERC regulation — but is governed by the Mini Grid Regulation.

3.2 Regulatory and Economic Incentives for Off-grid Investments

The FGN has outlined its commitment and approach to rural electrification in a number of official policies and plans, including but not limited to the NEPP (2001), the ESPRA (2005), the NREEEP (2015), the RESIP (2016), NERC Mini Grid Regulation (2017), and the PSRP (2017).

Policies Supporting Off-grid Electrification



YEAR
POLICIES/PLANS
IMPACT ON OFF-GRID OR RURAL ELECTRIFICATION

2001
National Electric Power Policy (NEPP)

Provides for the structuring and privatisation of the electricity market

Provides for a Rural Electrification Policy, and targets as well as the Rural Electrification Fund

Promotes research and development in the power sector

2005
Electric Power Sector Reform Act (EPSRA)

Unbundles and privatises the Nigerian electricity market

Develops a competitive electricity market

Establishes the Nigerian Electricity Regulatory Commission; Rural Electrification Agency

Consumer protection, licenses and tariffs

2015
Nigerian Renewable Energy and Energy Efficiency Policy (NREEEP)

Develops renewable energy and energy efficiency (RE & EE) targets and action plans

Power roadmap and support for electricity market reforms

Promotes off-grid renewables development and financing

Recommends additional regulations and economic instruments

Research development and training

Requires bilateral and regional cooperation

Implements existing planning and policy

2016
Rural Electrification Strategy and Implementation Plan (RESIP)

Coordinates and implements Nigeria's rural electrification policies, target and strategies

Administers the Rural Electrification Fund

Promotes low-cost technologies and private sector participation

2017
Power Sector Recovery Programme (PSRP)

Increases electricity access by implementing off-grid renewable solutions

Establishes data driven processes for decision making across the sector

Develops and implements a foreign exchange policy for the power sector

Makes electricity market contracts effective and ensures cost reflective tariffs

2017
Nigerian Electricity Regulatory Commission Mini-grid Regulation

Provides definition, registration and grant of permit for minigrid systems

Develops contract templates and enforcement of electricity contracts between all parties concerned

Describes operation of the minigrid including technical specifications

Proposes commercial arrangement including tariff setting

Establishes framework for investor and consumer protection

2017
Rural Electrification Fund Operational Guidelines (REFOG)

Provides capital subsidies/grants and technical support to developers of rural electrification projects

Establishes the investor eligibility and the project selection criteria under REF

Outlines the sources and allocation of REF resources

Develops a database of possible locations to be targeted by the REF

Outlines the REF grant award process, monitoring and evaluation of projects

Table 3. Timeline of key policies and their impact on off-grid electrification

These policy frameworks, among other regulations and plans, are expected to increase access to inclusive, modern, and clean energy services, improve energy security and climate objectives, and contribute to diversifying Nigeria's energy mix away from fossil fuels. The RESIP was developed based on these documents and was approved by the FGN in 2016 to pursue the government's ambitious targets, which are to increase access to electricity to 75% and 90% (both rural and urban) by 2020 and 2030 respectively, with at least 10% renewable energy by 2025.[12] The policy documents mentioned above contain a number of regulatory and economic incentives, which are discussed in this section.

These incentives were designed to promote private sector participation in the sector by attracting local and foreign investment, increasing access to concessionary finance, reducing costs for project development, enforcing contracts, limiting exposure to foreign exchange volatility through local sourcing of components, eliminating import duty/tax, and fast-tracking customs clearance. Each incentive and its relevance to minigrid development is discussed in detail below, organized by implementing body.

3.2.1 Federal Ministry of Power, Works and Housing:

National Renewable Energy and Energy Efficiency Policy, 2015

Section 2.6.2 of the NREEEP aspires to "drive the creation of market incentives for the deployment of efficient private-sector driven renewable electricity solutions, for remote and off-grid areas." Sections 2.7.3–2.7.5 provide for the participation of local and foreign banks, international donors and NGOs, and indigenous companies/communities to deploy renewable power supply to rural areas, while the FGN provides the framework for its implementation.[13] Under the supervision of the FMPW&H; the REA is currently implementing the Rural Electrification Strategy and Implementation Plan, supporting development under the NERC Mini Grid Regulations, and coordinating other regional and international energy sector initiatives, such as the ECOWAS Renewable Energy and Energy Efficiency (ECREEE) electrification targets, the United Nation Sustainable Energy for All (SE4All) initiative, to increase energy access and promote private sector investments in Nigeria.

3.2.2 Rural Electrification Agency:

Rural Electrification Strategy and Implementation Plan, 2016

Rural Electrification Fund Operational Guidelines, 2017

The RESIP is focused on developing a centrally coordinated, demand-driven, and market-oriented approach to rural electrification, and it targets a least-cost electrification pathway by providing for a national, sector-wide roadmap. The Rural Electrification Fund (REF), administered by the Rural Electrification Agency (REA), provides capital grants for up to 75% of project costs, including technical support to rural electrification.[14]

The REA provides one-off capital subsidies and technical assistance to project developers in order to promote fast and cost-effective expansion of electricity access in unserved rural areas across the different geo-political zones of Nigeria. The objective is to increase access to finance in order to achieve more equitable access to electricity, stimulate innovative approaches to rural electrification, and improve the living and socio-economic conditions of rural dwellers. The REF Operational Guidelines, 2017 is a working document that details the sources and allocation of REF resources, investors' eligibility criteria and qualified projects under REF, and the grant award process, including monitoring, verification and evaluation of projects.[15]

3.2.3 Nigerian Electricity Regulatory Commission:

Mini Grid Regulation, 2017

The NERC Mini Grid Regulation, 2017, governs the development and operation of electricity supply systems of under 1 MW, either in isolation from or interconnected to DisCo network infrastructure. [16] This regulation seeks to incentivise and simplify the process for private sector participation in the minigrid sector, which will in turn contribute to increased access to electricity in unserved and underserved parts of Nigeria.[17] It provides for a compensation mechanism to protect the rights of minigrid permit holders from early encroachment of the central grid, defines a multi-year tariff order (MYTO) methodology for calculating cost-reflective tariff (for permitted systems), and includes standardised contract templates, forms, and guidelines to promote uniformity across the sector.

