

A ROADMAP FOR ENERGY ACCESS IN DISPLACEMENT SETTINGS: **NIGERIA**



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About the GPA

The **Global Platform for Action on Sustainable Energy in Displacement Settings** (GPA) is the global initiative to promote actions that enable sustainable energy access and use in displacement settings. The GPA strives to remove barriers to energy access in humanitarian settings by providing a collaborative agenda for energy, development, and humanitarian partners to deliver concrete actions of Sustainable Development Goal 7 (SDG 7) for displacement contexts. It promotes and contributes to the humanitarian sector's transition to renewable energy, which will increase efficiency and reduce costs and carbon emissions. Hosted by the United Nations Institute for Training and Research (UNITAR), the GPA Coordination Unit galvanises collective action towards the GPA's realisation.

About the READS Programme

The **Roadmaps for Energy Access in Displacement Settings (READS) Programme**, funded by the IKEA Foundation and implemented by the GPA Coordination Unit at UNITAR, will produce a “roadmap report” for each of the ten countries in its scope. The roadmap reports take stock of the state of energy access in displacement settings in each country with a focus on identifying gaps and high-impact project opportunities to increase sustainable energy access for displacement-affected communities.

These reports consolidate existing data and are informed by workshops with in-country stakeholders to develop and refine the research, including representatives of communities which have been affected by displacement, energy companies, humanitarian and development organisations, and governmental authorities, among others. The roadmap reports present project concepts that have been prioritised by local partners as being the most impactful areas for sustainable energy interventions in displacement contexts. Each roadmap report is produced in partnership with an organisation working in displacement contexts in the focus country.

About the READS Partner

Mercy Corps is a global team of 6,000 humanitarians working together in 40+ countries, on the front lines of today's biggest crises to create a future of possibility, where everyone can prosper. Its mission is to alleviate suffering, poverty, and oppression by helping people build secure, productive, and just communities. Mercy Corps goes beyond emergency aid, partnering with local governments, forward-thinking corporations, social entrepreneurs, and people living in fragile communities to develop bold solutions that make lasting change possible. Committed to support dignified lives also in emergency situations, Mercy Corps powers displaced and host communities in their journey to resilience through clean, affordable, and sustainable energy solutions and decarbonise the humanitarian operations that support them. It does that by providing the enabling environment for reputable energy companies to deploy their services and products, including access to settlements, contextual knowledge, and linkages with the broader market.

About the IKEA Foundation

The **IKEA Foundation** is a strategic philanthropy that focuses its grant making efforts on tackling the two biggest threats to children's futures: poverty and climate change. It currently grants more than €200 million per year to help improve family incomes and quality of life while protecting the planet from climate change. Since 2009, the IKEA Foundation has granted more than €1.5 billion to create a better future for children and their families. In 2021 the Board of the IKEA Foundation decided to make an additional €1 billion available over the next five years to accelerate the reduction of greenhouse gas emissions.

About the Decarbonising Humanitarian Energy (DHE) Multi Partner Trust Fund

The **Decarbonising Humanitarian Energy (DHE)** Multi Partner Trust Fund is currently implemented through UNITAR, UNDP and NORCAP with seed funding from Germany's International Climate Initiative (IKI) and the German Federal Foreign office (GFFO). DHE aims to accelerate transitions away from diesel generators and towards cost-effective, sustainable energy solutions in humanitarian response. The Fund also supports approaches that use these energy transitions to facilitate energy access projects for communities in humanitarian settings.

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Abbreviations

DARES	Distributed Access through Renewable Energy Scale-up	NGO	Non-governmental organisation
DHE	Decarbonising Humanitarian Energy	NRC	Norwegian Refugee Council
DTM	Displacement Tracking Matrix	NSAG	Non-state armed groups
ECHO	European Civil Protection and Humanitarian Aid Operations	OCHA	United Nations Office for the Coordination of Humanitarian Affairs
EUR	Euro	PHC	Primary healthcare centre
FAO	Food and Agriculture Organization of the United Nations	PUE	Productive uses of energy
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit	REA	Rural Electrification Agency
GPA	Global Platform for Action on Sustainable Energy in Displacement Settings	READS	Roadmaps for Energy Access in Displacement Settings
GW	Gigawatt	REF	Rural Electrification Fund
IDP	Internally displaced person	RISE	Regulatory Indicators for Sustainable Energy
IOM	International Organization for Migration	SAFE	Safe Access to Fuel and Energy
KII	Key informant interview	SDG 7	Sustainable Development Goal 7
KV	Kilovolt	SEFORALL	Sustainable Energy for All
KW	Kilowatt	SHS	Solar home system
KWH	Kilowatt-hour	UEF	Universal Energy Facility
LPG	Liquefied petroleum gas	UN	United Nations
MSLA	Multi-Sectoral Location Assessments	UNDP	United Nations Development Programme
MW	Megawatt	UNHCR	Office of the United Nations High Commissioner for Refugees
NCAT	Nigeria Context Analysis Team	UNICEF	United Nations Children's Fund
NCFRMI	National Commission for Refugees, Migrants & Internally Displaced Persons	UNITAR	United Nations Institute for Training and Research
NEMA	National Emergency Management Agency	USADF	United States African Development Foundation
NEP	Nigeria Electrification Program	USD	United States Dollar
NERC	Nigeria Electricity Regulatory Commission	WASH	Water, sanitation, and hygiene
NGN	Nigerian Naira	WFP	World Food Programme

Overview of common energy terms

Energy technologies for electricity and cooking, and the terms used to describe them, can vary between countries, contexts, and organisations. The descriptions used in this report aim to con-

form with the most commonly-used definitions in displacement contexts but may differ from those used by other organisations. ●

TERM	DESCRIPTION
MULTI-TIER FRAMEWORK (MTF) FOR ACCESS TO ELECTRICITY	Access to electricity is categorised across seven attributes: capacity, availability, reliability, quality, affordability, formality, and health and safety. Each attribute falls in a range from Tier 0 (no access) to Tier 5 (full access). The MTF was developed by the Energy Sector Management Assistance Program (ESMAP) at the World Bank to better categorise access beyond a simple binary comparison of “access or no access”.
SOLAR LANTERN	Solar lanterns are an off-grid technology usually composed of a small solar panel, battery, and LED light integrated into a single unit. Solar lanterns can typically provide a few hours of light from a single charge and may have a USB connection for charging phones. Suitable for a single user or household, solar lanterns typically provide Tier 1 electricity access.
SOLAR HOME SYSTEM (SHS)	A solar home system (SHS) is an off-grid technology kit usually composed of a solar panel, battery, LED lights, switches and control systems, and often appliances. The size and services provided by a SHS can vary but typically offer several hours of electricity per day for lighting, phone charging, and appliances such as radios. SHS are used by both households and businesses, and sometimes by community facilities. SHS usually offer between Tier 1 and Tier 3 electricity access and can be acquired through upfront purchases or PayGo models.
MINI-GRID	Mini-grids are decentralised electricity networks which can operate independently of the national grid. They typically serve a community with tens to hundreds of connections. Mini-grids have a power source (usually solar or diesel), battery storage and a distribution network to supply electricity to customers, as well as power control systems. Mini-grids can be designed to provide any level of electricity access and usually provide Tier 1 to Tier 3. Customers could include households, businesses, community facilities, or other users. Customers typically pay fixed tariffs for electricity consumption, or daily rates. “Mini-grid” often refers to systems with capacities ranging from tens to hundreds of kilowatts, but generically could refer to smaller systems (also known as pico- or nano-grids) or larger ones, perhaps also with a connection to the national grid.
STANDALONE SYSTEM	A standalone system can provide electricity independent of the national grid, either fully off-grid or as a backup power source. Any type of electricity generation could supply a standalone system, but these are usually powered by diesel or solar with battery storage. Standalone systems typically refer to those which supply buildings, compounds, or operational purposes such as water pumps, but could include any off-grid system such as a mini-grid.
NATIONAL GRID	The national grid is the main electricity infrastructure of a country. It provides power through high-voltage transmission and distribution lines and is supplied by large-scale generation, such as power plants. The national grid can provide up to Tier 5 electricity access but, especially in remote areas and displacement contexts, its electricity supply may be unreliable or unavailable.
OFF-GRID OR DECENTRALISED SYSTEM	An off-grid or decentralised system can operate independently of the national grid network. The term “off-grid solar products” usually refers to consumer-focused systems, such as solar lanterns and SHS, whilst “decentralised systems” usually refers to larger systems such as mini-grids and standalone systems.
PRODUCTIVE USES OF ENERGY (PUE)	Productive uses of energy (PUE) include any applications of energy for businesses, income generation, or economic activity. This could include appliances or machinery to make work easier or more efficient, or to make new activities possible. PUE usually refers to electricity, but it also includes energy for cooking and other applications.

Overview of common energy terms

TERM	DESCRIPTION
MULTI-TIER FRAMEWORK (MTF) FOR ACCESS TO COOKING	Access to cooking is categorised across six attributes: exposure to harmful pollutants, energy efficiency, convenience of acquiring fuel and using the stove, safety, availability of fuel, and affordability. Each attribute falls in a range from Tier 0 (no access) to Tier 5 (full access). The MTF was developed by the ESMAP at the World Bank to better categorise access beyond a simple binary comparison of “access or no access”.
TRADITIONAL COOKING SYSTEMS	Traditional forms of cooking include the use of simple stoves (such as open fires, three-stone fires, or mud stoves) and biomass fuels (such as firewood and charcoal). Traditional cooking systems are sometimes referred to as “basic” stoves and fuels. These cooking systems usually have high emissions and low efficiencies but are generally the cheapest and most accessible.
CLEAN COOKING	Clean cooking systems meet international standards for emissions at the point of use. These can include energy efficient or so-called modern forms of cooking including electric cooking, liquefied petroleum gas (LPG), and high-performing biomass stoves, such as some which use pellets.
IMPROVED COOKSTOVES (ICS)	ICS include a wide range of stoves which provide advantages over traditional stoves but generally do not reach higher tiers of access. ICS can use a variety of biomass fuels including firewood, charcoal, pellets, or briquettes. ICS can be produced locally or shipped from other locations and are generally lower-cost than other manufactured stoves.
MODERN COOKING	Modern cooking refers to stoves and fuels which meet Tier 4 standards across all attributes. These include LPG, biogas, electricity, and ethanol cooking systems.
LPG STOVES	Liquefied petroleum gas (LPG) stoves are clean cooking systems which use canisters of LPG as fuel. LPG stoves offer higher-tier cooking solutions but generally have high upfront costs and rely on LPG supply chains. LPG is a fossil fuel but is considered clean at the point of use.
ELECTRIC COOKING	Electric cooking includes several technologies. Energy-efficient electric pressure cookers (EPCs), slow cookers, and rice cookers are appliances which use electricity to heat a pot and are particularly well-suited to foods which require slower cooking, such as beans. These appliances can be powered by on- or off-grid systems but generally require a reliable supply of electricity. Electricity-assisted cooking stoves use electricity to improve the efficiency of cooking with biomass, for example using fans powered by solar panels to increase the airflow over the fuels. This can enable the stove to reach higher temperatures and efficiencies than traditional cooking systems, and it usually uses off-grid power.
PRIMARY AND SECONDARY COOKING SYSTEMS	Households may use more than one type of stove or fuel to meet their cooking needs. The primary stove and fuels are the most used ones, whilst the secondary stoves and fuels are used less frequently.
STOVE STACKING	Stove stacking describes a situation where a household has access to multiple forms of cooking systems. This is usually in reference to having an improved or clean cooking system but continuing to use a traditional cooking system. This could be due to various reasons, such as to cook different kinds of food, convenience, preferences, fuel shortages, or many other reasons.

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Globally, over 100 million people have been forcibly displaced from their homes. Amongst those living in camps and settlements, more than 80% rely on cooking with firewood over open fires for cooking whilst over 90% lack access to electricity. Sustainable Development Goal 7 (SDG 7) calls for universal access to affordable, reliable, sustainable, and modern energy for all by 2030 – including communities affected by displacement – and rapid progress is required to achieve this ambitious goal.

The Roadmaps for Energy Access in Displacement Settings (READS) Programme aims to support the achievement of SDG 7 in ten countries affected by forced displacement including Nigeria, which hosts more than 3.5 million internally displaced persons (IDPs) and 135,000 refugees. This report consolidates the status of energy access in displacement settings in Nigeria, provides an overview of the stakeholders working towards SDG 7, and presents opportunities for high-impact projects to support increased access to sustainable energy for displaced people and host communities.

Energy access in displacement settings in Nigeria

Household electricity

Most people living in camps, camp-like settings, and host communities across northern Nigeria have limited access to electricity, and those who do usually have power for less than six hours per day. Connections to the national grid are available in some areas but uptake is inhibited by high fees and the actions of armed groups that have destroyed infrastructure; many households therefore rely on battery-powered or rechargeable torches for lighting. READS primary research found that following extensive flooding in Maiduguri in September 2024, prices for lighting products had greatly increased, the hours of service from the national grid had decreased, and the lack of lighting exacerbated existing protection and security risks as communities attempted to recover from the disaster.

Investing in large-scale infrastructure projects and providing subsidies for domestic connections could help increase the accessibility of the national grid network for people living in displacement-affected areas. Targeted subsidies and voucher systems could also be used to promote off-grid lighting solutions for households. Joint warehousing facilities, support for last-mile distributors, and demand stimulation activities could support the private sector to establish a dedicated local presence. Delivering training for technicians to repair electricity technologies, meanwhile, could help provide local maintenance that could both improve after-sales service and support local job creation.

Household cooking

The use of firewood and three-stone stoves is commonplace amongst displacement-affected communities in northern Nigeria, with a minority of households using charcoal to cook and small proportions using other fuels such as gas. Women and girls bear the responsibility for cooking in almost all households and fuel is commonly purchased despite the high costs, usually by men, as

it has become less readily available for collection from the local environment. In Maiduguri, prices of firewood and charcoal doubled or tripled following the flooding and the decreased availability – both in the local environment and for purchase, owing to disrupted supply chains – meant that household members spent more than six hours collecting fuel in response. The influx of IDPs >>

Executive Summary

in the area further increased competition for resources and drove up prices.

Fuel-efficient improved cookstoves could significantly reduce the amount of firewood or charcoal required to prepare meals. Subsidising stoves to reduce costs to consumers would likely be required to make them more affordable, whilst community engagement, such as awareness-raising campaigns, could help drive uptake. Clean cook-

ing companies could be supported to establish retail outlets to develop local distribution networks and, potentially, production facilities to increase local availability. At the national level, advocating for political commitments and increased funding from the federal government will be required to ensure that both policies and financing options offer a conducive environment for improving access to clean cooking.

Businesses and productive uses of energy

Common applications of energy for productive and income-generating activities include grinding grains and food processing, craft and artisanal work, and lighting and phone charging services for shops in camps and host communities. Whilst quantitative data is scarce on the use of energy by businesses, many enterprises rely on the national grid or diesel generators for power, which can be unreliable and expensive. READS research in Maiduguri found that diesel fuel costs were around 30-40% of businesses' total expenses, and the high prices of solar systems (either to purchase for the first time or to replace equipment damaged by the flooding) presented a barrier to transitioning to clean energy. Cooking fuel sellers, meanwhile, were unable to access land to collect firewood

and produce charcoal which meant that they were forced to suspend their work.

Ensuring the reliability of the national grid network would greatly improve businesses' ability to operate and provide consistent services to customers, especially for power-intensive applications such as processing crops. This will need to come from government-led initiatives to improve grid infrastructure with dedicated funds for strengthening the network in remote regions. For enterprises currently relying on diesel generators, introducing microfinance and subsidy schemes to make solar systems affordable could allow businesses to switch to renewable power and save on fuel costs.

Social institutions and community facilities

Social institutions and community facilities, such as schools, health centres, and water points, usually rely on either electric bulbs or kerosene lamps for lighting at night. National programmes have aimed to roll out solar power for these institutions, especially for healthcare facilities, but much greater investment will be required to provide reliable electricity across the country. In Maiduguri, larger health centres in host community areas typically had access to power, at least before the flooding, whereas smaller facilities and schools in camp settings usually used off-grid solar lighting. In all areas, respondents explained that poor lighting in communal areas and pathways impacted their nighttime mobility and made them feel unsafe.