3.2.4 Nigerian Investment Promotion Commission:

Compendium of Investment Incentives in Nigeria, 2017

Companies Income Tax Act, 1990

The incentives for the power sector fall under two categories: tax-based incentives such as credits, exemptions, allowances, breaks/holidays, or drawbacks and tariff-based incentives based on the fiscal policy for electricity supply. The level of implementation of these incentives is defined

in Appendix 4. The Compendium of Investment Incentives in Nigeria (CIIN) is a compilation of fiscal incentives in Nigerian tax laws and sector-wide fiscal concessions approved by the FGN and supported by legal instruments.[18] In addition, the Rural Investment Allowance was created by Section 34 of the Companies Income Tax Act (CITA), which states that "where a company incurs expenditure on the provision of facilities such as electricity et al (with no existing electricity facilities at all), for the purpose of a trade or business, such a company shall enjoy an additional allowance of 50% under the Second Schedule of CITA."[19]

The Nigerian Investment Promotion Commission (NIPC) houses a "One Stop Investment Centre"[20] —an investment facilitation mechanism where 27 government agencies are brought together, coordinated, and streamlined to provide efficient and transparent services to investors. The Centre provides statistical data and information on the Nigerian economy, investment climate, legal and regulatory framework, and other sector and industry specific information to aid existing and prospective investors in making informed business decisions.[21]

3.3 Policy Effectiveness and Impact

Pursuant to Section(s) 1.6 and 5.4 of NREEEP, the FGN is committed to a seamless implementation of the incentives discussed in this report. Policies that are clear, inclusive, and effectively communicated to all stakeholders play a fundamental role in scaling-up investments into minigrid development. Measuring and evaluating the effectiveness of policies over the short-, medium-, and long-term will further improve the enactment of supportive policies that boost confidence in the sector. Appendix 4 assesses the current level of implementation of the policy incentives in the sector.

The NERC Mini Grid Regulation promotes cost-reflective tariffs and a fast-track process for obtaining permits and creates a unique opportunity for interconnected systems. Power systems under 100 kW do not require a permit, while the permitting process for systems between 100 kW and 1 MW is abbreviated from the mandatory license for large power projects.[22] This differentiation facilitates investment and improves rural electricity access. The regulation de-risks off-grid investments by clarifying the financial and operational terms for isolated minigrids in the event of grid entry, in addition to providing for a 12-month (extendable) exclusivity period during which a minigrid developer can develop a project, thereby easing investor concerns of unanticipated competition.

The RESIP (2016) pursues the FGN's rural electrification target by promoting investments in electrification projects. Public-private partnerships are encouraged, whereby the private sector and community-based organisations are increasingly responsible for the service delivery, with limited financial support from the government. The Rural Electrification Fund is used to promote, support, and provide equitable distribution of electricity access by providing capital subsidies (grants) and technical assistance to supplement private funding. The REA acknowledges that minigrid solutions (with either fossil fuel or renewable resource-powered generation technology) may become the quickest approach to providing rural electricity to spur socio-economic development.[23]

3.3.1. Achievements in the Off-grid Sector

In 2017, the Board and Executive Management of the REA secured US $86 million (₦30.2 billion) under the 2016/2017 Capital Budget Provision. Since that provision, the REA has successfully contracted a total of 386 rural electrification projects across the six geopolitical zones, with 329 projects fully completed and 57 still ongoing. Furthermore, 28 projects have been contracted under the Zonal Intervention Projects. The rate of completion and performance of these projects is highly commendable, with solar (minigrids, street-lighting and standalone solar systems) contributing 107 projects (achieving 100% completion rate), and others--grid extension and injection substation projects--contributing 309 projects (with 81% completion). A total number of 4,830 skilled and unskilled jobs were created during the contract implementation phase.[24]

The REA secured a US$350 million (₦123 billion) loan from the World Bank to support the Nigerian Electrification Project (NEP). The NEP aims to provide a pipeline of potential local investments and financial incentives to catalyse the Nigerian off-grid market through the provision of detailed market data, grant funding, and technical assistance. It is expected that US$150 million (₦53 billion) of the total amount earmarked for NEP will be dedicated to the development of minigrid systems across the country. This funding is intended to support the electrification of 300,000 households and 30,000 local enterprises and institutions across Nigeria within the next five years (2018–2023).[25] Additionally, in 2018, the Rural Electrification Fund (REF) is implementing a separate US $6 million (₦2 billion) capital grant scheme for off-grid projects.

Development partners and investors such as All On continue to offer financial support in the form of working capital, equity, quasi-equity, debt, and tactical grant investments to new and existing energy solution providers to help grow and achieve scale. Nigeria's Bank of Industry (BoI) provides concessionary finance for the deployment of solar PV installations across the country. In partnership with General Electric, U.S African Development Foundation (USADF), and others, Power Africa has awarded nine US$100,000 (a total of ₦275 million) grants to entrepreneurs for innovative, off-grid energy projects in Nigeria. In addition, USADF and All On have an agreement to provide blended finance to off-grid energy companies, including minigrid developers, through 2020.

The Nigerian Energy Support Programme (NESP), implemented by GIZ , completed its first phase from 2013–2017 with development of six off-grid solar minigrids in five partner states, in collaboration with local private companies using a Public-Private Partnership (PPP) and split-asset model. Through this model, the private sector covered 50% of the project's capital costs with its own equity and project finance. The six minigrid projects are currently operational and are expected to provide 10,000 individuals with reliable access to electricity.[26] During its second phase (2018–2020), NESP will further support the implementation and enforcement of an investor-friendly minigrid framework. The goal is to deploy, through local partners, large off-grid solar minigrids that provide electricity services to 100,000 people and at least 400 businesses in rural Nigeria.[27]

Programmes like NESP have been particularly instrumental in establishing capacity building and business development services to the clean energy sector in Nigeria, through more than twenty training institutions. NESP recently developed seven clean energy certifications including training curriculum, provision of training materials, and faculty strengthening.[vi]

3.3.2. Barriers to Policy Implementation

Stakeholders have identified the overlapping mandates and a lack of interrelations between the various MDAs as a barrier, especially because the minigrid sector is regulated both within the renewable energy industry and broader power sector. This overlap has led to a lack of effective coordination and implementation of Nigeria's policy and institutional framework. The myriad policies on renewable energy need to be consolidated and clearly communicated in order to address the confusion in the sector. The electricity industry needs to further develop the capabilities to realise value and drive innovation across every point of the value chain.

The Federal Ministry of Finance has not aligned itself with public and private sector actors to facilitate tax breaks and expedite customs processes. This collaboration would increase the speed and lower the cost of minigrid deployment and is relevant to the financial sector through the role of electrification in reviving local economies and increasing tax revenues from the real economy. Expedited processes can be realised by eliminating VAT and tariffs on solar products. Experiences in Kenya and elsewhere show that the elimination of VAT, import duties, and tariffs significantly boosts the growth of the renewable energy market. Implementing the zero percent Corporate Income Tax for off-grid operations of renewable energy companies will have a sizeable impact. In this regard, there needs to be further clarification on the practical implementation of the 'Zero Duty' regulation contained in the NREEEP and the NIPC—Compendium of Investment Incentives with regards to all components of renewable energy installations.

The innovative finance instruments currently available in the market are still difficult for developers to access. Available finance often comes with long-lead times, and standardised financing templates are not available; in addition, many minigrid developers have had challenges compiling bankable documentation for investors. Stakeholders must work together to design investment templates to attract high-quality solar companies to invest in off-grid projects. This can be achieved by collaborating with the Bankers' Committee and Banks' Sustainability Group to agree on specific guidelines for commercial banks for assessing loan applications, including definition of renewable energy-specific collaterals for adoption by the entire banking community following the Ease of Doing Business Regulations. The Nigerian Renewable Energy Roundtable (NiRER) comprising of relevant stakeholders can serve as a platform to facilitate this joint task, in addition to addressing other industry-wide issues.

vi Nigerian Energy Support Programme. "Rapid Assessment of the Magnitude of Clean Energy Training Potential in Nigeria." 2017.

Chapter 4:
Opportunities for Growing the Nigeria Minigrid Market

To date, the FGN has enabled minigrid development through supportive policy and regulation. The policy framework is rapidly maturing and, in conjunction with ongoing training and capacity building by development partners, has prompted the private sector to increasingly invest in minigrid development. At the same time, as in any nascent industry, early projects have encountered challenges. To address these challenges, this chapter offers potential solutions to unlock the minigrid investment opportunity in Nigeria.

The perspectives expressed here were collected from a broad set of stakeholders, including those from financial institutions, industry experts, policymakers, and developers. Data were collected through personal interviews, workshop-style events, and minigrid site audits. A stakeholder roundtable hosted by NiRER collected feedback from 170 participants, identified for their involvement in at least one component of the minigrid value chain. This roundtable focused on renewable and off-grid energy in Nigeria, with an emphasis on economic and policy support of the sector.

Figure 6 summarises the opportunities highlighted by stakeholders as key to accelerating minigrid market growth and removing barriers to expansion. The sections that follow review these opportunities in detail at each step of the minigrid value chain and provide a summary of the challenges and actionable opportunities to address it. Chapter 5 further expands on these opportunities by identifying the specific stakeholders who can implement recommendations.

4.1 Opportunities for Growth During Project Development

(i) Site Identification and Assessment

Increase data availability to improve demand assessment accuracy through industry associations and a platform for data sharing.

Challenge: Limited data availability for demand assessment can prevent developers from efficiently and accurately evaluating local economic activity, energy demand, consumption trends, and customer payment behaviour. Inaccurate customer enumeration, poor load growth prediction, and inadequate customer engagement can result in poor capacity utilisation and higher costs (excess system capacity supported by insufficient load). In addition, lack of customer payment history data can lead to reduced revenue if customers are not actually able to afford tariffs.

Opportunity: Industry associations and a platform for data sharing among stakeholders can allow more accurate load assessment and better site selection. Increased data availability will allow developers to better understand customer loads and predict up-front customer acquisition. Although existing energy databases, such as that created by REA and FMPWH,[vii] enable more detailed site assessments, they do not provide a mechanism for developers and other stakeholders to share information. An industry association or new data-sharing platform could improve data access to allow more comprehensive site assessments.

vii. REA's energy database provides information such as population, load profiles, energy resources, schools, and available grid infrastructure allowing developers evaluate potential off-grid sites. http://rea.gov.ng/energydatabase/

OPPORTUNITIES FOR SCALING THE MINIGRID MARKET

PHASE 1 Project Development

INCREASE DATA AVAILABILITY
through development of industry associations and a data sharing platform

INCREASE CONFIDENCE IN DISTRIBUTION COMPANY (DISCO) TRANSPARENCY
by improving enforcement of 5-year DisCo extension plans and guaranteeing asset purchase upon DisCo expansion

INCREASE AFFORDABLE PROJECT FINANCE
by creating a minigrid finance consortium, providing concessional and other appropriate financing instruments, conducting investment trainings, and increasing the limit for minigrid system size

REDUCE ESIA COSTS
by streamlining the process for minigrids where appropriate and providing ringfenced support to fund ESIA processing

PHASE 2 Construction

REDUCE HARDWARE COSTS
through a business consortium to increase buying power, employing split asset business models, and utilizing existing unelectrified grid extension projects

ELIMINATE IMPORT BARRIERS
by exempting minigrid components from duties and addressing customs delays

PHASE 3 Operation

BYPASS MOBILE LIMITATIONS
in network service and payment platforms by expanding payment options

INCREASE CAPACITY UTILISATION
through demand stimulation programmes, energy efficiency measures, and modular system designs

Figure 6. Opportunities across the minigrid value chain

Increase confidence in distribution company (DisCo) transparency by improving enforcement of 5-year DisCo extension plans and guaranteeing asset purchase upon DisCo expansion.