Reinforcing and extending the national grid could help promote equality of access to electricity amongst social institutions in different areas, especially in the most remote regions. As this would likely require several years of government support, providing off-grid alternatives such as standalone solar systems could improve the education and healthcare services available to people living in displacement-affected areas. Implementing these through multi-year contracts with the private sector could support the sustainability of these interventions. To help address community concerns around security, street lighting could be installed in public areas to improve safety and increase footfall in marketplaces after dark. >>

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Humanitarian operations

Recent programmes have seen humanitarian agencies transition to renewable energy. IOM completed the solarisation of nine of its humanitarian hubs in Borno State and in doing so reduced its reliance on diesel generators, whilst interorganisational initiatives such as the Decarbonising Humanitarian Energy Multi-Partner Trust Fund aim to support the sustainable energy transition for organisations working as part of the humanitarian response. Most boreholes in northern Nigeria still rely on manual pumping but some have been converted to solar to provide improved access to water for drinking, sanitation, and irrigation.

Renewable energy systems can support humanitarian and development organisations operating in remote areas by reducing their reliance on costly diesel fuel and the inconsistent national grid network. Funding limitations mean that most organisations cannot afford the upfront expenditure on sustainable energy equipment. To help overcome this, forming partnerships with companies and establishing long-term financing agreements could accelerate implementation, and savings on diesel usage could be put towards repayments. Training local staff in energy-efficient practices could help reduce energy usage, whilst learning from promising examples could provide blueprints for scale-up across Nigeria and beyond. >>

Lack of connection to the national grid and unreliability of the network in rural areas

High costs of off-grid lighting solutions

Low availability and high costs of firewood, charcoal, and improved stoves

Supply chain issues associated with insecurity and remoteness

High upfront costs of solar systems for businesses

Weak after-sales service and technical support for energy products

Financial constraints of social institutions and humanitarian organisations to invest in renewable energy

BARRIER

Support government-led investment in large-scale infrastructure projects and provide subsidies for household connections

Provide targeted subsidies, implement voucher systems, and support customer credit for PayGo models

Promote fuel-efficient improved cookstoves through subsidies and support companies to establish local retail outlets

Invest in decentralised warehousing facilities and support last-mile distributors

Establish subsidy schemes and partnerships with microfinance institutions for productive uses

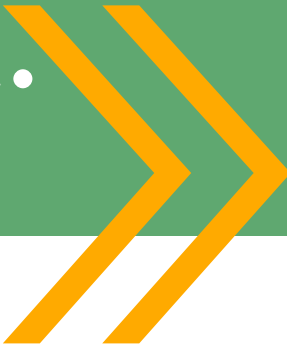
Build the capacity of local technicians and create local maintenance hubs

Establish partnerships with companies to facilitate long-term financing and service agreements

OPPORTUNITY



Initiatives to scale up sustainable energy will need to work closely with local stakeholders to ensure solutions are accessible and affordable for the people who need them the most.



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Stakeholders in Nigeria

The humanitarian response stretches across many regions of the country, as do the organisations working as part of it. Government ministries, humanitarian agencies, non-governmental organisations, private companies, finance institutions, and community-led groups operate throughout Nigeria and each has its own projects, goals and mandates. Sustainable energy projects have been implemented throughout displacement settings but are usually reliant on support from external stakeholders, such as national and international donors, to provide basic levels of energy access for communities.

Private sector involvement and the growth of local market systems are inhibited by the volatile security situation and the limited ability of potential customers to pay. Collaborations between different types of stakeholders – such as donors to provide funding, humanitarian and development organisations to offer expertise, and community groups to ensure local engagement and support – have shown promise. However, the number of programmes and the level of available funding will need to be greatly scaled up to meet the growing needs across displacement settings.

Opportunities to scale up sustainable energy

There is great potential to expand access to sustainable energy in displacement settings in Nigeria. Current levels of access to electricity and clean cooking are very low amongst both displaced and host communities, whilst humanitarian organisations are still highly reliant on diesel generators. Initiatives to scale up sustainable energy

will need to work closely with local stakeholders to overcome two of the most persistent challenges in displacement settings in Nigeria: ongoing security risks that affect how programmes can be implemented, and the affordability of sustainable energy products and services for the people who need them the most. >>

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Executive Summary

The READS Programme hosted an engagement workshop in Kano in September 2024, which brought together stakeholders working on energy in displacement settings across Northern Nigeria. During a co-design session, participants established the foundations for high-impact project concepts to improve access to sustainable energy. These concepts were subsequently developed and refined, drawing upon previous work in Nigeria and primary fieldwork undertaken in Maiduguri, to showcase the potential investment opportunities and serve as a starting point for future support. A summary of these project concepts is shown in Table 1.

Improving access to sustainable energy will require a coordinated effort and a shared vision between all stakeholders working in displacement contexts. Based on the findings in this report, the READS Programme has outlined a roadmap for

energy access in displacement settings in Nigeria with short (2026-2027), medium (2028-2029), and long-term (2030+) goals. These include promoting clean cooking, supporting livelihoods through irrigation and training, powering schools and health centres with renewable energy, and helping humanitarian organisations transition to sustainable power.

The challenge is significant: achieving access to affordable, sustainable, reliable, and modern energy for displaced people and host communities by 2030 will require more projects, activities, partnerships, coordination, and funding than ever before. Promising initiatives, which have overcome persistent challenges, have helped to guide the way and these provide the first steps towards greater investment, new collaborations, and improved access to sustainable energy in displacement settings throughout Nigeria. ●

TABLE 1

High-impact project concepts to increase sustainable energy access with estimates of their potential reach, duration, budget, and scalability.

PROJECT	NAME	REACH	DURATION	BUDGET	SCALABILITY
1	Local production of improved cookstoves	40 stove production groups	5 years	\$6 million	Medium
2	Solar irrigation for improved agriculture	250 systems	3 years	\$1 million	High
3	Solar lighting for marketplaces	20 marketplaces	2 years	\$500,000	Medium
4	Solar power for schools	200 schools	3 years	\$2 million	High
5	Energy efficiency upgrades for humanitarian operations	20 facilities	3 years	\$1.5 million	High
6	Green financing models for humanitarian operations	20 projects	5 years	\$4 million	High
7	Solar systems for primary health centres	100 clinics	4 years	\$4 million	High
8	Solar solutions for entrepreneurs in displacement settings	1,000 businesses	2 years	\$1.5 million	High
9	Capacity building and training for sustainable energy systems	Hundreds of participants	3 years	\$1 million	Medium
10	Rapidly deployable energy solutions for emergency situations	150 units	2 years	\$4 million	High

01

Setting the scene



Setting the scene

Access to energy across Nigeria's displacement settings is extremely low. Internally displaced persons (IDPs), refugees, and members of the host communities typically have limited access to electricity for basic services and rely on traditional forms of cooking. The uptake of sustainable energy solutions is hindered by many challenges including the rural and remote nature of most displacement contexts, ongoing security challenges especially in Northern Nigeria, and chronic underinvestment in energy access within humanitarian frameworks and planning. Flooding in Maiduguri, Borno State in September 2024 highlighted and exacerbated many of the challenges these communities face and, while some projects have worked to provide basic lighting and clean cooking, far greater resources will be required to meet national and international energy access targets.

Most displacement-affected communities in Northern Nigeria have limited access to national grid electricity, either through a lack of connections or from an inconsistent or unreliable supply. Most households rely on expensive battery-powered torches for lighting and the supply of solar products is compromised by the fragile security situation. Supporting the private sector to increase the availability of electricity technologies, such as through warehousing facilities or consumer financing, could help to scale up electricity access for basic services.

The vast majority of households rely on firewood and three-stone fires for cooking, with some using charcoal and a very small proportion using gas or electricity. Women and girls are almost always responsible for cooking, exposing them to serious protection risks when collecting cooking fuel, whilst men usually purchase the fuel. Surveys in Northern Nigeria found that fuel costs were increasing and firewood was becoming harder to collect; these issues were made more difficult by large numbers of people being displaced to new areas. Increasing the uptake of efficient, improved stoves and supporting local production could help to alleviate some of the persistent issues related to lack of access to clean cooking.

Energy access for livelihoods is similarly limited. Sparse and unreliable access to the national grid means that generators are used by those businesses which can afford them, but high fuel costs limit their use. Some use solar systems but these are also expensive and difficult to repair. Community facilities face the same issues: basic lighting is typically available in schools but this varies between regions, whilst electricity in health centres is usually dependent on the type of facility. Solar power for humanitarian operations, especially for offices and water pumping, is becoming more common in replacing diesel generators but significant investment is needed to scale up this positive trend. >>

At the READS workshop, stakeholders shared their experience through co-designing potential high-impact sustainable energy projects.

Setting the scene

Addressing the challenge of achieving universal access to sustainable energy in displacement settings requires coordination at all levels – from local to global [1]. International targets for energy access are met through implementation on the ground, with each country, region and community requiring its own consideration and planning to reach this shared goal. Stakeholders from humanitarian agencies, development organisations, and the private sector have implemented projects to improve access to sustainable energy, but these are typically limited to specific locations and lack long-term investment. Furthermore, the amount of research and evidence needed to fully understand the energy needs and develop appropriate solutions does not match the scale of the challenge to inform sustainable energy scale-up across Nigeria's displacement settings.

Acknowledging this, the Roadmaps for Energy Access in Displacement Settings (READS) Programme aims to provide a country-level overview of sustainable energy in displacement settings, and a focus on individual settlements and communities where possible. With the Programme working across ten countries, Nigeria is the seventh to be featured in a READS Roadmap Report alongside Kenya, Uganda, Rwanda, Lebanon, Ethiopia, and Jordan.

A goal of the READS Programme is to identify new opportunities for high-impact projects to increase sustainable energy access by consolidating the existing knowledge on sustainable energy in displacement settings. This includes published literature – such as government policies, programme output reports, datasets, academic papers, and press releases – but also the experiences and expertise of practitioners working on project implementation and, most importantly, of community members.

In support of this, the READS Programme hosted a workshop in Kano, Nigeria in September 2024

to engage with these stakeholders. Participants included representatives of communities that have been affected by displacement, the private sector, humanitarian organisations, and governmental authorities, among others. As many displacement-affected communities live in Borno State, which is heavily affected by conflict as well as experiencing devastating flooding in September 2024, the READS Programme undertook surveys and interviews to better understand the energy needs and priorities of displaced and host community members, both in the long term and immediately following the flooding.

Informed by published literature, the knowledge and experiences shared during this workshop, and primary qualitative research, the READS Nigeria Roadmap Report highlights the most pressing gaps, barriers, and opportunities for sustainable energy in displacement settings, as well as the roles of the stakeholders involved. It also provides a spotlight for potential high-impact projects, co-designed in the workshops by stakeholders from different types of organisations, which could significantly improve sustainable energy access if they received support and investment.

The energy needs of each community, household, business, or institution will vary, as will the most effective ways of addressing them. This report aims to be as broad as possible in covering different kinds of energy access, and as comprehensive as possible in each topic, but is inherently limited by the nascent nature of research on sustainable energy in displacement settings and the uniqueness of each context. The authors hope that further research – perhaps focusing on specific areas of energy access, settlements, or the impact of new projects – can build on this report by diving deeper into these areas and promote greater uptake of sustainable energy in displacement contexts. ●

02

Forced displacement in Nigeria

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National overview

The Federal Republic of Nigeria is a large and geographically diverse country in West Africa and the most populous country in Africa with over 237 million inhabitants [2]. The country's largest political party, the All Progressives Congress (APC), leads the federal government and is headed by President Bola Ahmed Tinubu, who has been in power since 2023. Nigeria faces a range of challenges, including regional conflicts and significant economic disparities, and it also hosts a dynamic political, economic, and social landscape. Nigeria is classified as a lower-middle-income country and is pursuing a range of economic reforms in

pursuit of achieving higher-income status in the future [3]. Across the country, 51% of people live in rural areas, and 49% in urban centres.

As of April 2025, Nigeria is home to more than 3.5 million IDPs who have been forced to leave their homes due to conflict, insurgency, and communal violence (see Table 2) [4]. More than 2.2 million IDPs live in the North-East region and 92% were displaced due to insurgency, and 6% due to communal clashes. The North-West hosts 718,126 IDPs while the North-Central region hosts 604,640 IDPs.

>>

TABLE 2

The number of IDPs and refugees, asylum seekers, and refugee returnees in selected locations [5].

LOCATION	IDPS	REFUGEES, ASYLUM SEEKERS, AND RETURNEES	TOTAL	PERCENTAGE (%)
NIGERIA	3,575,114	135,489	3,710,603	100
BORNO	1,704,175	21,666	1,725,841	46.6
BENUE	457,666	8,805	466,471	12.6
KATSINA	270,968	18	270,986	7.3
ADAMAWA	200,211	32,028	232,239	6.3
ZAMFARA	216,885	1	216,886	5.8
YOBE	167,320	1,613	168,933	4.6
SOKOTO	99,729	5	99,734	2.7
TARABA	62,564	16,335	78,899	2.1
PLATEAU	55,053	59	55,112	1.5
KOGI	20,793	6	20,799	0.6
OTHERS	319,750	54,953	374,703	10.0

National overview

Nigeria also hosts 126,428 refugees and asylum seekers from over 45 countries, with most originating from Cameroon (see Table 3) [4]. These refugees are concentrated in border states across the North-East (in Borno, Adamawa, and Yobe), North-Central (Benue), and South-South (Cross River) regions. An additional 20,996 individuals are awaiting registration as refugees or asylum seekers. Since the beginning of 2025, 8,361 refugees have returned to Nigeria, including 1,075 people who returned from Cameroon, Chad, Niger, and Sudan, and 7,286 people who were repatriated bilaterally by the Nigerian government from Chad in February 2025. Over 408,781 Nigerian refugees remain registered in neighbouring countries including Cameroon, Chad, and Niger.

Nigeria provides a challenging environment for displaced people due to ongoing conflicts, particularly in the northeastern part of the country.

The majority of IDPs were displaced as a result of the Boko Haram insurgency, violence from non-state armed groups (NSAGs), and intercommunal clashes such as those between farmers and pastoralists, with many having been displaced for several years [6].

While Borno State has been an epicentre of displacement due to NSAGs, other states like Zamfara, Kaduna, Katsina, and Benue have also been affected by intercommunal violence and banditry. The conflict and associated displacement have had a detrimental impact on agriculture with more than 676,000 hectares of farmland destroyed, exacerbating food insecurity. Hundreds of thousands of houses have been destroyed or damaged, leaving nearly 854,000 people living in displacement at the end of 2022, a significant increase from the previous year. ●

TABLE 3
The country of origin and numbers of refugees registered with UNHCR [5].

COUNTRY OF ORIGIN	REGISTERED REFUGEES	PERCENTAGE (%)
TOTAL	80,915	100
CAMEROON	76,359	94.4
NIGER	1,465	1.8
CENTRAL AFRICAN REPUBLIC	981	1.2
SYRIAN ARAB REPUBLIC	615	0.7
DEMOCRATIC REPUBLIC OF THE CONGO	535	0.7
OTHERS	960	1.1

Causes of displacement

Changing environmental factors have resulted in ongoing instability and displacement crises. The Lake Chad Basin – which stretches across most of Chad and Niger, as well as parts of northwest Nigeria and Cameroon – has shrunk to less than 10% of its size since 1960 and, as a result, exacerbated political conflicts and struggles over land [7]. This has been exploited by NSAGs like Boko Haram and has led to destabilisation in Nigeria and its neighbours.

The Boko Haram insurgency originated in Nigeria and spread to Chad and Cameroon, leading to widespread destruction, displacement, and economic decline, as traditional livelihoods around Lake Chad have been abandoned and trade routes were disrupted [8, 9]. While the initial security responses to Boko Haram were domestic and military-focused, the growing humanitarian crisis prompted a joint security action through the Multinational Joint Task Force, highlighting the cross-border nature of the insurgency and the challenges of regional security cooperation [10]. The insurgency and counterinsurgency efforts have had significant consequences, limiting growth and development in the Lake Chad Basin states [11].

Deteriorating environmental conditions, such as desertification and soil degradation, in northern Nigeria have pushed Fulani herders to migrate southwards in search of pasture and water. This has led to conflicts between herders and farmers over resources and displacement of both groups. Clashes have forced people from both communities to flee their homes and villages for safety: attacks often involved the burning of houses, farms, and other property, rendering many homeless and forcing them to seek refuge elsewhere [12]. Amnesty International documented at least 3,641 deaths from such violence between January 2016 and December 2018, leading to the displacement of thousands [13].

Around 148,000 internal displacements were attributed to conflict and violence in 2022, the low-

est annual figure since 2012. However, attacks by Boko Haram and other NSAGs, which have been active in the north-east of the country since 2009, continued to trigger displacement and many situations are protracted with individuals and families unable to return home for extended periods. In areas where humanitarian access is restricted by insecurity, such as Baga, Doron Baga and Marte in Borno State, IDPs are not able to receive aid. This increases their vulnerability, including food insecurity and lack of access to health and other basic services. It also exposes them to protection risks, including gender-based violence [6].