Challenge: Low confidence in distribution company transparency lowers investor and developer confidence in isolated minigrids located near the grid edge. Uncertainty around grid expansion limits the ability to develop optimal sites; most developers select locations far away from the grid to reduce the chances of grid interconnection, but these communities are often characterised by lower electricity demand.

Opportunity: Improved regulatory enforcement can increase confidence in the financial security of projects against grid expansion. Today, distribution companies are expected to create 5-year expansion plans to inform developer site selection. Distribution companies are also permitted to purchase minigrid assets upon expansion, but must compensate developers for minigrid assets acquired. By enforcing the creation of 5-year plans and increasing clarity on the process of payment for minigrid asset takeover upon grid extension, NERC can increase confidence in minigrid deployment.

(ii) Design and Planning

Increase affordable project finance by creating a minigrid finance consortium, providing concessional and other appropriate financing instruments, and increasing the limit for minigrid system size.

Challenge: *Limited project financing and high commercial interest rates* make it difficult for companies to enter the minigrid market, and most minigrid developers in Nigeria today have expressed difficulties procuring finance. Many developers struggle to present bankable projects that attract investors. Commercial projects are often delayed by over a year to acquire sufficient debt and equity, which is available from most local financing institutions at rates of 20% or higher. More affordable capital, such as that available from investors like the Nigerian Bank of Industry (BOI), All On, and ElectriFi, can be complicated for some developers to access due to funding restrictions or documentation requirements. Difficulty accessing concessional financing limits many smaller companies to higher-cost debt, in some cases preventing them from entering the market.

Opportunity 1: Developers and development partners recommend a ***global minigrid finance consortium*** to support funding throughout the project lifecycle. This group of finance experts can also provide guidance to minigrid developers on creating accounting and management best practices to better attract new equity investment.

Opportunity 2: Investment and development partners can provide ***appropriate financing instruments and payment guarantee schemes*** to support minigrid projects and ***investment trainings*** to developers. Development finance institutions (DFIs) should provide project developers with financing instruments (patient equity and debt, grants, and concessional finance) at affordable rates. Financing projects in the local currency is especially important for early stage companies in the Nigerian market. These financing instruments could include currency hedging services to de-risk investments in addition to traditional loans. Additionally, development partners can increase funding availability by providing partial grants and operational subsidies to developers to lower the cost of debt and promote efficient long-term operation of the minigrid. Investment trainings have impact in helping developers access finance; the REA and DFIs should continue to conduct these for local investors and banks on how to assess the viability of minigrid system financing.

Opportunity 3: NERC should ***consider increasing the 1 MW limit*** for minigrid systems permitted under the regulations. International financiers have pointed out the benefits of larger systems, which are more efficient and demonstrate investment needs more in line with existing financing options. Therefore, NERC could study the prevalence and necessity of systems larger than 1 MW capacity and adjust the regulation accordingly.

Reduce environmental and social impact assessment (ESIA) costs by streamlining the assessment process for minigrids where appropriate.

Challenge: The prohibitive cost of ESIAs has discouraged developers from undertaking permitted minigrid projects (i.e., projects larger than 100 kW). ESIAs are required for these systems, but can take up to a year to complete. Developers and policymakers noted that the expense and time demands of ESIAs have hindered the rapid scaling of minigrid systems in Nigeria.

Opportunity 1: NERC can work with developers to create a ***streamlined ESIA requirement*** for minigrid projects. While recognizing the clear importance of impact assessments, proponents of rural electrification requested an affordable, efficient, and enforceable ESIA process to speed up minigrid project implementation. Reducing the time and expense of this process would increase the installation of systems greater than 100 kW. Lessons can be learned from the clear definition of the environmental impact assessments process available on the Tanzanian Mini-grids Information Portal,[28] which is reported to lower costs and ease logistical barriers of deployment.

Opportunity 2: Development partners could offer a ring-fenced support element to ***fund the ESIA process*** for developers. Lowering the cost of ESIAs to developers could hasten project development while a less prohibitive time and cost model is developed.

4.2 Opportunities for Growth During Construction

Reduce hardware costs through a business consortium to increase buying power, employing split asset business models, and utilizing existing unelectrified grid extension projects.

Challenge: High hardware costs incurred during procurement and system installation amplify developer challenges in accessing capital. Developers pass these high up-front costs to the end-user when the minigrid becomes operational.

Opportunity 1: A consortium of minigrid developers, hardware suppliers, and service providers can work to lower hardware costs through scaling and collaboration. A strong industry association and supplier network across the value chain can tap industry expertise to achieve standardisation, modularity, and bulk purchasing of minigrid systems. Standard, modular minigrid systems would reduce engineering time by a third and installation costs by 80%, while bulk purchasing can save an additional 15% on capital expenditures. In total, standard, modular, containerised systems will reduce the total cost of service by up to 20%.[29]

Opportunity 2: The *split asset model* implemented in several existing projects lowers minigrid capital costs by dividing the ownership of generation and distribution assets. This model has been successful in several East African countries, where the government owns the distribution network. In Nigeria, the implementation of state or national ownership of distribution assets would lower developer capital cost and spread the investment risk.

Opportunity 3: The *rehabilitation of existing and dilapidated grid extension projects* can allow minigrids to be implemented in underserved areas with lower distribution costs. Existing infrastructure projects can be ceded to minigrid operators by the REA or local government agencies, which often installed distribution that was never electrified.

Eliminate import barriers by exempting minigrid components from duties and streamlining customs processes to avoid delays.

Challenge: Import duties and customs delays increase the cost and time required to construct minigrid systems. Most developers experienced unexpected port delays and import duties. While the Nigerian Customs Service has clear guidelines on import duties for different categories of products, they have been inconsistently implemented and are subject to sudden change, impacting the effective cost of hardware components.

Opportunity: Tax and duty exemptions on minigrid components can lower up-front cost for developers. Consistent enforcement of such exemptions would enable more accurate pricing of minigrid systems and increase investor confidence. Port operations should also allow ***speedy and reliable processing of energy system components***, which would lower the cost of delays and unexpected holding fees.

4.3 Opportunities for Growth During Operation

(i) Metering, Billing, and Collections

Bypass mobile limitations in network service and payment platforms by using vouchers, scratch cards, and mobile money top-up.

Challenge: *Limited mobile network service and the absence of mobile payment platforms* decreases collection success. Without mobile payment options, operators rely on collection agents and imperfect voucher or scratch card methods of prepayment, and cannot employ remote monitoring technologies.

Less reliable methods of payment and collections can reduce revenue; for instance, one developer relayed a concern that local sales agents often ran out of vouchers on the weekend, limiting the ease of prepayment, thereby decreasing sales.

Opportunity: *Expanding payment options* by allowing customers to choose between vouchers, scratch cards, or mobile money to top-up their accounts can minimise collections challenges. The Nigerian Communications Commission and the Central Bank of Nigeria have made concerted efforts to harmonise regulation and engage the various stakeholders in the mobile money sector to allow a more inclusive approach, enabling additional capable players to participate. The Gates Foundation is also working with the Nigerian government to increase digital payment options for low-income households.[30] Once successful, this will enable mobile money solutions to be used for minigrid collections where network coverage exists. The convenience of mobile payment platforms can improve customer engagement, increasing minigrid sales and overall system viability.

(ii) System Maintenance

Increase capacity utilisation through demand stimulation programmes, energy efficiency measures, and modular system designs.

Challenge: *Poor capacity utilisation* increases operating costs, and is common in rural communities that lack daytime commercial electricity consumption. Load profiles in these areas often peak in the evening from household electricity use; this increases the cost of electricity by requiring expensive battery or generator components to complement the low-cost daytime solar resource.

Opportunity 1: Improved coordination of demand stimulation efforts can help minigrids access appliance financing programmes that are already being implemented. For instance, state government and development partner programmes intended to help rural communities finance agricultural processing equipment can work together with developers to complement new electricity systems with productive use appliances in the same community.

Opportunity 2: The development and deployment of *standardised modular minigrid systems* can improve capacity utilisation, in addition to reducing hardware cost as described above. Standardised system additions could increase minigrid capacity through a module containing additional PV panels, battery storage, and other hardware. Modular system components would allow developers to more effectively size systems and upgrade capacity as energy demand increases. Sizing systems based on current demand will increase capacity utilisation and subsequently lower the LCOE of electricity consumed.

Chapter 5: Recommended Next Steps

Minigrid projects in Nigeria have gained traction recently because they provide an effective solution to rural electrification in a challenging environment. However, key challenges continue to limit the market. Support from policymakers, the business community, investors, and development partners is needed—in addition to continued developer efforts—to achieve a market-driven approach to scaling within the sector. This chapter discusses the recommended next steps for each stakeholder group to address barriers to investment and unlock the ₦2.8 trillion (US$8 billion) annual revenue opportunity for minigrids in Nigeria.[31]

5.1 Policymakers

Policymakers are vital to the minigrid scaling process, as they are responsible for making and enforcing regulations that enable market growth. Policymakers can take the following steps to accelerate minigrid deployment in Nigeria:

1. **Allow tax and duty exemptions and reduce import delays.** Eliminating duties and fees on renewable energy technology imports will reduce up-front cost for developers, lower tariffs for end-users, and increase productivity across the economy. Consistency in implementing such exemptions will encourage investor confidence. FGN should reduce customs delays, which further increase up-front costs for developers by incurring additional storage fees, extending project timeline, and uncertainty and risk.

2. **Clarify current regulations and implement additional enabling policies.** Current policies around the publication of distribution company expansion plans should be clarified and enforced to eliminate the uncertainty minigrid operators currently face. Additional clarity can also help developers avoid costly litigation with DisCos. The NERC regulations can be expanded to protect minigrid operators if distribution companies default on payments after the minigrid asset transfer. The regulations can address larger systems to help minigrid developers attract multinationals and foreign investors who are able to finance only larger systems with greater expected returns.

3. **Increase state and local government involvement** in off-grid projects, as well as increasing coordination and collaboration with federal energy agencies (such as the REA). State and local governments have key roles to play in supporting and enabling minigrid development. First, governments can lower the cost of engagement by sensitizing communities about the potential role of minigrid projects to provide a sustainable source of energy. Second, states can provide vital local knowledge on site suitability, assist with land acquisition, and provide a connection to the local DisCo. Third, through a split-asset model states could take on some of the risk of minigrid development by investing in distribution assets. Finally, appliance-financing programmes should be coordinated with local minigrid development to improve appliance usage and stimulate energy demand.

4. **Review the ESIA process** required for minigrid permitting and consider opportunities to streamline the process. Technical assistance or abbreviated requirements through regulatory action could decrease the investment required in ESIA for minigrids. Alternately, the government could provide resources to reduce the financial and temporal burden of the ESIA process for minigrids.