Whilst conflicts between communities are ongoing, most internal displacements in 2022 were associated with disasters. Between June and November 2022, the worst floods in a decade hit Nigeria and triggered over 2.4 million displacements, the highest in Sub-Saharan Africa in that year. Half of the displacements were reported in the southern state of Bayelsa in the Niger River delta, with the states of Anambra and Kogi also heavily affected. IDP camps in Borno were also flooded, forcing thousands of people already displaced by conflict and violence to flee again. In addition to causing displacement, the floods limited humanitarian access by damaging roads, bridges and other infrastructure.

Although new instances of displacement decreased in 2022, the total number of IDPs at the end of the year was the highest since records began in 2013. Nigeria was home to 3.6 million IDPs, of whom 1.9 million were living in protracted displacement in Borno State. The continued growth in the number of IDPs as reported by the International Organization for Migration (IOM), suggests that the actual numbers could be considerably higher than recorded due to limited accessibility in certain areas [14]. As a result, the full scale of displacement and the needs of affected populations may be underreported. ●

Policy frameworks for displaced populations

The national strategic vision for refugees and IDPs in Nigeria is to ensure that all displaced individuals live safe, dignified, and productive lives, supported by government-led services and programmes, with a focus on sustainable reintegration and community resilience. Nigeria has committed to several international frameworks related to the protection and integration of refugees and IDPs. The country is a signatory to the 1951 Convention relating to the Status of Refugees and its 1967 Protocol, and made pledges under the Global Compact on Refugees in 2021 including [15]:

- ◆ Incorporating refugees, IDPs, and their host communities into national development plans,
- ◆ Strengthening and enhancing its capacity to protect refugees and IDPs, including the integrity of the asylum system in line with international standards,
- ◆ Ensuring the availability and accessibility of durable solutions for refugees and IDPs,
- ◆ Sustaining its role in regional and sub-regional efforts to address the root causes of displacement, and
- ◆ Harmonising existing databases on displaced people and using this data for evidence-based planning and programming.

The Nigerian government has taken measures to prevent and address internal displacement [16]. This includes the development of a National Policy on Internally Displaced Persons in 2021 which outlines strategies and frameworks for preventing displacement, protecting, and assisting displaced persons, and finding durable solutions [17]. Nigeria's commitments at the Global Refugee Forum in 2023 focused on incorporating displaced people into national development strategies and improving self-reli-

ance through accessible education, healthcare, and economic participation. The country's "out-of-camp" policy allows refugees to integrate into local communities [18] and the government has also suggested proactively relocating residents from disaster-prone areas to prevent displacement caused by natural disasters [19].

To support the implementation of these policies and the realisation of their goals, the Federal Ministry of Humanitarian Affairs, Disaster Management and Social Development oversees several agencies that support displaced people. The National Commission for Refugees, Migrants & Internally Displaced Persons (NCFRMI) mobilises effective and durable solutions for displaced people and is responsible for the registration and documentation of refugees and asylum seekers and for coordinating with international organisations and NGOs [20]. NCFRMI also supports long-term reintegration and self-reliance for displaced communities. The National Emergency Management Agency (NEMA) leads on coordinating disaster response, prevention, and mitigation [21]. The National Identity Management Commission provides refugees and asylum seekers with access to the National Identification Number system, granting them formal recognition and access to essential services such as banking, travel, healthcare, and taxation [22]. Other government initiatives include the National Mine Action Centre, which works with partners to conduct surveys and clear mines and explosive devices in areas designated for relocation or the return of displaced populations [23].

Despite these government policies, challenges remain in delivering effective support to displaced people. Coordination and implementation issues, resource constraints, and security risks continue to hinder effective delivery of healthcare, education, and employment opportunities to displaced populations [16].

>>

Policy frameworks for displaced populations

In addition to federal initiatives, individual states have introduced policies to address the challenges faced by displaced people. For example, the 25-year Borno State Development Plan (2020) aims to drive stabilisation, boost recovery efforts, and stimulate growth across all sectors to support a peaceful, stable, and self-reliant society by 2030 [24].

However, some state-level initiatives risk hindering progress towards these aims. In 2022, the Borno State government announced that by 2025 all camps will be closed, and IDPs will be relocated to their local government areas of origin [25]. The state government had previously declared the closure of all IDP camps in Maiduguri by

31 December 2021 [26] but the actual enactment was delayed until early 2023 [27], possibly owing to the challenges and risks of relocating people amid ongoing security concerns [28].

The ongoing threat of camp closures has forced many IDPs to relocate to towns that struggle to accommodate new arrivals, leading to overcrowded living conditions and overburdened public services and infrastructure. The IDPs, both in camps and within local communities, have insufficient access to essential services, cramped living conditions, and increased vulnerability, stressing the dire humanitarian situation in Nigeria's northeast [29]. ●

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Humanitarian support

Humanitarian assistance in Nigeria is delivered through a range of United Nations (UN) agencies and national and international non-governmental organisations (NGOs):

- ◆ The Office of the United Nations High Commissioner for Refugees (UNHCR) works closely with the Nigerian government to support displaced people by providing essential services such as non-food items, shelter, livelihood assistance, registration, documentation, and protection support. UNHCR also monitors and reports on issues concerning displaced populations in Nigeria, including publishing regular reports on protection concerns, incidents of sexual and gender-based violence (SGBV), and other emerging issues [5].
- ◆ The United Nations Office for the Coordination of Humanitarian Affairs (OCHA) mobilises aid efforts, facilitates information sharing among partners to increase efficiency and reduce duplication, advocates for support, and provides situational analysis and estimates of funding requirements [30].
- ◆ The World Food Programme (WFP) provides food assistance and cash transfers to displaced people and host communities, supports livelihoods programmes, and offers logistical support for organisations including internet connectivity and air transport to remote locations [31].
- ◆ The International Organization for Migration (IOM) supports migration into and out of Nigeria, supports capacity building of the national government, and implements the Displacement Tracking Matrix (DTM) system to collect comprehensive data (including on energy) on IDP situations in the country [32].
- ◆ Other UN agencies include the United Nations Children Fund (UNICEF), United Na-

tions Development Programme (UNDP), and the Food and Agriculture Organization of the United Nations (FAO).

Strategic partnerships and continued dialogue with stakeholders are essential. The Nigeria Crisis Response Plan 2024-2025 outlines a vision to support the transition towards evidence-based, long-term solutions for displacement, emphasising the need for life-saving assistance while bolstering the resilience of displaced populations and local communities.

Despite Nigeria's commitment to international policies and organisations working to support displaced people, the delivery of critical services and assistance is hindered by high costs and underfunded programmes. OCHA estimated that \$926 million would be required to meet the needs of 4.4 million people – out of a total of 8.1 million in need of assistance – but only 57% of this funding had been secured by the end of 2024 [33]. These challenges are compounded by the operational context, especially the ongoing insurgency in the North-East and conflicts in other regions, which strains the capacity to provide adequate services to refugees [29] and increases costs [34]. ●

3.7
million

IDPs, refugees,
and asylum
seekers in
Nigeria in 2025

Employment and income levels

The National Policy on Labour Migration, introduced in 2020, aims to protect the rights of all migrant workers, ensuring that migrants and their families are treated with dignity and respect. The policy upholds the trade union rights of migrant workers, including freedom of movement, the ability to earn and remit income, and the right to engage in collective bargaining [35]. It also states that IDPs can seek employment and engage in economic activities without discrimination and ensures access to income-generating opportunities and livelihood support to help them rebuild their lives [36].

According to the African Development Bank, 69% of Nigerians were living in poverty in 2020 [37]. Economic growth has remained subdued since 2015 and, despite expansion in some sectors, job creation has failed to keep pace with the rapidly growing labour force. The World Bank reported Nigeria's unemployment rate at 23.1% in 2019, with an additional 20% of the labour force under-employed [38].

The lack of employment opportunities is even more pronounced for IDPs and refugees. Despite some policy support, displaced people face multifaceted restrictions on formal employment and entrepreneurship: many are limited to a narrow range of jobs in the informal sector that lack job security, benefits, and legal protections. A key challenge for refugees is the legal framework, which often restricts their right to work, move freely, and obtain permanent residency status. Other barriers for both IDPs and refugees include the lack of identity documents, discrimination, and limited access to skills training and education, all of which further impede their ability to find stable, well-paying jobs. This, in turn, forces many to rely on humanitarian aid or resort to precarious livelihood activities to make ends meet, inhibiting their financial self-reliance [39].

The Centre for the Study of Economies of Africa conducted an assessment in Abuja to identify income-generating activities undertaken by IDPs, their vocational skills, and training needs. The assessment found that many IDPs engage in agricultural activities such as crop farming, livestock

rearing, poultry farming, fishery, or agro-processing ventures. The study suggested that value addition through processing and packaging could enhance profitability and create sustainable income streams [40].

IDPs are encouraged to start small businesses and enterprises that cater to local needs, including trades and services that are relevant to the local economy. Several humanitarian organisations provide support for IDPs to start income-generating activities offering training, resource provision, and market linkages to help them become self-reliant [41].

Despite these initiatives, implementation has been inconsistent and leaves many displaced people struggling to build secure futures for themselves and their families [42]. Limited access to skills training and education further hinders the ability of IDPs and refugees to find stable, well-paying work. This perpetuates a cycle of poverty and dependence on humanitarian aid.

The income levels in displacement settings in Nigeria have been severely affected by the ongoing conflict and displacement crises, particularly in the northeastern part of the country. A 2023 report by IOM found that IDPs face substantial disruptions in their livelihoods. Many who relied on farming as their main source of income before displacement now find themselves without access to agricultural land, forcing them to resort to manual labour, market selling, or cleaning jobs [43], with WFP reporting that 39% of IDP households in Borno State have no access to farmland [44].

The IOM study also found that displaced households earn less than half of what non-displaced households earn in Jos, Plateau State. This has affected the IDPs' ability to meet their basic needs with only 5% stating that their current financial resources are sufficient, compared to 71% before displacement. The arrival of IDPs did not significantly impact the income levels or access to work of the non-displaced local community, however some reported increased rent and goods prices since the IDPs' arrival [43]. ●

Access to finance

Displaced people in Nigeria face significant barriers when it comes to accessing financial services. Although microfinance institutions and loan programmes exist, eligibility criteria and practical accessibility can be major hurdles for these vulnerable populations. Many displaced individuals lack the necessary documentation, collateral, or steady income streams required to qualify for traditional loans or microfinance services. Even when financial services are theoretically available, utilisation rates tend to be low due to these barriers. While the government has established frameworks to address the needs of IDPs and refugees, the execution of these plans often falls short, leaving many without the targeted assistance they need [45].

A survey on access to finance found that formal financial inclusion in Nigeria increased from 56% in 2020 to 64% in 2023, whilst the percentage of financially excluded Nigerians decreased from 32% to 26%, moving closer to the national target of 25% by 2024. Despite this progress, significant barriers persist, particularly for IDPs and refugees who often lack proper identification and access to nearby banking services. The COVID-19 pandemic worsened these issues by disrupting economic activities and aid delivery [46].

Remittances play a vital role in supporting displaced populations in Nigeria [47] but many individuals face significant barriers in accessing affordable and reliable money transfer services. IDPs and refugees without access to formal banking systems instead often rely on informal, cash-based systems, which can be costly and risky. Policies intended to aid these vulnerable groups have had limited impact, with challenges such as restricted employment opportunities and lack of financial inclusion further hindering their ability to earn, save, and transfer funds securely. Addressing these systemic issues is crucial to ensuring displaced people can access the financial services necessary to rebuild their lives [48].

The Nigerian government and international organisations are working to alleviate these barriers and promote greater financial inclusion for displaced populations. One significant initiative is Nigeria's partnership with the World Bank through a \$500 million loan to fund the Solutions for the Internally Displaced and Host Communities Project. This programme aims to enhance access to resilient basic services and economic opportunities in northern Nigeria, an area which has been profoundly affected by displacement due to conflict, violence, and climate change [49]. ●

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03

National energy context of Nigeria



National overview

Nigeria faces challenges in ensuring equitable and reliable access to sustainable energy, particularly in rural and underserved regions. Despite policy frameworks aimed at expanding energy access and promoting renewable energy (see Table 4) access to sustainable energy in Nigeria remains limited. Although the country scores above regional and global averages for electricity access and clean cooking, there is still room for significant improvement in key areas.

Nigeria relies heavily on fossil fuels, particularly oil and gas, which have dominated the power landscape for decades. The low cost and high availability of these conventional energy sources have limited the adoption of renewable energy solutions. Moreover, the high initial investment required for renewable energy installations and limited access to specialised investment capital have deterred potential investors [50].

Recently fuel costs began to increase which made fuel unaffordable for low-income households. Petrol prices rose from around 880 Nigerian Naira (NGN) to NGN 950-1150 per litre (around \$0.55 to \$0.60-0.75¹), driven by the re-

moval of government subsidies, before petroleum refineries increased local production to compete with one another and reduced the price to around NGN 825 (\$0.53) per litre [51].

Nigeria's electricity access rate has improved steadily since 2021 [52]. According to the World Bank data (Table 5), approximately 61% of the population had access to electricity in 2023, up from 55% in 2020 [53]. However, the progress remains slow, with average annual increases of 1% between 2010 and 2022 and the country has the largest electricity access deficit in the world of approximately 86 million people. The growing population has not been matched by an increase in grid capacity – which already provides far less power than its generation capacity owing to transmission and infrastructure issues – and so much of the electrification expansion is driven by off-grid electrification through diesel generators and solar power. Barriers which have hindered progress include resource concentration, low investment, limited infrastructural capacity, and a lack of political will [54, 55].

A significant disparity in the levels of electricity access remains between urban and rural areas. Rural regions have also experienced slow annual growth rates in access, of only 1.3 percentage points between 2013 and 2023 [53]. Regionally, the South East zone has the highest electrification rate of approximately 75%, while the North East lags at around 30%, according to a 2024 >>

1 The exchange rate of Nigerian Naira (NGN) to United States Dollars (USD, \$) has changed significantly in recent years. From 2017 to 2023 the rate increased from around NGN 315 to NGN 460 per \$1, before reaching around 775 NGN in 2023 and then further increasing and fluctuating between NGN 1450-1650 since 2024. Where conversions were not available in the original sources, representative figures have been used to estimate NGN values in USD.

TABLE 4

Regulatory Indicators for Sustainable Energy (RISE) Pillars for Nigeria and the regional and global averages [58].

RISE PILLAR	NIGERIA	SUB-SAHARAN AFRICA	GLOBAL
OVERALL	53	39	56
ELECTRICITY ACCESS	90	54	62
CLEAN COOKING	53	32	30
RENEWABLE ENERGY	32	44	41
ENERGY EFFICIENCY	37	26	46

National overview

survey conducted by the National Bureau of Statistics in collaboration with World Bank [56].

In locations where electricity is available, reliability remains a challenge, with households experiencing an average of nearly seven blackouts per week, each lasting around 12 hours [56]. The average grid-connected household receives just 6.6 hours of supply on a typical day [57] with relatively low electricity consumption at 136 kilowatt-hours (kWh) per capita in 2022 [53]. As a result, many Nigerians rely on petrol and diesel generators for power [57].

Access to clean cooking remains low with only 26% of the population using clean fuels and technologies; 11% in rural areas and 45% in urban areas [53]. The majority of households depend on wood for cooking fuel which constitutes 70% of cooking fuel needs, followed by liquefied petroleum gas (LPG) at 23% [56]. Firewood collection is time consuming, primarily carried out by women and places a significant burden on households [59]. Due to high demand for woodfu-

el, Nigeria ranked among the top 10 countries for wood removal (both for industrial and woodfuel use) in 2018 [60]. The country also has one of the highest deforestation rates globally, with an average forest loss of more than 163,000 hectares per year between 2015 and 2020 [61]. The widespread use of open fires and solid fuels for cooking also poses serious health risks, contributing to an estimated 131,000 premature deaths in 2021 [62], making it the nation's leading cause of death after malaria and HIV/AIDS.

To address these issues, Nigeria's Energy Transition Plan was launched in August 2022, outlining a comprehensive strategy to achieve net-zero emissions by 2060. This plan seeks to transition the country from fossil fuels to renewable energy sources and requires an estimated capital investment of \$500 billion above business-as-usual spending to achieve net zero by 2060 [63]. The plan is designed to tackle both energy poverty and climate change, with the goal of lifting 100 million Nigerians out of poverty and providing universal access to modern energy services [64]. ●

TABLE 5

Selected Sustainable Development Goal 7 (SDG 7) indicators for Nigeria and the regional and global averages [65].