5.2 Business Community

The business community can play a crucial role in achieving cost reductions throughout the minigrid value chain, particularly during procurement, installation, and system maintenance. The private sector can take the steps below to realise these cost savings:

1. **Create a minigrid business community consortium.** A consortium of industry experts with an interest in participating in the minigrid value chain, including manufacturers, hardware suppliers, vendors, and developers, can work collaboratively to accomplish bulk procurement and lower overall minigrid costs. A business consortium could pursue system standardisation and ready-to-install systems, enabling cost savings through bulk purchasing, decreased design and installation cost, and time savings.

2. **Design standardised, modular minigrid systems.** Hardware manufacturers can work with developers to design modular minigrid systems that are adaptable to demand growth. Modular systems will decrease the need for developers to initially oversize systems, lowering up-front costs and increasing capacity utilisation.

3. **Improve telecom service reliability.** Telecom companies can work with developers to improve service reliability in minigrid communities. Better service will enable operators to remotely monitor plant operations and improve system efficiency. Additionally, if telecom companies are able to develop telco-led business models that allow customer payment through mobile platforms, minigrid developers can partner with them to implement mobile payments for electricity services.

5.3 Investors and Development Partners

The unavailability of affordable project financing is a significant barrier to accelerating minigrid deployment in Nigeria today, and is the result of both real and perceived investment risks in the minigrid sector. Investors and development partners can pursue the following steps to increase access to finance and encourage minigrid investments:

1. **Support efforts to increase access to affordable finance.** Today, local Nigerian financial institutions are reluctant to invest in minigrids. When they do invest, they often offer loans at high interest rates to match the perceived market risk of minigrid projects. However, developers need access to affordable debt as well as equity to be able to scale-up their operations. More local institutions could offer affordable interest rates if they receive technical assistance and on-lending focused on better understanding the true risks associated with the Nigerian minigrid market, potentially with the support of development partners. Facilities are now available through DFI support from Sterling Bank, Access Bank, and United Bank for Africa (UBA), as well as through the African Development Bank's Facility for Energy Inclusion (FEI) that minigrid developers will be able to tap for affordable financing. Local banks can also reduce investment risks by providing currency-hedging services to offset foreign exchange risks. To encourage investment in minigrids, portfolio aggregation can reduce risk, tools can be developed to help finance institutions understand the risk of minigrid projects, and credit enhancements can help backstop risk.

2. **Provide partial grants and operational subsidies.** Development partners can support market scaling by providing funding to supplement developer debt and equity. Partial grants and subsidies—for example, to facilitate a split asset model or connection subsidies—allow developers to invest debt and equity while creating bankable projects with affordable tariff structures. Operational subsidies motivate operators to supply reliable electricity and improve system efficiency thereby fostering long-term sustainability. Similarly, full grants should be discouraged, as developer co-investment of debt and equity incentivises efficient operations and long-term project success.

3. **Create a minigrid finance consortium.** Investors and development partners can advance investments by creating a finance consortium in which different investors are responsible for funding specific project stages in the minigrid value chain. A consortium could provide funding access to developers in the form of grants, subsidies, technical assistance, or concessional loans throughout the project lifecycle. Additionally, this consortium can provide recommendations on best investment strategies to the government and can develop tools to assess and reduce the risk of minigrid projects.

4. **Coordinate cross-sectoral implementation to stimulate demand.** Development partners, along with NGOs and government, can coordinate efforts with related sectors. For example, partnerships between developers and appliance manufacturers or agricultural organisations can enable appliance financing for minigrid customers, improve productive uses, and drive energy demand. Development partners and the government can also work together with banks to conduct investment trainings, which would help investors better understand the real risks associated with minigrid project financing.

5.4 Minigrid Developers

Developers should continue to hone their business models and take advantage of cost-reduction opportunities to make minigrid systems viable in rural communities. Minigrid operators can continue to support economic viability through the following steps:

1. **Improve customer engagement strategies.** Developers can improve customer engagement through more frequent communication, both during project development and throughout the operation of a minigrid project. In addition to increasing customer buy-in through personal communication, developers can use appliance-financing programmes to offer additional services to customers.

2. **Implement cost-reduction strategies.** Developers can implement site clustering, demand stimulation, and the education or financing of energy-efficient appliances to lower costs and improve capacity utilisation. Clustering sites will reduce O&M expense by lowering labour and logistics costs. Additionally, stimulating demand through continuous community engagement and appliance financing programmes will increase energy load and enhance capacity utilisation. Finally, the use of more energy-efficient appliances can lower peak demand and reduce the total cost of generation.

3. **Develop a data-sharing platform.** Currently, the REA and FMPWH database supports minigrid development by providing access to available data to inform site assessment. However, the data available on this platform is not comprehensive across all of Nigeria. Data availability can be improved by encouraging a shared platform among developers and other government and development partners that collates information such as site demographics, load profiles, payment behaviour, and other useful data from many sources. Groups such as the Africa Mini-Grid Developers Association (AMDA) Nigeria or Renewable Energy Association of Nigeria (REAN) can support the robustness of data collected through such platforms.

Chapter 6: Conclusion

This report has put into perspective the path traversed to develop the minigrid industry in Nigeria, and the potential path forward to bring it to scale. The opportunity is undeniable: minigrids can be used to provide cost effective and reliable power to millions of un- and underserved Nigerians while creating a market opportunity with potential annual revenue of ₦2.8 trillion (US$8 billion). Accelerating development of this market will require building on the foundation in place and addressing key challenges that may slow progress.

Implementation of the commercial minigrids detailed in this report provides a proof point for how projects can be successfully installed and operated. These projects also provide clear best practices that developers, investors, and other stakeholders can learn from as the next generation of minigrids are installed. At the same time, their experience highlights opportunities to significantly reduce cost through a variety of measures. Similarly, continued improvement of the business and policy environment will enhance project bankability and sustainability and unlock investment needed to reach greater scale. This report presents a set of key recommendations for how policymakers, the business community, investors and development partners, and minigrid developers can address these challenges and help to realise this enormous opportunity.

As the minigrid sector in Nigeria grows, it offers both meaningful impact and exciting investment opportunities. In a matter of 12–24 months the number of commercial minigrid systems is expected to increase by a factor of ten, while project costs are falling and best practices are being implemented across the sector. This progress can be further accelerated as new investors enter the market and stakeholders address opportunities for enabling growth. As the Nigerian market scales, it can be a vanguard for expanded minigrid development across sub-Saharan Africa, where investors and developers can transfer the experiences and lessons learned in Nigeria to other countries with similar energy landscapes. Taken as a whole, the future is bright for the minigrid industry and the electrification of rural Nigeria.

Appendices

Appendix 1. Minigrid Value Chain

Phase 1 Project Development

The project development phase of the value chain begins with **site identification and assessment,** in which suitable sites for minigrid systems are selected. During site assessment, developers evaluate current energy demand and anticipate future load by engaging with community members to understand their energy needs. Indicators used to evaluate demand include grid proximity, level of economic activity, willingness to pay, and geographic location. Developers often avoid sites in close proximity to the national grid due to uncertainty of grid extension, but this can force them to avoid sites with high economic activity and latent demand. The level of economic activity—for instance, the presence of commercial kiosks, productive use equipment, or cell phone use—is often used as a proxy for willingness and ability to pay. The presence of a cell phone service allows developers to explore mobile payment platforms. Site selection should also include an evaluation of logistical convenience, political stability, community safety, and local and state support.

After a site has been identified, **design and planning** begins. This involves the assessment of available energy resources, feasibility studies, and decision-making about the minigrid system structure. Developers explore various design variables to select a suitable generation technology, system configuration, distribution line and pole structure, and overall system layout. System capacity is determined during system design using data collected through site identification to estimate current and future electricity demand. The system design process balances cost, system efficiency, and maintenance requirements to determine the most suitable system configuration. Additionally, developers must demonstrate a successful business model in order to secure project financing. Developers also consider relevant government regulations that affect minigrid operability, including tariff regulations, licensing, and permitting. Design and planning also includes ESIA, which involves evaluating the environmental and social impact of the project and implementing appropriate measures to minimise and mitigate associated risk.

Customer acquisition is required to guarantee an off-taker of electricity and the generation of revenue. During customer acquisition, developers manage customer relationships and develop strategies to increase customer retention, sales, and payment collection. A sale strategy may involve increasing productive uses (e.g., grain milling or water pumping) by leveraging consumer appliance financing to stimulate demand. Developers engage the host community to identify challenges to customer acquisition and retention. For instance, some customers prefer service bundles that allow them to pay per time rather than per kWh consumed. Similarly, there may be a preference for different payment platforms such as mobile money or vouchers over cash or credit card payments. Customer acquisition is an ongoing process that continues throughout the value chain until the project's end of life.

Phase 2. Construction

The construction phase of the minigrid system begins with **procurement** of equipment and electrical components necessary for generation, distribution, and metering. Procurement activities may involve requests for proposals, quotation requests, tenders, manufacturer selection, negotiations, insurance, and legal services, in addition to product inspection, import, and transportation to site. The quality of service provided to customers depends largely on system efficiency, which is specific to the procured components.

System installation involves hardware assembly and construction. Installation begins after all the necessary equipment has been sourced and procured. It includes setting up generation, distribution, and metering systems. Depending on the generation technology, this component may involve the installation of solar panels, inverters, mounting systems, and battery storage systems. Distribution lines, poles, and associated electrical equipment are also installed to distribute power to the consumer.

Additionally, system installation may include infrastructural work such as building accessible roads, water supply, and other supplementary infrastructure.

As construction ends but before plant operation begins, the installed equipment is tested to ensure the plant is working according to operational specifications through **commissioning**. Commissioning includes activities such as equipment inspection, system testing (required by the Nigerian government), calibration, and troubleshooting. These processes ensure that construction and installation are in accordance with drawings and specifications. A commissioning and performance certificate is typically issued once the plant has been established to meet the required design performance level and cleared to begin operations. This component of the value chain may also involve an official unveiling of the project, often commemorated in a ribbon-cutting ceremony to declare the commencement of operations.

Phase 3. Operations

Ongoing operations of a minigrid system involve **metering, billing, and collections.** This component includes monitoring usage, customer invoicing, payment collection, and customer relationship management. Metering systems provide demand and usage data and enable operators to determine appropriate usage fees and tariffs. Regular meters provide only basic data on energy demand, power generation and consumption, voltage and total supply hours. Smart meters can provide operators with more detailed information, including the quantity of electricity used, time of use, and appliances associated with each connection. The information collected allows operators to analyse usage data for load management to improve operational efficiency, such as developing strategies to shift peak demand and subsequently reduce O&M costs. The billing and collections processes are vital to revenue generation and often occur through prepaid or pay-as-you-go systems.

The **system maintenance** component involves servicing and maintaining generation, distribution, and metering systems to ensure seamless operation. Maintenance includes daily monitoring of plant operation, equipment inspection, and repair. A warranty is often available for most generation system components for a certain period, after which an independent company may be contracted to provide maintenance services. In addition to the jobs created for technology manufacturers and maintenance service providers, there is also opportunity to build local capacity by training host community members to become service technicians and customer service representatives. Local participation in ongoing maintenance can enhance efficient system operation and safety.