SDG7 INDICATOR		NIGERIA	SUB-SAHARAN AFRICA	GLOBAL
ACCESS TO ELECTRICITY (%)	Total	61	53	92
	Rural	27	33	84
	Urban	89	82	98
ACCESS TO CLEAN COOKING	Total	26	22	74
	Rural	11	9	54
	Urban	45	42	89
RENEWABLE ENERGY (% FINAL CONSUMPTION)	-	80	70	20

Electrification policies and the national grid

Nigeria faces significant challenges in generating, transmitting, and distributing sufficient electricity to meet the country's needs. The national grid can transmit only around 5,000 megawatts (MW) out of a potential 15,000 MW, leading to frequent blackouts and unreliable power supply [66]. The country's overburdened power infrastructure presents a barrier, as outdated transmission and distribution networks – coupled with high technical and non-technical losses – have severely limited the ability to effectively harness and distribute electricity. Exacerbating this challenge is the persistent threat of theft, sabotage, and vandalism, which continues to undermine the reliability and stability of the power supply.

Additionally, the historic absence of comprehensive and well-implemented policies and regulations has created an unstable investment environment, deterred potential investors, and slowed the growth of the renewable energy sector. The lack of a clear and consistent regulatory framework has made it challenging for the industry to thrive and for the country to capitalise on its renewable energy potential [67].

In response, Nigeria has taken steps to improve electrification through national policies and regulations. The Energy Commission of Nigeria developed the 2022 Revised National Energy Policy, which provides a framework for sustainable energy development and emphasises the active participation of the private sector in the energy sector, and the National Energy Master Plan [68, 69]. The Nigeria Integrated Resource

Plan (2024), meanwhile, was developed by the Ministry of Power and presents a least-cost electricity investment roadmap for electricity generation, distribution, and efficiency measures to meet demand up to 2045 [70]. Nigeria currently aims to achieve universal electrification by 2030 by expanding grid connections while also supporting off-grid solutions in rural and sparsely populated areas.

The Nigerian government, supported by international organisations such as the World Bank, is making significant investments to strengthen electricity distribution and transmission infrastructure. The Nigeria Distribution Sector Recovery Program, for example, aims to improve the performance of electricity distribution companies by providing financial support and is expected to rehabilitate networks and install electric meters [71]. Nigeria has also developed an electrification roadmap, in collaboration with Siemens, which outlines a three-phase plan to increase the system's operational capacity from 7 gigawatts (GW) to 25 GW over the long-term through upgrades and expansions in generation, transmission, and distribution [72].

The government has also implemented policy reforms to liberalise the electricity sector, which includes the introduction of the "willing seller, willing buyer" model for electricity distribution. This policy allows communities and businesses to negotiate directly with power producers, potentially increasing access for those willing to pay for reliable power [73].

>>

Nigeria's electricity access rate has improved steadily but progress remains slow.

Electrification policies and the national grid

The National Renewable Energy and Energy Efficiency Policy (NREEEP), introduced in 2015, provides a coordinated framework for promoting renewable energy adoption and energy efficiency measures. The policy aims to achieve “Electricity Vision 30:30:30” (30,000 MW of power by 2030 with at least 30% sourced from renewable sources) with a focus on solar, wind, hydro, and biomass energy [74].

UNDP has also supported the development of the power sector. Its De-risking Renewable Energy for the Nigerian Power Sector project aims to implement 20 GW of solar generation capacity and involves policy and financial de-risking instruments to encourage private sector participation. A demonstration project was completed in Ogun and Jigawa States to create solar-based electricity markets and showcase the potential for large-scale solar energy integration into Nigeria's power grid [75].

In addition to infrastructure, addressing the skills gap is also a pressing concern. Nigeria faces a shortage of technical expertise and capacity to design, install, and maintain renewable energy systems – an obstacle that continues to hinder sustainable energy implementation [54]. As part of its support for the NREEEP, UNDP trained 200 youths in the design, installation, and maintenance of solar photovoltaic systems [76].

The government is also promoting local manufacturing and assembly of solar components to drive down costs. The National Agency for Science and Engineering Infrastructure, for instance, has established a photovoltaic panel manufacturing plant in Nigeria to reduce the reliance on imports, enhance affordability, and support job creation in the renewable energy sector [77]. Despite this positive step, high costs and low human resource capacity may limit the local production of solar panels and continue the country's reliance on imported equipment. ●

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Policies for mini-grids and off-grid solutions

As Nigeria's economy continues to grow, there is increasing demand for reliable electricity. The transition from inefficient diesel generators to cleaner energy sources presents a significant opportunity and Nigeria has the fastest growing solar market in Africa, driven by commercial and industrial applications and middle-class consumer uptake of solar and battery systems. There is a large market for off-grid solar lighting products but customers are typically sensitive to prices; as a result, cheaper but lower-quality products are commonplace and do not last as long as those which meet industry standards.

Nigeria has a robust regulatory environment to support mini-grid development. The government has introduced financing mechanisms to scale mini-grids, which often combine renewable energy sources such as solar panels, wind turbines, and biomass generators with backup systems for uninterrupted power supply [78]. The total market potential has been estimated to be worth \$9.2 billion annually and mini-grid systems could save rural households approximately \$4.4 billion annually by replacing costlier and less reliable energy options [79]. Mini-grids can be designed to support both residential and small business needs, fostering economic activity in previously underserved areas, and overall Nigeria offers one of Africa's leading mini-grid environments through its combination of government policy, subsidy support, and customers' ability to pay for their presently unmet electricity demand.

The Rural Electrification Agency (REA) promotes rural electrification in Nigeria by coordinating electrification programmes and supports public and private projects to increase electricity access in rural areas. REA plays a central role in implementing Nigeria's off-grid electrification agenda through the Nigeria Electrification Program (NEP) and the Rural Electrification Fund (REF), guided by the Rural Electrification Strategy and Implementation Plan which was developed in 2016.

The Nigeria Electricity Regulatory Commission (NERC) revised its 2016 Mini-grid Regulations in 2023 to improve procedures, address concerns of distribution companies and mini-grid operators, and encourage investment [80]. Notable updates include a more streamlined permit application process, greater tariff flexibility and the removal of the licensing requirement for mini-grids with capacities below 100 kilowatts (kW). The regulation also enables developers to set cost-reflective tariffs and outlines clear processes for compensation or integration when the national grid is extended to areas already served by mini-grids. By prioritising deployment in unserved, predominantly rural areas with low purchasing power, the regulation aims to promote private sector engagement and scale up decentralised energy solutions. >>

Projects led by the government and international organisations aim to scale up solar mini-grids in Nigeria.

Policies for mini-grids and off-grid solutions

Government-led initiatives

The Mini-Grid Acceleration Scheme is a programme implemented by REA to expand access to reliable electricity in rural and underserved communities, supported by €6 million in funding from the European Union and the German Government under the Nigerian Energy Support Programme [81]. Launched in 2019, the scheme operates nationwide with the goal of providing reliable electricity to at least 21,000 customers through solar mini-grids while developers are selected through a competitive tender process. Other REA projects, such as the Interconnected Mini-Grid Acceleration Scheme [78], also supports mini-grids for community electrification around the country [82]. REA has also partnered with CrossBoundary Access and ENGIE Energy Access to construct mini-grids for households and micro-businesses in rural areas, aiming to provide connections to 15 rural communities across Nigeria [83].

The REF supports solar mini-grids and energy efficiency measures to promote sustainable energy. The fund provides subsidies to cover up to

75% of the initial capital costs for mini-grid projects, facilitating their implementation in underserved areas [84, 85]. The REF has supported the deployment of mini-grids and solar home systems (SHS) across various states, including two 100 kWp solar-hybrid mini-grids in Edo State [86].

The Solar Power Naija Initiative, launched in 2020, aims to reach 5 million households (approximately 25 million people) by providing new solar-based connections in off-grid communities. It is supported by a NGN 140 billion (\$340 million) intervention facility from the Central Bank of Nigeria, which includes low-interest loans for solar home systems and mini-grid projects [87, 88]. Administered by REA, the programme focuses on expanding energy access through SHS and mini-grid facilities, with a broader goal of increasing local participation in the off-grid solar value chain and supporting domestic manufacturing [89]. The Initiative received an additional \$24 million from the Nigeria Sovereign Investment Authority for the assembly and deployment of SHS [90].

Projects supported by international organisations

The NEP is designed to provide electricity to households, micro-, small, and medium enterprises, as well as education and healthcare facilities through off-grid electricity solutions for underserved populations across Nigeria [91]. Initially launched as the Nigeria Electrification Project, the programme received \$550 million in funding from the World Bank and African Development Bank, and has since deployed 176 mini grids, reaching approximately 7.8 million people. For example, a collaboration between Husk Power Systems, the World Bank, and the Nigerian gov-

ernment led to the installation of solar mini-grids in six rural communities in Nasarawa State that provide power to around 5,000 households and 500 businesses [92].

Building on the Nigeria Electrification Project, the Distributed Access through Renewable Energy Scale-up (DARES) project, running from 2023 to 2028 and backed by a \$750 million credit from the International Development Association, aims to further improve clean energy access. DARES aims to provide electricity to over 17.5 million >>

Policies for mini-grids and off-grid solutions

Nigerians through the deployment of solar home systems and mini-grids [91]. The project is expected to attract over \$1 billion in private investments and is supported by key partners including the Global Energy Alliance for People and Planet (GEAPP), GIZ, Sustainable Energy for All (SEforALL), and the African Development Bank. It also supports the Nigerian government's efforts to coordinate off-grid electrification with a strong emphasis on gender inclusion by targeting female-headed households, women-led businesses, and promoting employment opportunities for women in the energy sector [93].

DARES comprises three main components: solar hybrid mini grids, standalone solar systems, and technical assistance. The first supports the development of 10,000 private sector-led mini-grids in underserved and unserved areas with potential for productive use, with the goal of connecting 10 million people. The second component aims to accelerate the off-grid market and leverage private sector-based solutions through result-based financing and potential upfront catalyst grants [93]. Overall, the project aims to replace over 280,000 polluting petrol and diesel generators and support 237,000 small businesses across the country [94].

The Africa Mini-Grids Program, implemented in collaboration with REA and the Global Environment Facility, also supports the deployment of mini-grids across Nigeria [95]. The initiative focuses on enhancing energy access for agricultural development and aims to install 23 mini-grids across six geopolitical zones, reaching over 70,000 people. It also supports productive use and social connections to boost economic activity and improve living standards in rural areas.

UNDP's Derisking Sustainable Off-Grid Lighting Solutions project focuses on making off-grid solutions more accessible to rural households by reducing barriers to private sector investment [96].

Targeting communities across Nigeria and implemented by REA, the project helps reduce reliance on fossil fuels, decrease carbon emissions, and improve energy access for millions of Nigerians.

The United States African Development Foundation (USADF) supports off-grid energy projects across Nigeria. For example, a USADF awarded a grant to Salpha Energy, a private company, to provide pay-as-you-go solar systems to over 2,000 homes and businesses in Akwa Ibom State, while also creating jobs and supporting skills development [97]. USADF also provided a \$100,000 grant to Green Village Electricity to implement an 18 kW solar system for 140 households in Egbeke, Rivers State, which was later expanded to a 100 kW system serving 250 households and businesses [98]. Green Village Electricity has since installed 14 solar mini-grids across Nigeria, creating more than 2,000 jobs.

The Regional Off-Grid Electricity Access Project, launched in 2022 running to 2030, aims to expand access to sustainable electricity using standalone solar systems across 19 West and Central African countries, including Nigeria. Led by ECOWAS and BOAD, the \$338.7 million project is funded by the World Bank, Clean Technology Fund, and the Netherlands and aims to adopt a harmonised approach across the region. In Nigeria, early implementation began in mid-2022 through ongoing studies and scoping activities. >>

27%

Nigeria's
electricity
access rate
in rural areas

Policies for mini-grids and off-grid solutions

Electricity for productive uses and community facilities

The Universal Energy Facility (UEF) is a multi-donor results-based financing facility for energy access across Sub-Saharan Africa, including Nigeria, managed by SEforALL and funded by a range of national and private donors [99]. In 2024, under the UEF, SEforALL signed grant agreements with 19 clean energy developers to deploy high-capacity solar and battery storage systems across the country. This is part of the Stand-Alone Solar for Productive Use programme, which aims to provide reliable electricity to businesses and institutions, enhancing economic opportunities and reducing carbon emissions. To date, the programme has installed over 1,600 solar systems for businesses and institutions in underserved communities.

The Energizing Education Initiative, part of the NEP and launched in 2017, seeks to provide sustainable and reliable electricity to 37 federal universities and seven teaching hospitals using solar hybrid power systems. The programme has delivered solar power to institutions across Nigeria, including the University of Lagos, Ahmadu Bello University, and the University College Hospital in Ibadan [100]. It has also provided renewable power to marketplaces including 1,198 shops in Sabon Gari Market in Kano and other commercial hubs [101, 102]. In 2025, the Energy Commission of Nigeria launched the NGN 10 billion (\$6.5 million) Renewed Hope Solarization Project with similar goals to provide 2 MW of solar power to federal universities and tertiary hospitals nationwide [103].

The Energizing Agriculture Project, initiated by RMI in collaboration with REA, has been addressing productive uses of energy (PUE) in rural areas since its launch in 2021 [104]. The project integrates mini-grids with agricultural equipment (such as solar irrigation, refrigeration, or processing machinery) to enhance productivity and reduce emissions. It also supports smallholder rice farmers in upgrading to electric processing equipment and is exploring opportunities for the use of electric vehicles to replace conventional

transportation for produce [105]. The programme is projected to reduce greenhouse gas emissions by 1.4 million tons of CO₂ by 2030, create or enhance over 150,000 jobs, and improve the livelihoods of nearly four million Nigerians [106].

The Energy Commission of Nigeria, funded by the Japanese International Cooperation Agency, has conducted energy audits in public buildings to promote energy efficiency and conservation [107]. These include integrating renewable energy sources such as solar power into public facilities and, by reducing energy consumption and promoting renewables, these initiatives contribute to more sustainable public institutions and community facilities across the country.

Two companies, SAO Energy and Okra Solar, have partnered to provide sustainable electricity to institutions [108]. Working with the state governments in Kwara and Ondo, they provided electricity to primary healthcare centres (PHCs) and digital learning centres using solar mesh-grids, improving healthcare services and educational facilities in these areas, whilst also supplying power to nearby households at a flat usage-based tariff.

The German non-profit organisation A2EI, Nigerian solar distributor Chromevolt, and the Health Electrification and Telecommunications Alliance have partnered to provide sustainable power for 75 PHCs in the country [109]. These centres were selected in consultation with the National Primary Health Care Development Agency and local authorities. Since May 2024, 54 PHCs in the North Central Regions of the Federal Capital Territory, Kaduna State, Nasarawa State, and Niger State have received customised solar systems including photovoltaic modules, hybrid inverters, and lead-carbon batteries. Chromevolt's technicians provide on-site training and five years of maintenance, and the systems are monitored remotely through an open-source data platform, ensuring impact measurement and reporting. ●

Clean cooking

In March 2024, the Government of Nigeria approved the National Clean Cooking Policy which seeks to expand access to clean cooking for all households and institutions in Nigeria by 2030. The policy aims to improve health outcomes, create jobs, build livelihoods, protect the environment, and enable families, institutions and businesses to save time and money through the promotion of clean cooking solutions. Despite the adoption of this policy, the recent removal of subsidies on petrol and electricity has led many households that transitioned to cleaner cooking gas to revert to the use of firewood and charcoal, further exacerbating the problem [110].

Several barriers must be addressed to achieve the goals of the National Clean Cooking Policy including supply chain constraints, cooking practices, limited awareness of the benefits of clean cooking, and the lack of finance, product standards, and good industry practices [111]. Overcoming these challenges will require concerted efforts by the government, private sector, and development partners to promote clean cooking solutions and incentivise the transition to cleaner fuels and technologies.

Prior to the 2024 policy, the National Clean Cooking Scheme was launched by the Federal Ministry of Environment in 2012, aiming to distribute improved biomass cookstoves across the country [112]. In 2014, the government approved NGN 9 billion (\$56 million) for the distribution of 750,000 clean cookstoves and, in the same year, the National Assembly Intervention on Clean Cooking Initiative was introduced to further encourage the adoption of clean cookstoves.

UNDP collaborates with the Energy Commission of Nigeria on projects related to energy efficiency, clean cooking, and human capital development [113]. This collaboration involved revising the National Energy Policy to incorporate clean cooking solutions. By promoting energy-efficient practices and clean cooking technologies, the

partnership aims to reduce environmental impacts while improving health and living conditions for Nigerian communities.