Grid interconnection or decommissioning is the final component in the value chain. If the grid arrives before the project's end of life, an isolated minigrid operator may convert to an interconnected minigrid or transfer assets to the distribution company. Conversely, if the project reaches its end of life before grid extension occurs, the minigrid developer can disassemble the equipment, and the components can be either resold, repurposed, refurbished, recycled, or disposed. The entire minigrid system may also be refurbished to continue serving the same community. At the end of the project life, the developer should also conduct an evaluation of the minigrid to determine its environmental and social impact on the community.

Appendix 2. List of Audited Commercial Minigrids

Developer	Location (Community)	Local Government Area	State
ACOB Lighting Technology Ltd.	Dokan Karji	Kauru	Kaduna
Arnergy Solar Ltd.	Obayantor	Ikpoba-Okha	Edo
CREDC	Umon Island	Biase	Cross River
GoSolar	Kurdula	Gudu	Sokoto
GVE Projects Ltd.	Bisanti	Katcha	Niger
GVE Projects Ltd.	Egbeke	Etche	Rivers
GVE Projects Ltd.	(i) Angwan Rina (ii) Demshin	Shendam	Plateau
Havenhill Synergy Limited	Kigbe	Kwali	FCT (Abuja)
Nayo Tropical Technology Ltd.	Tungan Jika	Magama	Niger
Rubitec Solar Ltd.	Gbamu Gbamu	Ijebu-East	Ogun

Appendix 3. Minigrid Project Attributes

Note: To protect proprietary information, projects below are ordered differently from Appendix 2.

kW capacity	Number of connections	Tariff Structure (₦/kWh)	O&M (N/month)	Capacity utilisation (%)*
34	280	220/160†	40,000	70
85	500	180	125,000	47
20	130	120/150†	25,000	40
50	100	200	140,000	5
100	300‡	140	50,000	20
40	800	200	200,000	100
26	326	200	30,000	3
16§	100	-	-	2
80	500	200/300†	80,000	80
100	250	288	32,500	9

* Based on current number of connections; several projects were only recently commissioned and will significantly increase their capacity utilisation over the next year.
† Tariff structure differentiated by commercial and household users, respectively.
‡ Expanding to 765 connections as of July 2018.
§ Not yet fully operational.

Appendix 4. Level of Implementation of Off-grid Renewable Energy Investments

Implementation of NREEEP, 2015

S/N	Strategies	Level of Implementation (* NONE / ** LOW / *** HIGH)
1	Public Benefits Fund (PBF) based on penalties of companies not meeting standards with a portion of the tariff designed to support renewables.	NONE
2	Tax incentives to manufacturers of renewable energy and energy efficient equipment and their accessories to promote widespread use including: (i) five year tax holiday for manufacturers from date of commencement of manufacturing; (ii) five year tax holiday on dividend incomes from investments on domestic renewable energy sources.	HIGH
3	Providing fiscal incentives, subsidies to alleviate up-front costs, tax and excise duty exemptions for prospective investors in the renewable energy (RE) subsector.	LOW
4	Government (federal/state) shall assist in allocation or grant of land to manufacturers of energy-efficient products and renewable energy projects.	HIGH

Implementation of CIITA, 2017

S/N	Categories	Level of Implementation (NONE / LOW / HIGH)
1	Tax holiday of three years, and renewable for the next two years	HIGH
2	Exemption from duty taxes on imported equipment, machinery, spares, and consumables.	NONE
3	Capital & investment allowance, which can be carried forward and used after tax holiday period	NONE
4	Manufacture of transformers, meters, control panels, switchgears, cables, and other electrical-related equipment is considered a pioneer industry. As a result, there is a tax holiday of five to seven years	LOW
5	Allowance for 100% foreign ownership of electricity plants	HIGH
6	Repatriation of profit with 5% withholding tax	HIGH
7	20% tax credit on qualifying expenditure for companies and other organisations engaged in research and development activities for commercialisation	LOW

* NONE: Not known to have been implemented at all
** LOW: Implemented, with no clear procedure
*** HIGH: Implemented and highly accessible with clear procedures

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Who we are

The Nigerian Economic Summit Group RC:303317

The Nigerian Economic Summit Group Ltd/Gte (NESG) is a leading private sector think tank and Policy Advocacy Group founded in 1996 with a commitment to the development of a modern, globally competitive economy. The NESG is an independent, non-partisan, non-sectarian organisation, committed to fostering open and continuous dialogue on Nigeria's economic development.

NiRER

The Nigerian Renewable Energy Roundtable (NiRER), hosted by the NESG, is a multi-stakeholder engagement platform, established to provide an enduring framework to address the challenges for renewable energy advancement as well as provide a scaling up and expansion of investments in order to create jobs, improve business value chains, and increase access to reliable electricity supply.

ROCKY MOUNTAIN INSTITUTE

Rocky Mountain Institute (RMI) is an independent, nonpartisan, non-profit organisation founded in 1982 with the mission to transform global energy use to create a clean, prosperous, and secure low-carbon future. RMI engages businesses, communities, institutions, and entrepreneurs to accelerate the adoption of market-based solutions that cost-effectively shift from fossil fuels to efficiency and renewables.

All ON

Energy innovations.
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All On, an independent impact investing company, was seeded with funding from Shell, and works with partners to increase access to commercial energy products and services for under-served and un-served off-grid energy markets in Nigeria, with a special focus on the Niger Delta.

NiRER

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...a Working Group of Public & Private Sector Professionals
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02 Research/Data Management

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04 Business Facilitation

OUR VALUES

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Access to Finance	Investment & Business Environment	Training, Quality Control & Utilization	Knowledge Management & Advocacy

Office Address: 3rd Floor, Right Wing, Unity Bank Tower
Plot 785, Herbert Macaulay Way, Abuja.

Telephone: +234 8099905174 **Email:** nirer@nesgroup.org
Website: www.nesgroup.org