A collaboration between FAO and the International Centre for Energy, Environment, and Development focused on improving energy access for vulnerable communities in conflict-affected areas of Northeast Nigeria through the Safe Access to Fuel and Energy (SAFE) initiative [114]. Between 2017 and 2019, the programme primarily supported women and addressed both immediate energy needs and long-term sustainability. It established local production centres for fuel-efficient stoves and trained around 100 IDPs and host community members in stove production and marketing, which resulted in the sale of over 12,000 stoves. The programme also undertook public awareness campaigns to encourage households to adopt cleaner cooking technologies [115].

Under the SAFE programme, FAO distributed fuel-efficient stoves and briquettes to nearly 50,000 households in Borno, Adamawa, and Yobe in 2022 and 2023. This intervention was supported by multiple donors, including the Central Emergency Response Fund, European Civil Protection and Humanitarian Aid Operations (ECHO), and several governments [116]. This was estimated to have reduced firewood consumption by up to 65% and, in doing so, reduced the risk of harassment and violence against women and girls during fuelwood collection.

Despite these initiatives, several challenges continue to hinder the adoption of clean cooking technologies in Nigeria. Public awareness and education campaigns, particularly in rural areas, have been limited and there is a lack of comprehensive data on the demand, supply, and quality of improved cookstoves. The absence of sufficient testing facilities for verifying clean cooking standards and efficiency further compounds these challenges. ●

04

Energy for displaced people



Overview

The current energy situation in displacement settings in Nigeria is characterised by limited access to electricity and a heavy reliance on biomass for cooking. IDPs generally have very limited incomes which affect their ability to purchase energy for lighting and cooking, and often live in crowded and informal settlements without access to infrastructure such as the national grid [117, 118]. Insecurity caused by NSAGs, high inflation, limited employment opportunities, and deforestation further exacerbate the challenges faced by people living in displacement-affected areas [119].

Whilst up-to-date information on the levels of energy access in displacement settings is limited, several studies provide valuable insights into how displaced and host communities use energy for lighting, cooking, and other essential services. This report draws on three main sources: a broad site-level assessment across thousands of locations undertaken by IOM, focus group discussions and key informant interviews (KIIs) on energy access conducted by the Mercy Corps Nigeria Context Analysis Team (NCAT), and primary research carried out by the READS Programme team.

In 2021, IOM integrated energy access into one of its Displacement Tracking Matrix (DTM) Multi-Sectoral Location Assessments (MLSA), a regular data collection exercise that monitors a wide range of issues relevant to displacement [120]. The DTM MLSA gathers insights from key informants to provide a site-wide overview of general energy access levels, rather than a detailed household level data on specific energy sources. The MLSA covers two types of displacement settings: IDPs living within host communities, and those living in camps or camp-like settings which include temporary facilities in formal or spontaneous sites. Geographically, it focuses on two regions: the North Central and North West zones, and the North East zone (see Table 6). The assessment investigated energy access for household lighting and cooking, water, sanitation, and hygiene (WASH) facilities, and public lighting. Whilst the data was collected several years ago, the MLSA remains the largest-scale assessment on energy access in displacement settings and continues to offer an important and representative picture of the situation.

The Mercy Corps NCAT undertook a detailed study on access to energy for lighting and cooking in northern Nigeria in October and No- >>

TABLE 6

Breakdown of the IOM DTM MLSA zones and states covered, the number of sites assessed, the number of IDPs and households in each zone, and the percentage of host community and camp or camp-like settings.

ZONE	STATES COVERED	SITES	IDPS	HOUSEHOLDS	HOST	CAMP
NORTH CENTRAL AND NORTH WEST	Benue, Kaduna, Kano, Katsina, Nasarawa, Plateau, Sokoto, Zamfara	1,604	833,006	134,908	94%	6%
NORTH EAST	Adamawa, Bauchi, Borno, Gombe, Taraba, Yobe	2,379	2,182,613	444,781	87%	13%

Overview

venber 2023 [121]. The study used focus group discussions and KIIs in seven local government areas (LGAs) in Northeast and Northwest regions (Jere, Ngala, and Gwona in Borno State; Geire and Song in Adamawa State; Fagge in Kano State; and Jibia in Katsina State) and involved displaced people living in informal camp settings, host community members, and returnees. With 260 participants across 28 focus groups and an additional 28 KIIs, the study provides valuable qualitative insight into the energy needs of dis-

placement-affected communities in the Northeast and Northwest of Nigeria.

To complement these studies, the READS team conducted qualitative primary research in six locations in and around Maiduguri, Borno State. As detailed in the following section, this research provides further context to the energy-related challenges faced both by displaced people and host communities – particularly in the aftermath of the catastrophic flooding in September 2024.

Access to energy in Maiduguri

Overview of the study

On 9 September 2024, the Alau Dam in Konduga LGA, Borno State, collapsed and triggered severe flash floods across Maiduguri and Jere LGAs. By 10 September, an estimated 240,000 people were affected and, by 18 September, the floods had resulted in at least 37 deaths, 58 injuries, and the displacement of over 414,000 people in Borno State.

The impact was most severe in Maiduguri town, the state capital and largest city in northeastern Nigeria. By 10 September, floodwaters had submerged over 40% of Maiduguri Municipal

Council (MMC), which has an estimated population of more than 870,000, including at least 230,000 IDPs. The most affected areas included Gwenge and Fori under MMC LGA, as well as Maiduguri in Jere LGA. The floods trapped people in their homes, on trees, and in unsafe, inaccessible locations.

This study aimed to explore access to energy in these areas before, during, and after the flooding. The assessment collected data through household interviews with IDPs, host community members, camp representatives, and insti- >>

TABLE 7

Summary of the household survey respondents in each locational context: Bakasi and Doro Camps, Fori and Gwenge, and Dala Lawanti and Maiduguri.

LOCATION	FEMALE (%)	MALE (%)	IDPS (%)	HOSTS (%)	PERSONS WITH DISABILITIES (%)
BAKASI AND DORO CAMPS	24 (80%)	6 (20%)	27 (90%)	3 (10%)	2 (6.7%)
FORI AND GWENG	20 (66.7%)	10 (33.3%)	12 (40%)	18 (60%)	4 (13.3%)
DALA LAWANTI AND MAIDUGURI	23 (76.7%)	7 (23.3%)	9 (30%)	21 (70%)	6 (20%)

Overview

tutional stakeholders across both flood-affected and non-flood-affected areas. Additional KIIs were conducted with business owners, community leaders, and persons with disabilities. Interviews were primarily conducted in local languages (such as Kanuri, Hausa, and some in Shuwa Arabic), recorded, transcribed into English, and analysed using thematic coding to identify key trends and insights.

The study focused on four key areas: household electricity access, clean cooking solutions, energy access for livelihoods and productive uses, and energy access for social institutions such as schools and health centres. The assessment captured both current and prior energy access levels, examined barriers to and opportunities for

scaling sustainable solutions, and evaluated the impact of the floods. Key stakeholders, such as the State Emergency Management Agency, camp chairpersons, and IDP representatives were engaged throughout the process.

In total, 90 household surveys were conducted with 30 in each of three location types. Respondents included men and women from both IDP and host communities, as well as persons with disabilities, with a breakdown shown in Table 7. In addition, 25 KIIs were undertaken: 14 with business owners (8 women, 6 men), 6 with community leaders (all men), and 5 with persons with disabilities (2 women, 3 men). Finally, six field observations were conducted on energy and cooking facilities in social institutions.

Study locations

The study focused on energy access in three contexts, each represented by two locations:

- 1. Camps for flood-displaced IDPs and host community members (Bakasi Camp and Doro Camp).** These sites hosted both IDPs and host community members affected by the floods, though the camps themselves were not directly affected. Bakasi Camp, previously closed, was temporarily reopened following the disaster. Doro Camp, an unofficial camp, was home to one of the largest IDP populations even prior to the flood with many residing there since 2018.
- 2. Flood-affected areas with both IDP and host community populations (Fori and Gwenge).** Some IDPs in Fori and Gwenge live in makeshift shelters near the river, which made them particularly vulnerable to the effects of the flooding.
- 3. Areas that were not directly affected by the flooding (Dala Lawanti and Maiduguri).** These locations are home to both IDPs and

host community members. Dala Lawanti has fewer IDPs, with some living in makeshift tents. In Maiduguri town, IDPs reside within host communities or in unofficial camps.

Access to the national grid was very limited in all locations, both before and after the flood. Doro and Bakasi Camps still have no access to the grid. In Fori and Gwenge, households had access to either an 11 kilovolt (kV) or 33 kV lines. Those connected to the 11 kV line received around five hours of power per day, whilst few households that can afford the 33 kV line (with monthly bills exceeding NGN 25,000 (\$15) at the time of data collection, and over NGN 50,000 (\$30) by May 2025) received five to seven hours per day. There had been no grid electricity in Dala Lawanti for nine months prior to the assessment period, and in Maiduguri the grid provided only two to four hours of power per day. Following the flooding, most households in Fori and Gwenge were left without power for over a month, and Maiduguri experienced prolonged outages because of damaged infrastructure. ●

Electricity access for households

According to the IOM DTM MLSA, in 2021, 59% of camps and camp-like settings in the North West and North Central regions used electricity as their main source of energy [120]. Of these, the vast majority (87%) reported having electricity for less than six hours per day, with only a small proportion having access for longer periods (see Table 8) and durations of access were particularly low in Benue, Nasarawa, Sokoto, and Zamfara. In host community settings where IDPs resided, 52% used electricity as their main source and 74% of these had access for less than six hours per day. The shortest durations were reported in Kano, Nasarawa, Sokoto, and Zamfara.

Across the North West and North Central areas, electricity for connectivity (such as televisions, computers, radios, and internet) was the highest priority in 34% of camp settings and 54% of host settings, whilst electricity for phone charging was priorities in 53% of camps and 31% of host settings. For second priorities, 18% of camp settings a priority phone charging, following cooking fuel at 53%. In host settings, both phone charging and cooking fuel were equally prioritised at 31%. For locations without access to electricity, the lack of charging points and high

electricity costs were cited as the most common barriers for households.

In the North East, the same study found that 33% of camp and camp-like locations and 54% of host settings used electricity as a source of energy, but the study was unable to determine the duration of power in most locations. Where data was available, electricity was typically available for less than 12 hours per day. In camp settings with electricity, 64% used liquefied fuel (diesel and petrol) whilst 33% had access to the national grid – which is typically much less available in the North East, compared to North West and North Central – and 3% used solar power. In host settings, 52% relied on fuel, 44% were connected to the grid, and 4% used solar energy. In camp settings in the North East, electricity for phone charging was the highest priority in 58% of locations, followed by connectivity and entertainment in 32%. In host settings, these priorities were reported at 45% and 40%, respectively.

In late 2023, Mercy Corps' NCAT found that many communities in Borno, Kano, and Katsina were not connected to the grid, largely due to electricity infrastructure destruction by NSAGs [121]. >>

TABLE 8

Proportions of locations using electricity as the main energy source and average daily availability of electricity [120].

REGION	SETTING TYPE	LOCATIONS USING ELECTRICITY	0-6 HOURS	6-12 HOURS	12-18 HOURS	18-24 HOURS	UNKNOWN
NORTH WEST AND NORTH CENTRAL	Camp and camp-like	59%	87%	10%	2%	1%	-
	Host community	52%	74%	22%	4%	1%	-
NORTH EAST	Camp and camp-like	33%	9%	10%	3%	-	79%
	Host community	54%	7%	4%	2%	1%	86%

Electricity access for households

Around two thirds of respondents in Adamawa (mostly host communities) had grid connections whilst the remainder (mostly returnees) could not afford connection fees or electricity bills.

The majority of households (65%) used battery-powered torches for lighting, followed by rechargeable lighting devices (35%), especially those with unreliable grid connection. Solar-powered devices were highly favoured as these avoided the cost of frequently purchasing batteries for torches – typically two to three times per week, costing NGN 100-300 (\$0.06-\$0.19) each time – or visiting recharging centres usually three to five times per week, costing around NGN 100 (\$0.06) each time.

Most respondents (90%) expressed dissatisfaction with their current lighting solutions. In Borno, many preferred portable generators over grid access, although solar devices were sometimes stolen. In Adamawa, displaced households declined grid connections owing to high costs and noted that solar lighting was less effective during the rainy season. In both states, many IDPs and returnees had received lighting devices from NGOs or government bodies as part of non-food item (NFI) distributions, whilst those in Kano and Katsina had not received them.

The NCAT report also found that most lighting devices were purchased from local shops and markets which were convenient for consumers, but respondents in Kaduna and Katsina highlighted how security challenges caused supply chain issues which resulted in higher prices. Poor battery disposal was also identified as a concern for both human and environmental health.

Several partnerships have aimed to improve access to electricity for displacement-affected communities. Since 2017, UNDP and Panasonic, with funding from the Government of Japan, have distributed solar lanterns to IDPs in Ngwom, near Maiduguri, Borno State to provide reliable lighting, enhanced everyday activities and improve living conditions [122]. In 2018, the Global Initiative for Food Security and Ecosystem Preservation provided 1,000 people living in IDP camps in the Northeast region with small solar kits including a 10 Watt solar panel, battery, three bulbs, a radio, and USB charging at an estimated cost of NGN 27,000 (\$75) per household [123, 124]. >>

"Before the flood, we relied on solar lamps donated by NGOs. The flood damaged them, leaving us dependent on unreliable torchlights or borrowed light."

– IDP living in Fori

Access to electricity in Maiduguri

Households across all locations experienced unreliable electricity access and reported difficulties in cooking, studying, and accessing essential services after dark. This forced them to rely on temporary solutions such as solar-powered lamps, rechargeable devices, battery-powered torches and locally-made lanterns. These alternatives were often insufficient, costly, and difficult to maintain due to limited charging points, frequent battery replacements, and rising fuel prices.

Many households could not afford to maintain consistent lighting which leaves them in darkness. The high cost of fuel and batteries – typically NGN 200-300 (\$0.13-0.19) for small and NGN 300-400 (\$0.19-0.26) for large batteries – and spare parts for alternative lighting sources place a significant financial strain on households. This was exacerbated by high demand for electricity and lighting solutions which drove prices up. Safety was also reported as a widespread concern, either from lack of lighting or reliance on low-quality alternatives.

IDPs and host community members living in camps

Even before the flooding, lighting in Bakasi and Doro Camps was inadequate. Most respondents highlighted that households relied on solar-powered lamps, rechargeable torches, or locally-made lamps. While solar lamps provided basic electricity access, they were often ineffective due to the scarcity of charging points – usually operated on a commercial basis and located outside the camps – and the high cost of charging.

“We mainly use solar lamps and torchlights but charging them is difficult.”

– Man, Bakasi Camp

“We often struggle to keep the generators running because fuel is expensive and not always available.”

– Man, Doro Camp

Battery-powered torchlights were widely used but around half of the respondents found them costly and unreliable due to the frequent need for battery replacement. A small number of residents

in more remote areas of the camps relied on locally-made lamps costing NGN 2,000 (\$1.30) for small models and NGN 3,500-4,500 (\$2.25-2.90) for larger ones. These lamps required more than two batteries to operate which placed additional financial strain on already vulnerable households.

“In the host community, we used solar lights, which were sufficient for our needs. Now in the camp, I have no access to lighting and rely on small torchlights borrowed from other households.”

– Female head of household, Bakasi Camp

After the flooding, the situation deteriorated significantly. Many solar-powered lights were destroyed, leaving households in darkness and further compromising safety in poorly lit communal areas. Around half of the respondents reported having no reliable access to lighting, forcing them to rely on makeshift solutions. >>

Access to electricity in Maiduguri

“The darkness in the camp is very unsafe, especially for women and children. Walking to the latrines at night is dangerous because we can’t see, and there’s always a risk of harassment.”

– Elderly woman in a female-headed household, Bakasi Camp

Without access to reliable lighting, many residents turned to small battery-powered torches or phone flashlights. However, these were quickly depleted and difficult to recharge, leaving households with few alternatives. Poorly lit paths to essential services, such as latrines and water points, became increasingly hazardous. Almost all respondents raised concerns about safety,

especially for women and children. Reliance on alternative and hazardous lighting sources, such as kerosene lamps, introduced additional risks including fire hazards in crowded shelters and health risks from smoke exposure.

“Yes, kerosene lamps are a fire hazard, especially when used inside tents. They also produce a lot of smoke, which is not safe, particularly for children. Torchlights are safer but are not effective enough to light the entire camp, leaving dark areas where theft and other security issues can occur.”

– Woman living in Doro Camp

IDPs and host community members in flood-affected areas

In Fori and Gwenge, electricity access posed a significant challenge for both IDPs and host community members. Almost all host community households had access to the national grid before the flood, but electricity supply was inconsistent: most areas received no more than two to three hours of power per day, with some communities experiencing complete outages for days or even months.

Vulnerable groups, including many IDPs, generally had no access to the grid even before the flood. Around half of these households relied on a combination of alternative sources, such as small solar lamps provided by NGOs, locally made lamps, and battery-powered torches. A few respondents used kerosene lanterns, which they found to be expensive, unreliable, and limiting in terms of mobility.

“I used lanterns before the flood, but they were expensive and unreliable. I also had a small solar lamp, but it didn’t provide enough light. During the flood, I lost access to reliable lighting, which made moving around in the dark difficult and unsafe due to my disability.”

– Disabled male head of household, Gwenge

“During the flood, we had no light at all. It was very dark, and we couldn’t go outside to fetch water or move around after sunset.”

– Single mother, Fori >>

Access to electricity in Maiduguri

“Before the flood, we used electricity from the national grid, which was unreliable, supplemented with torchlights and phone lights. During the flood, power was cut, leaving us in darkness. Now, two months later, we still have no electricity and rely solely on torchlights, which feels unsafe.”

– Married woman, Gwenge

The flooding worsened the conditions considerably. Floodwater destroyed solar panels and other infrastructure, leaving most households in complete darkness. Nearly all respondents mentioned that batteries and fuel supplies became scarce and unaffordable.

“The flood left us in complete darkness. Without proper lighting, our nights feel unsafe and hopeless.”

– IDP living in Fori

The reliability of the national grid declined further, with some communities reporting more than a month without electricity at the time of data collection. This had forced households to attempt

improvised and often dangerous solutions such as oil lamps made from cans which would spill and cause burns.

“The flood took away more than just light, it left us feeling insecure at night. The solar lamps we relied on are no longer as dependable.”

– Host community member, Fori

Lighting remained a critical issue across affected locations. Damaged solar lamps and the high cost of repairs or replacements left households dependent on unsafe and temporary solutions. Around half of the respondents reported that the price of alternative lighting had more than doubled, from around NGN 1,000 to NGN 2,500-3,000 (\$0.65 to \$1.60-\$1.95), making them inaccessible for many.

“The flood damaged our lamps and made prices double. We are left in complete darkness at night, which feels unsafe and isolating.”

– Married woman, Fori

IDPs and host community members living in areas indirectly affected by flooding

Even prior to the floods, residents of Dala Lawanti and Maiduguri faced significant challenges with electricity access. Grid outages were frequent and prolonged: most of Dala Lawanti had been without electricity for over nine months, and some parts of Maiduguri had been without power for more than a month. Households instead relied on rechargeable lamps, locally-made lanterns, and battery-powered lanterns.

“We’ve been without electricity for over a year, leaving us no choice but to depend on lanterns.”

– Widow in Maiduguri

Around half of the respondents mentioned that rechargeable lanterns and flashlights were helpful but dependent on unreliable electricity supply for charging. Battery-powered lanterns were >>

Access to electricity in Maiduguri

a common alternative but their low brightness made them unsuitable for certain tasks.

“We use battery-powered lanterns for lighting. They are not ideal because they don’t provide enough light for cooking or other tasks at night.”

– Male head of household, Dala Lawanti

“I use locally made lanterns and rechargeable lights when possible. The lanterns require regular changing of batteries, which is expensive and burdensome for me.”

– Disabled woman in Maiduguri

Although these areas were not directly affected by flooding, their indirect repercussions significantly worsened already challenging conditions. Almost all respondents mentioned that the influx of displaced persons increased competition for basic resources, including those for lighting such as batteries. Batteries usually lasted one week whilst lanterns required daily charging, depending on usage and household size. Monthly expenditure was estimated at NGN 1,800 (\$1.15) for small lanterns and NGN 2,500 (\$1.60) for larger ones. Around half of the respondents reported that rising prices for fuels and batteries strained their finances.

“The influx of displaced persons has increased competition for basic resources like lighting fuel, making it harder to afford.”

– Married woman in Dala Lawanti

“The lighting resources are not sufficient, and we often run out of batteries or charging for lanterns and torchlights. The cost of batteries and kerosene further strains my finances.”

– IDP living in Dala Lawanti

Almost all respondents expressed concerns about the safety risks associated with poorly lit households and surrounding areas. Some respondents highlighted how limited access to reliable lighting disrupted daily activities and increased the risk of accidents, particularly at night. Others noted difficulties in monitoring children and navigating in the dark, and some people highlighted the emotional toll and fear caused by inadequate lighting.

“The lack of safe lighting poses risks, especially for my children. There’s always a fear of fire accidents or burns, and it makes nighttime activities challenging.”

– Female head of household with six children, Maiduguri

“I feel unsafe at night due to inadequate lighting in my home. Navigating in the dark is difficult and increases my vulnerability.”

– Disabled woman in Maiduguri

“Without proper lighting, I feel unsafe at night. There have been instances where I’ve heard noises, and I worry about the safety of my children.”

– Female IDP in Maiduguri ●

Barriers to electricity access

IDPs residing in both camp and host community settings face significant barriers to household electricity access. Those in host community areas are typically more likely to have connections to the national grid than those in camps, and where connections exist, host areas generally have access to power for longer durations each day. Despite this, the overall availability of grid electricity – amongst households with connections – is low in all areas. The recent flooding in Maiduguri further decreased supply in already underserved locations. High costs of the national grid remain a key barrier to access, both relating to the ongoing costs of grid electricity and the initial connection fees, which are widely perceived as unaffordable for many households. Furthermore a lack of financing mechanisms, subsidies, and access to financial services (such as bank accounts and mobile money) also inhibits access to off-grid solar products.

Households in all settings typically rely on basic alternatives, such as battery-powered torches, either as a primary source of electricity or as a frequent backup to the unreliable grid. These provide poor-quality light and require regular charging or battery replacement, which can be both inconvenient and expensive, especially when community charging points are distant or out of service. Alternative lighting sources, such as kerosene lamps, offer poor performance and raise safety concerns, especially for children, persons with disabilities, and elderly people.

In households with access to generators, the demand for both batteries and fuel increased following the flooding, driving up prices and making even basic lighting less affordable. Meeting rising demand and replacing damaged equipment remains challenging due to security concerns and logistical issues that restrict companies' ability to transport products to remote or conflict-affected regions. Companies are also faced with customs clearance issues, import taxes, and a lack of lo-

cal distribution networks, meanwhile customers often receive weak after-sales support and products with short lifetimes. These issues also limit the availability of new and alternative products reaching these markets, for example energy-efficient or certified appliances.

OPPORTUNITIES Access to the national grid varies significantly across IDP-hosting regions, both in terms of network coverage and the availability of electricity, with most camp-like settings having minimal or no access. Investing in large-scale infrastructure projects to expand, densify, and reinforce the network could improve household access to the grid. This would likely need to be supported through subsidised connection fees and tariff support for low-income households to address affordability constraints reported by respondents across several studies.

Access to basic electricity services – such as for lighting, entertainment, and connectivity – were found to be priorities for households and held above other types of electricity needs. Households also expressed a preference for solar-powered lighting sources to avoid recurring expenditure on charging. Improving the availability of high-quality and certified solar products, such as solar lanterns and SHS, to replace low-quality alternatives such as battery-powered torches present a business opportunity for the private sector if current market barriers can be overcome.

Affordability remains one of the biggest barriers to increasing reliable electricity access amongst displaced and host community households and so enhancing the affordability of solar solutions could drive uptake. This could be done through subsidies and results-based financing, for example, which would reduce the cost of electricity products for consumers. Introducing voucher systems to provide discounts on solar products could support the private sector by allowing customers to buy from different vendors. >>

Barriers to electricity access

Alternatively, allocating funding to specific companies to extend customer credit could support more households in accessing PayGo solar, but payment schemes should be flexible to accommodate varying incomes and not overburden vulnerable households with excessive monthly fees. Subsidisation and other financial accessibility mechanisms should be gradually reduced over time, if possible, to support the transition to a sustainable market system and avoid companies withdrawing from the market suddenly when support ends.

Supply chains and logistics would need to be improved to facilitate better access to electricity services. Companies could invest in warehousing facilities further along the supply chain – potentially shared by multiple companies and managed by another organisation – to support a more consistent supply of quality energy products. This could be used for both solar equipment and appliances such as fans, refrigerators, and televisions. ●



Clean cooking for households

Access to cooking fuels is one of the largest issues across displacement settings in Nigeria. In addition to the time burden and exposure to risks for those gathering firewood, including for both domestic use and commercial selling, fuel collection is a major contributor to environmental degradation. Despite this, reliance on biomass for cooking remains high and there are not yet any commercially-scaled alternatives available in displacement settings.

The IOM DTM MLSA found that 94% of locations in the North Central and North West areas used firewood as their most common source of cooking fuel, followed by charcoal (4%), and this was consistent across both camp and host settings. Three-stone fires were the most common type of stove used in 85% of locations, followed by fired clay (7%) and improved metal (5%) cookstoves. Gas stoves were used in a small number of locations. Overall, access to cooking fuel was ranked as the second or third highest priority for household energy access.

In the North East Zone, firewood was the most common source of fuel in 90% of locations, followed by charcoal (9%) and electricity (1%); this was similar across host and camp settings. The most commonly used stoves in each location were three-stone fires (84%), followed by fired clay (12%), improved metal (4%), and liquid fuel (1%) cookstoves. Cooking fuel was ranked among the top three priorities across all locations, with some households needing to share cooking resources with other families.

The Mercy Corps NCAT report found that, in 2023, firewood was used by 65% of its respondents whilst charcoal was used by 52%, in addition to other fuels such as agricultural residues and non-organic waste. In host communities in Adamawa, however, 27% of households connected to the national grid used electricity to cook and 11% used gas.

Most households cooked their food outdoors (76%) with the remainder doing so inside or in communal spaces. The responsibility for cooking fell mainly to women (95% of households) and,

in some cases, girls whilst men were usually responsible for purchasing fuel (75%). Almost three quarters of households purchased fuel more than four times per week, typically costing around NGN 350 (\$0.25) to cook each time, whilst two thirds of households reported sometimes or rarely having enough money to buy fuel when they needed to cook.

Many households preferred to use charcoal as it is easier to use, generates less smoke, and does not darken pots. Charcoal vendors in Kano reported a decrease in availability during the rainy season, as producers focus on farming activities, and noted that rising gas and kerosene prices could drive up demand for cheaper charcoal. A ban on cutting down trees in Adamawa, meanwhile, increased the scarcity and prices of both firewood and charcoal and meant that sellers no longer operated openly, in fear of fines.

Finally, the Mercy Corps NCAT report found that 90% of respondents stated that it can be difficult to access food and that high costs (of both food and fuel) led households to skip meals or eat under-cooked food. Other coping mechanisms included preparing food that requires less or no cooking. >>

2-3x

Increase in the cost of firewood and charcoal after the flooding in Maiduguri

Access to clean cooking in Maiduguri

Respondents highlighted common challenges related to clean cooking across all locations including limited access to cooking fuels, financial strain, safety risks, and health concerns caused by smoke exposure. These issues were exacerbated by recent flooding which destroyed cooking resources and disrupted supply chains which made firewood and charcoal even harder to access.

Households mostly rely on firewood and charcoal for cooking but the availability of these fuels

is limited and prices doubled or tripled after the flood, shown in Table 9. Cooking with firewood and charcoal exposed households to smoke-related health issues, including coughing, eye irritation, and respiratory problems. Women and children also faced risks of harassment, injury, and snake bites while collecting firewood.

“Now over 40% of my household's resources are spent on energy needs.”
– Woman living in Bakasi Camp

IDPs and host community members living in camps

Before the flooding, firewood was the primary cooking fuel in Bakasi and Doro Camps but its availability was limited. Some households received limited supplies of charcoal from NGOs but these were insufficient. After the flooding, floodwaters destroyed cooking tools and disrupted access to firewood and charcoal.

“We mainly use firewood for cooking, though it’s becoming harder to find. Sometimes we get charcoal, but it’s expensive.”
– Male head of household in Doro Camp

“I use firewood for cooking because it is the only option available. Sometimes, I collect small sticks around the camp, but it’s not enough to prepare meals for the whole day.”
– Female head of household in Bakasi Camp

“The flood destroyed our cooking tools and left us without the resources to cook properly. In the camp, firewood is not easily accessible.”
– Female head of household in Bakasi Camp >>

TABLE 9
Approximate fuel prices (NGN) in the study locations for firewood and charcoal, each of which comes in a bundle or bag of around 50-60 kg.

FUEL	FIREWOOD (NGN PER BUNDLE)		CHARCOAL (NGN PER BAG)	
	BEFORE FLOODING	AFTER FLOODING	BEFORE FLOODING	AFTER FLOODING
BAKASI AND DORO CAMPS	300-500	1,000-3,000	6,000-7,000	11,000-12,000
FORI AND GWENGE	500	1,000-1,500	4,000-7,000	10,000-14,000
DALA LAWANTI AND MAIDUGURI	150-200	500	6,500-7,000	9,000-11,000

Access to clean cooking in Maiduguri

Cooking with firewood exposed households to smoke-related health issues and collecting firewood from the local environment posed safety risks, including harassment and injury. Women and girls, typically responsible for collecting fuel, needed to travel more than 10 km into the bush to find firewood, which took more than four hours of walking. Vulnerable groups, such as the elderly and disabled, faced even greater challenges and usually needed to rely on family members to provide them with cooking fuel.

“In the camp, I rely on firewood that my older grandchildren help collect, but it’s never enough.”

– Elderly female head of household in Bakasi Camp

“The smoke from firewood worsens my health, and it affects everyone in the household, especially children.”

– Female head of household in Bakasi Camp

“When we go out to collect firewood, there is always a fear of encountering snakes or being harassed by strangers.”

– Woman living in Doro Camp

IDPs and host community members living in flood-affected areas

In Fori and Gwenge, IDPs depended on firewood and charcoal, while some host community members used gas stoves. The low availability of firewood meant that household members, usually women and girls, needed to travel at least two hours to collect firewood which exposed them to safety risks.

“I worry every time my children help me gather firewood, they could get hurt or sick.”

– Female IDP and head of household in Gwenge

“During the flood, accessing charcoal became much more difficult, and firewood was hard to gather because areas were flooded.”

– Male head of household in Gwenge

During the flooding, supply chains were disrupted, making firewood and charcoal scarce and increasing the time spent collecting fuel to four to six hours per roundtrip. As a result, households were forced to cook using wet firewood – which produced thick black smoke, worsening respiratory and eye issues – or unsafe alternatives such as burning plastic.

“The smoke from burning wet firewood irritated our lungs, and children often developed coughs and chest pain.”

– Single mother in Fori IDP camp

“We had no choice but to burn plastic; it was the only thing we could find to cook with.”

– IDP in Fori >>

Access to clean cooking in Maiduguri

IDPs and host community members living in areas indirectly affected by flooding

In Dala Lawanti and Maiduguri, firewood and charcoal were the primary cooking fuels before the flooding but scarcity and rising costs made them difficult to access. The influx of IDPs in the area increased competition for cooking fuels and meant that people needed to travel further to collect firewood.

“With more people arriving, firewood has become scarce and more expensive. I now travel longer distances to gather it, and it is a struggle to meet my family's needs.”

– Woman in Dala Lawanti

Cooking with firewood exposed households to smoke-related health issues which is exacerbated when cooking is done indoors. As in other areas, collecting firewood from the local area posed safety risks, particularly for women and children.

“Gathering firewood is dangerous, especially when I have to travel farther and return late in the evening.”

– Female head of household in Dala Lawanti

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Barriers to clean cooking

Almost all households in displacement-affected areas are reliant on traditional sources of cooking. The limited availability of firewood and charcoal presents a critical day-to-day challenge: household members, usually women and girls, have to travel long distances into local areas to collect fuel, which exposes them to the risk of violence due to the distances travelled and time required. Firewood has become scarcer around Maiduguri as a result of the flooding, especially due to increased population in the area, which affects families' ability to meet their cooking needs, particularly for those with elderly or disabled family members.

Many households also regularly purchase cooking fuel, including when the collection of firewood is not possible. This comes at a high cost and in flood-affected areas prices more than doubled. This expenditure has limited households' ability to cook and some reported relying on coping strategies such as skipping meals. Meeting the present costs of cooking remains a challenge for many households and makes investing in cleaner alternatives out of reach. Income is one of the biggest barriers to transitioning to cleaner fuels: women without income sources use the cooking sources that are available to them, which are typically the most basic low- or no-cost options of firewood and three-stone stoves.

The IOM DTM MLSA and Mercy Corps NCAT studies found that small proportions of households used improved cookstoves, LPG stoves, or electricity for cooking. The uptake of improved cookstoves and fuels is, in part, limited by the low availability in the market as well as the high costs of these technologies. Weak distribution networks for improved stoves, the absence of certified suppliers, and a lack of repair and maintenance facilities in camps and rural towns further inhibit clean cooking access. Furthermore this is affected by low awareness of improved cookstoves in general and the benefits they can bring [125], especially

for the health of the user. Cultural preferences for traditional cooking methods, often viewed as familiar and reliable, tend to limit the adoption of alternative or novel cooking options [126].

Finally, clean cooking has generally not received comprehensive policy support and investment at the national or state levels, which has limited the uptake of improved cooking solutions. Although the recently introduced National Clean Cooking Policy seeks to expand access to clean cooking, and many organisations have implemented projects to increase its uptake, greater coordination and financial support will be required to reach their policy goals.

OPPORTUNITIES Most households rely on firewood and charcoal and, without a radical change, large proportions of the population are likely to continue doing so in the short to medium term. Given the ongoing reliance on these fuels, it is increasingly important to use biomass resources more efficiently. Improved cookstoves can support this by reducing the amount of firewood or charcoal required per meal. While biomass would still be consumed, this could significantly decrease overall demand and ease pressure on scarce resources.

Community-led patrols in the area could help ensure that biomass is collected responsibly and reduce the risk of violence against those collecting firewood. These patrols could also be supported through other programmes, such as those focused on protection or environmental sustainability. Alternatively, cooking fuel could be distributed by humanitarian or development organisations which ensures it comes from a sustainable source.

To facilitate this, the availability of clean cooking solutions – both improved biomass and charcoal stoves, and more advanced options such as LPG and electric stoves – must be increased. Dis- >>

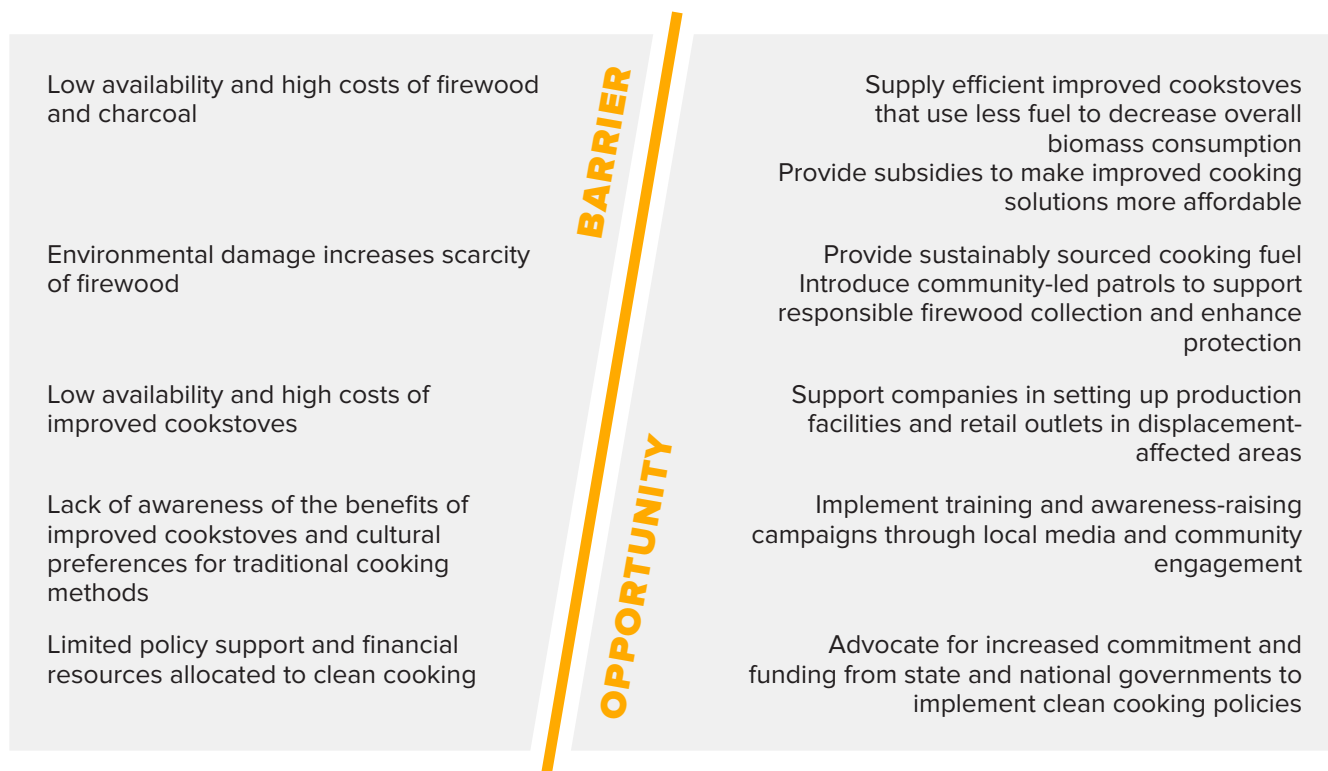
Barriers to clean cooking

tribution programmes led by NGOs and UN agencies can play a role in increasing access, while supporting the private sector to produce and sell high-quality and durable stoves could offer a more sustainable long-term solution. Financial support for companies or end users to decrease the costs of stoves would likely be required to catalyse uptake. Non-financial support, such as strengthening supply chains or improving warehousing and local production facilities, could also help companies establish themselves and their products in the market [126].

Raising awareness within local communities about the benefits of clean cooking could further encourage uptake. In-person promotional activities and radio campaigns can be effective in

rural areas where access information is limited, and demonstration events can help to familiarise people with new technologies and cooking practices. Coordination between NGOs and companies could balance the promotion of health and environmental benefits with advertising for specific products.

These efforts must be supported by coherent strategies at both state and national levels. Recent policies aim to increase the uptake of clean cooking but, in order for their goals to be realised, sufficient funding and capacity must be directed to implementation. Continued advocacy with government stakeholders can help to keep clean cooking high on the political agenda and maintain its importance in policymaking at all levels. ●



Energy access for livelihoods and productive uses

Access to energy can provide opportunities for livelihoods and PUE in displacement-affected areas. These activities often serve as a foundation for income generation to support economic integration and resilience.

One of the most common uses of energy is for food processing, including activities such as grinding grains, preparing snacks, and preserving food. Women in IDP camps, for example, often rely on grinding machines powered by electricity or generators to process grains, enabling them to either sell food items in local markets or prepare meals for their families. Agricultural activities also require energy: electricity can power irrigation systems and equipment for milling and drying crops. This helps preserve harvested crops for longer periods, allowing families to meet their food needs and creating opportunities to sell surplus produce.

Crafts and artisanal work – such as tailoring, carpentry, and metalwork – also rely on electricity to operate tools and increase efficiency. Tailors may use electric sewing machines while carpen-

ters and metalworkers require electricity for their equipment. Access to electricity enables people to sustain their livelihoods and provide services within camps and host communities.

In addition to productive work, retail services in displacement settings also depend on electricity. Small shop owners use lighting to attract customers, especially as many businesses operate beyond daylight hours in crowded camp environments. Many also use electric appliances, such as refrigerators to store perishable goods, which can increase their profitability.

Displaced communities face significant challenges in accessing energy for livelihoods. The limitations of the national grid – both in terms of coverage and supply reliability – often mean that businesses cannot depend on it for consistent power. Generators are relatively common but fuel costs are high, while solar systems involve high initial investment costs that are unaffordable for many businesses. As a result, access to sustainable energy for livelihoods remains limited. >>

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Access to energy for livelihoods in Maiduguri

Across Bakasi Camp, Doro Camp, Fori, Gwenge, Dala Lawanti, and Maiduguri, respondents highlighted common challenges related to electricity access for livelihoods and PUE. Typical monthly incomes across all locations were estimated at NGN 80,000-120,000 (\$50-\$75) and businesses reported fuel costs to be around 30-40% of total expenses. Rising fuel prices have strained businesses while the high upfront costs of solar systems limit the potential to invest in alternative energy sources. Despite these challenges, there is strong interest in solar energy to overcome limited access to lighting and avoid disruption to business operations.

“Without access to electricity, I depended on a generator to power my equipment. The fuel costs were so high that it significantly reduced my profits.”

– Entrepreneur in Bakasi Camp

Businesses dependent on electricity, including those providing phone charging, tailoring, and refrigeration services, were severely impacted by flooding that destroyed buildings and equipment. The lack of lighting has increased the risks of theft, violence, and accidents, especially for women and people with disabilities, which concerned both business owners and customers.

“The absence of lighting after sunset raises safety concerns for both customers and business owners. There are increased risks of theft and violence due to the darkness.”

– Business owner in Fori

“There is a severe lack of lighting in the camp surroundings, especially after dark. The few existing lights are insufficient to ensure safety, particularly for business operations and personal security.”

– Business owner in Maiduguri

IDPs and host community members living in camps

Before the flooding, solar panels and generators were the primary energy sources for businesses in Bakasi and Doro Camps. However, both options were expensive and required frequent maintenance. Fuel costs consumed a large portion of income, with some estimating it to be around 30-40% of monthly expenses. Despite not requiring fuel, solar systems were also expensive to maintain for businesses due to regular upkeep costs.

“I had to rely on a solar panel for lighting, but even then, it wasn’t enough to run my business efficiently. The cost of repairs and replacement parts was always an issue.”

– Shop owner in Doro Camp

Floodwater damaged or destroyed many solar panels and generators. As a result, businesses were forced to cease operations or scale back their working hours, particularly after dark, leading to reduced incomes and inability to replace damaged equipment.

“The floods damaged my solar panel and generator. Replacing them has been impossible because the costs have gone up, and my income has dropped significantly.”

– Saloon owner in Doro Camp

With no financial support available for energy equipment, most business owners could not afford to restore their access to electricity. >>

Access to energy for livelihoods in Maiduguri

Meanwhile incomes decreased as entrepreneurs and customers are worried that poor lighting throughout the camps has increased safety risks, making them unable to visit shops or other businesses at night.

“I would happily use solar energy if it were affordable and accessible. But I need financial support to cover the cost of setup and equipment.”

– Resident of Doro Camp

“After the flood, I had to stop working after dark because it’s too dangerous without reliable lighting. My earnings have dropped significantly.”

– Trader in Bakasi Camp

“I can’t leave my shelter after dark anymore. It’s too risky without proper lighting in the camp.”

– Woman in Bakasi Camp

IDPs and host community members living in flood-affected areas

Before the flooding, solar lanterns and small generators were commonly used by businesses in Fori and Gwenge for lighting and electricity to support their operations. Retailers of cooking fuel, such as firewood and charcoal sellers, also relied on energy access and currently face many similar issues.

“Before the flood, my firewood and charcoal business was doing well. I had steady access to energy for my operations, and my income was enough to support my family.”

– Business owner in Fori

“The flood destroyed my house and business, leaving me with nothing. My firewood and charcoal business was washed away, and I can’t access the land to collect firewood anymore.”

– Business owner in Fori

“The flood destroyed my shop and equipment. I had to move to an open space that isn’t secure, making it difficult for people to trust my service and leaving me unable to maintain my previous level of business operations.”

– Shop owner in Fori

The flooding destroyed homes, businesses, and energy infrastructure. Some business owners, especially those selling fuel, could no longer reach areas to collect firewood. Others lacked safe spaces to restart operations.

As a result, some businesses explored temporary measures such as borrowing generators but these were not sustainable in the long term. Others considered using new technologies, such as electric cooking, but the high cost presented an insurmountable barrier. >>

Both solar panels and generators required frequent maintenance.

Access to energy for livelihoods in Maiduguri

“I borrow a generator from a friend and try to charge as many phones as I can with the limited fuel I can afford. However, it’s not a reliable solution, and the lack of security reduces customer trust.”

– Owner of charging business in Fori

“I would consider using solar-powered cooking equipment if it were affordable and accessible. It would help reduce dependence on charcoal, but the cost remains a barrier.”

– Restaurant owner in Gwenge

IDPs and host community members living in areas indirectly affected by flooding

Before the flooding, solar lanterns, small generators, and other alternative energy sources were commonly used in Dala Lawanti and Maiduguri. Access to electricity was reliable and an important component of many businesses. Although the flooding did not affect the areas directly, businesses were subject to indirect effects which impacted their operations.

“Before the flood, my business was doing well. I had steady access to energy for my operations, and my income was enough to support my family.”

– Barber in Dala Lawanti

Damage to the roads and electricity distribution network led to curtailed operating hours and increased costs for fuel used for generators and cooking. These disruptions made it significantly harder for businesses to continue their operations.

“Due to the lack of lighting, I had to reduce my business hours, as it became too unsafe for both me and my customers to operate after dark.”

– Beverage seller in Maiduguri

“The flooding didn’t directly affect my business or home, but it has indirectly made things harder. With damaged roads and disrupted supply chains, getting fuel for my generator has become more expensive.”

– Business owner in Dala Lawanti

“Although the flood hasn’t directly affected Dala Lawanti, it has still impacted my business. The demand for charcoal has risen, doubling prices. Damaged roads have also increased transportation costs, making it harder to bring charcoal to the market.”

– Business owner in Dala Lawanti

Some businesses with solar systems recognised the advantages of off-grid renewable energy and expressed interest in scaling up their systems but, as in other areas, the cost remains a major barrier.

“I’m highly willing to expand my solar system and explore other sustainable energy solutions if they are safe, affordable, and reliable.”

– Resident of Maiduguri ●

30-40 %

of monthly expenditure is spent on fuel

Barriers to energy for livelihoods and productive uses

IDPs and host communities, particularly in the northeastern regions affected by conflict, face significant challenges in accessing energy for livelihoods and productive uses. Many economic activities such as crop processing, artisanal work, and shops are reliant on energy. However, the unreliability of power for those with connections hampers their ability to operate. For those without a grid connection, securing access remains challenging in informal or crowded camp-like settings with limited infrastructure [127, 128].

Among businesses using off-grid solutions, affordability remains a constraint. High and rising fuel prices limit generator use or cut into profits while solar systems come with high initial costs and expensive maintenance. Additionally, the destruction of energy equipment during flooding has further constrained recovery, with many businesses unable to afford replacements and instead rely on borrowed equipment to continue operating. At present, businesses are unable to access financial support to invest in new energy solutions.

These issues are compounded by disrupted supply chains, mainly caused by insecurity, which limits the potential to replace or improve equipment, drives up prices, and delays recovery. Access to alternative equipment – such as solar

power to replace generators, or new appliances to improve operations – is therefore limited, despite interest from local entrepreneurs. Electric cooking appliances, for example, were raised by respondents as a potential alternative for cooking businesses using charcoal, whilst others shared a desire to transition to solar power if it were an affordable and available option.

OPPORTUNITIES

The limited reach and reliability of the national grid continue to constrain energy access for businesses. Government-led initiatives focusing on grid expansion, densification, and connectivity are pivotal to improve access, especially for areas without connections [129]. Where grid expansion is not viable, mini-grids can offer an alternative and provide sufficient electricity for small businesses, such as shops, as well as energy-intensive applications, such as machinery. PUE could also provide anchor loads for mini-grids to make them more financially viable, and potentially enable cross-subsidisation to make household tariffs more affordable. For smaller applications, standalone solar systems could provide electricity to individual businesses.

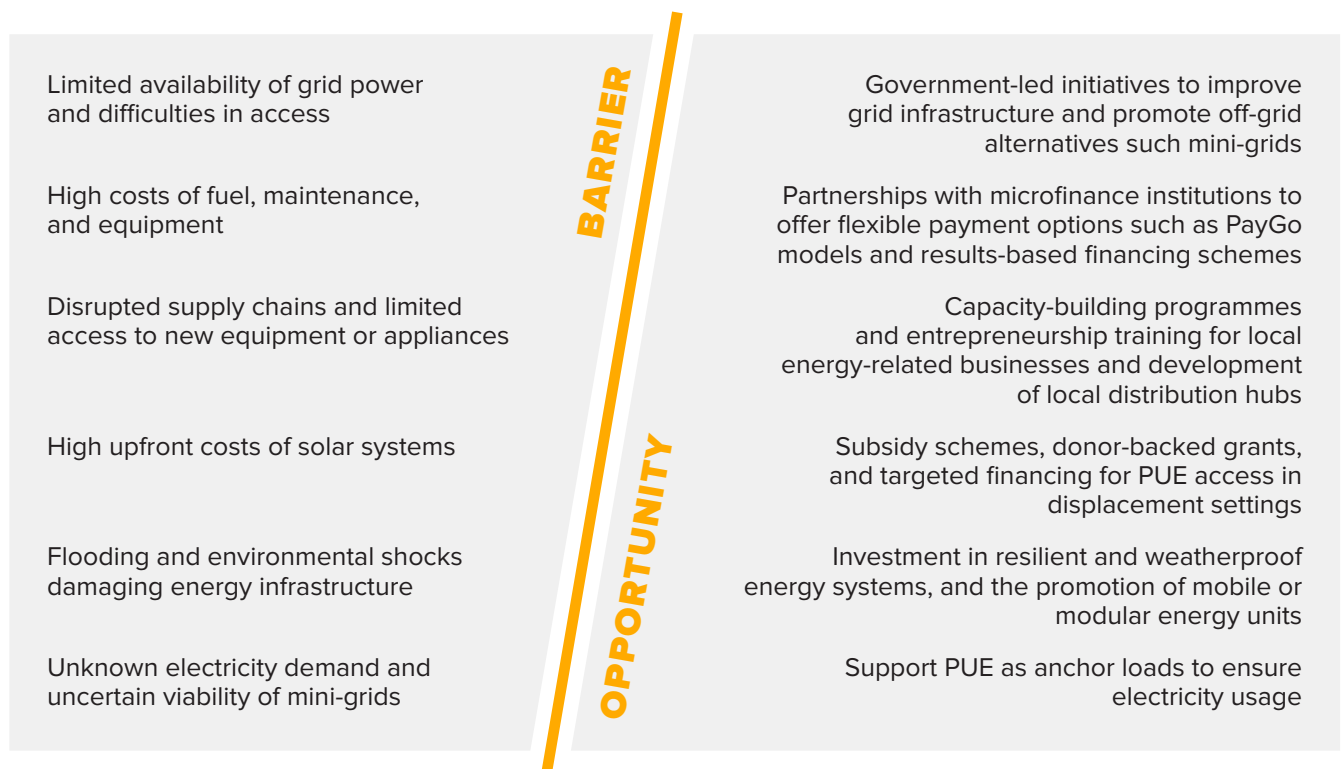
The high costs associated with electricity provision – both in terms of upfront investment for purchasing equipment and appliances, and operating costs for fuel and maintenance – >>

Some businesses borrowed generators to maintain their operations, but this was not sustainable in the long term.

Barriers to energy for livelihoods and productive uses

represent a major barrier to adoption. Businesses with limited financial resources could significantly benefit from credit and spreading payments across longer time periods to avoid the need for a large (and potentially unattainable) investment in equipment at the point of purchase. Subsidies and partnerships with microfinance institutions could facilitate financing options for PUE appliances and energy investments to make them more attainable for businesses.

As with other areas of energy access, disrupted supply chains limit access to energy technologies and increase prices in displacement-affected areas. Investing in capacity-building programmes could help address this by training technicians to install and maintain energy systems, thereby increasing reliability, reducing maintenance delays, and decreasing the need to replace equipment. Targeted entrepreneurship training, especially for women and youth, could foster local business development, employment, and service provision. ●



Energy access for community facilities

The energy needs for community facilities in displacement settings are substantial and diverse [130, 131]. Schools require electricity for lighting classrooms (especially for evening classes), powering computers, and ensuring a safe and conducive learning environment for students. Health facilities need electricity for lighting, powering medical equipment, refrigerating vaccines and medicines, and maintaining a clean and hygienic environment. Community centres, places of worship, and public spaces require electricity for lighting that supports safety and social cohesion.

The IOM DTM MSLA assessed lighting sources across communal areas, and WASH facilities, shown in Table 10. In all zones electric bulbs and kerosene lanterns were most commonly used but this varied significantly across camp and host settings, and between different locations. In the North West and North Central, camp settings in Kaduna were entirely reliant on electric bulbs, whereas those in Benue and Zamfara mainly used kerosene lanterns; in host settings, Kano, Katsina, Nasawara and Sokoto predominantly used electric bulbs, while Benue host locations used lanterns, and others used a mix. In the North East the breakdown of lighting sources again varied by setting and location: sites in

Bauchi and Taraba relied heavily on lanterns, but others presented a mix of different sources.

Several programmes aim to improve sustainable electricity access for health facilities. The Nigeria Solar for Health Programme, launched by the European Union, aims to provide uninterrupted solar power to 45 healthcare facilities across five states between 2024 and 2027. In February 2025, the EU also announced a \$40 million investment in Nigeria's energy sector, focusing on hydropower and solar initiatives targeted at healthcare facilities and rural electrification efforts.

REA has deployed 100 containerised solar hybrid systems, each with a capacity of 50 kW, to health-care centres nationwide. In April 2025, REA initiated the next phase of its project to deliver solar hybrid systems to an additional 400 PHCs. However, with the Federal Ministry of Health reporting that Nigeria hosts over 40,000 hospitals and clinics in 2021, with 10,900 being private facilities and 29,468 public facilities, substantial investment is required to bring solar power to health centres around the country [132].



TABLE 10

Sources of lighting used in communal areas and WASH facilities as reported by the IOM DTM MSLA.

LOCATION	ELECTRIC BULBS	KEROSENE LANTERNS	SOLAR LAMPS	LIQUID FUEL	CANDLES	NO LIGHTING
NORTH WEST AND NORTH CENTRAL	42%	32%	21%	4%	1%	-
NORTH EAST	32%	36%	20%	6%	1%	9%

Access to energy for community facilities in Maiduguri

The absence of permanent infrastructure, such as schools and hospitals, was a key issue in all locations assessed during the READS primary research. Existing facilities have limited or unreliable electricity: those with grid connections (in Fori, Gwenge, Dala Lawanti, and Maiduguri) lost power when the flooding damaged electricity lines whilst those without (in Bakasi and Doro Camps) rely on limited off-grid solutions.

The slow recovery of national grid infrastructure post-flooding and technical issues have left many institutions in Fori, Gwenge, and Dala Lawanti struggling to restore normal operations. Temporary solutions such as solar-powered radios for education and mobile health centres have been deployed but offer insufficient capacity for providing quality services; solar systems, while beneficial, were often inadequate due to limited capacity, and generators were costly to maintain due to fuel shortages. Across Bakasi Camp, Doro Camp, Fori, Gwenge, and Dala Lawanti, these issues have restricted the expansion of essential services like healthcare, education, and vocational training.

Poor lighting in communal areas, pathways, and homes has heightened safety risks across all locations. This has had a particularly strong impact on vulnerable groups such as women, children, the elderly, and persons with disabilities. The lack of reliable lighting has disrupted daily activities, limited nighttime mobility, and exacerbated feelings of insecurity as unlit areas became hotspots for theft, harassment, and accidents.

“We mainly use solar lamps and torchlights. However, these are not always effective, and we face difficulties in charging them due to the limited availability of charging points in the camp. Occasionally, I have to choose between charging my phone or lighting the space.”

– Female head of household, Bakasi Camp

“During the flood, we had no light at all. It was very dark, and we couldn’t go outside to fetch water or move around after sunset. It was very unsafe for us and especially for the children.”

– Woman, Fori Host Community >>

Energy access amongst health centres depended on the type of facility.

Access to energy for community facilities in Maiduguri

IDPs and host community members living in camps

In Bakasi and Doro Camps, social institutions often relied on small-scale energy solutions such as solar-powered radios and solar panels in mobile health centres. These enabled the provision of essential services for education and health-care but were intrinsically restricted by their limited capacities.

“We use solar radios to teach; it’s not ideal, but it ensures children can continue learning even in this situation.”

– Teacher in Bakasi Camp

“The safe spaces are powered by solar panels, which allow us to run activities during the day, but the lack of stable electricity limits what we can do.”

– Camp facilitator in Doro Camp

Even before the flooding, these solutions faced issues. Solar systems were less effective during prolonged cloudy periods and fuel shortages for generators resulted in a lack of power. Despite these problems, these temporary solutions provide limited but critical support to the availability of essential services.

“The solar power has been helpful, but the generator is essential during cloudy days when the solar doesn’t provide enough energy.”

– Health facility caregiver in Bakasi Camp

“We often struggle to keep the generators running because fuel is expensive and not always available.”

– Community member in Doro Camp

IDPs and host community members living in flood-affected areas

In Fori and Gwenge, disparities in resource allocation were evident. Non-ward-level health centres lacked solar systems and depended on ward-level centres for vaccine storage, creating inequities in service delivery. Disruptions in education were also a major concern, as schools dependent on the national grid struggled to conduct evening classes and maintain operations after the flood.

“We had to temporarily transport vaccines to the ward-level centre because our grid was down.”

– Health worker in Gwenge

“The solar power allowed us to keep the vaccines safe and continue delivery services while we awaited repairs to the grid.”

– Health worker in Fori

“Without reliable power, we are limited in how we can conduct classes, especially when the grid goes down.”

– Teacher in Fori >>

Access to energy for community facilities in Maiduguri

IDPs and host community members living in areas indirectly affected by flooding

In Dala Lawanti, prolonged electricity outages due to transformer repairs (both before and after flooding) severely impacted non-ward-level health centres. In contrast, ward-level health centres with solar power and backup generators were better equipped to continue services. Furthermore, staff members in health centres highlighted how the lack of cooking facilities, which are available in facilities elsewhere, limits the nutritional support they are able to provide to community members.

“We’ve been without electricity for months, and it has severely affected our ability to provide night-time services.”

– Health worker in Dala Lawanti

“We don’t have dedicated kitchens for cooking; it is managed elsewhere. If we had proper facilities, we could provide better nutritional support to the community.”

– Health worker in Dala Lawanti

“We are still waiting for repairs to the grid, but at least the solar-powered centres were able to continue with services in the meantime.”

– Health worker in Dala Lawanti

In schools in Dala Lawanti, limited access to electricity was a challenge and solar systems powered only staff rooms. In Maiduguri schools had no access to electricity at all which made evening classes nearly impossible.

“We have to manage with no electricity at all. It’s a struggle to maintain operations.”

– School staff member in Maiduguri

“We don’t have power for the classrooms, and it affects our ability to teach after hours.”

– Teacher in Dala Lawanti ●

Providing improved options for institutional-scale cooking could improve access to quality nutrition as well as reduce costs.

Barriers to energy for community facilities

Energy access amongst community facilities varies significantly depending on their type and location: ward-level health centres generally had access to the national grid, for example, whilst smaller facilities did not. Schools and hospitals with access to the national grid are generally able to offer more or better services to their users, but this is reliant on the network providing consistent and reliable power. Damage caused by flooding, meanwhile, destroyed critical grid infrastructure which left facilities disconnected. Whilst some have access to backup electricity supplies, the high price of fuel makes them a costly alternative. The large investment required to extend and maintain the network remains a significant barrier to community facilities having consistent access to grid electricity.

Some facilities without grid connections had access to solar solutions but these presented other issues. Respondents shared how the limited capacity of solar systems meant that power was limited during cloudy periods and affected their ability to provide services after dark (for example lighting for evening classes). Small-scale solar alternatives provided a valuable option to support their work, such as solar radios for teaching in schools, but were not sufficient as a long-term solution because the low capacities limit the services that facilities can provide.

Energy for cooking in community facilities also faced barriers. Some respondents in health centres noted that the inability to provide on-site cooking limited the potential for nutrition and feeding programmes. Offering more sustainable options for food preparation could therefore contribute to better health outcomes.

Finally, many respondents raised concerns about how the lack of lighting in public areas made them feel unsafe, at risk of theft or harassment, or vulnerable to attacks and accidents. Others, especially those running businesses, shared how it affected people's willingness to move around their local area at night to access shops and marketplaces. In many areas, the provision of community-wide public lighting will not be fulfilled without a central body to organise it and sufficient funds to install and maintain it in the long term.

OPPORTUNITIES Expanding the reach and availability of the national grid would help to provide more consistent access to electricity for community facilities across displacement-affected areas. This would be particularly impactful for smaller or more local facilities which currently lack grid access. It would also allow them to provide new services, such as vaccinations supported by reliable power for refrigeration. Such initiatives to improve the grid would require coordination from the government and significant investment in infrastructure improvements.

For facilities with limited or no access to grid electricity, off-grid systems – either as backup or main source of power – could support key community services. Larger-scale standalone solar systems with sufficient capacity to power core operations could greatly improve the reliability of electricity access and, with it, the quality of services that community members receive. These systems would be expensive, however, and so would likely require upfront investment from government bodies or donors, as well as funds for ongoing operations and maintenance (O&M). Partnering with the private sector through multi-year contracts, such as power-purchase or servicing >>

Barriers to energy for community facilities

agreements, could enable better long-term operation of the electricity systems.

Providing improved options for institutional-scale cooking could improve access to quality nutrition for users as well as reduce costs. Where available, cooking in community facilities is reliant on biomass, and so improved cookstoves or electric stoves (if the electricity is sufficiently reliable) could present an opportunity to decrease fire-wood consumption. This would require detailed assessment on the needs of each facility, the compatibility of alternative cooking methods, and long-term partnerships and capacity building with local staff. These could be supported by local NGOs and humanitarian agencies whose remits aligned with the facilities' work, such as UNICEF for schools. Pilot schemes could be rolled out across selected facilities and, based on the potential, refined and scaled up further across displacement settings.

Improving lighting in community spaces could improve the perception of safety, decrease the risk of theft or accidents, and increase footfall for local businesses. Standalone solar-powered streetlights could provide an option for public lighting, as could lights connected to the national grid or a local mini-grid powered by solar or diesel. A large initial investment would be necessary to purchase and install the lights, and any work should be done in consultation with the local community. This can help to identify where improved lighting is most in need and increase community buy-in, which could be further supported by forming a local committee to oversee the maintenance and protection of the streetlights. Additionally, local electricity networks which provide lighting could also be used to power community phone charging points to enhance connectivity and help people access information and entertainment, which were key priorities for many respondents. ●

Access to the national grid varies between facilities and can be unreliable

Solar solutions have limited capacities which affects the services that can be provided

Little provision of energy for institutional cooking

Lack of funding and coordination for public lighting

BARRIER
OPPORTUNITY

Government-led initiatives to improve grid infrastructure

Improved off-grid alternatives such as standalone solar systems with multi-year contracts with the private sector

Pilot and scale clean cooking options

Work with communities to install public street lighting and charging points

Energy access for operational purposes

Humanitarian organisations have substantial energy needs to maintain their operations and support displaced populations. They require electricity for their offices, warehouses, and distribution centres, as well as for powering communication equipment, water pumps, and other essential infrastructure. Reliable energy access enables humanitarian organisations to effectively deliver aid and services to those in need.

One prominent use of energy in displacement settings is for pumping water. The IOM DTM MLSA found that, in the North West and North Central zones, around 70% of boreholes still relied on manual hand pumping across both camp and host settings. Only a small number used grid electricity (19%), solar power (7%) or liquid fuel (4%) to pump water. In the North East zone, meanwhile, boreholes in host settings were primarily manual (54% of locations) or powered by the grid (21%), solar (14%) or liquid fuel (9%). In camp settings, however, solar was most common (50%) followed by manual (26%), liquid fuel (13%) and grid power (7%).

Water pumping has been the focus of development initiatives in conflict-affected areas. A public-private partnership between FAO, Eni, and the Nigerian National Petroleum Corporation, for example, implemented 17 solar water pumping stations in Borno, Adamawa, and Yobe between 2018 and 2020 [133]. These are estimated to provide clean water, sanitation, and irrigation for around 67,000 displaced people and host community members.

Humanitarian agencies are also transitioning to solar power to reduce the costs and greenhouse gas emissions associated with providing essential services. In 2025, IOM announced that it had completed the solarisation of all nine UN humanitarian hubs in Borno State, Northeast Nigeria [134]. The project, which began in 2024 and was funded by the UK's Foreign, Commonwealth and Development Office, involved installing 2,000 solar panels with a total capacity of 1,250 kWp across hubs in Maiduguri, Bama, Banki, Damasak, Dikwa, Gwoza, Monguno, and Ngala. This is the largest solar initiative in Nigeria's humanitarian sector to date. Previously reliant on diesel generators that accounted for about 40% of operational costs, the hubs now use hybrid solar power supply systems, reducing fuel dependency, cutting carbon emissions, and improving energy security. This shift not only supports climate action but also enhances the delivery of life-saving services to over 1.3 million people in hard-to-reach areas. The hubs provide accommodation, internet access, office space, and training facilities for thousands of aid workers, boosting operational efficiency.

By improving energy access in displacement settings, community facilities and humanitarian operations can enhance their effectiveness, improve service delivery, and contribute to the overall well-being and resilience of displaced populations. >>

Barriers to energy for operational purposes

Inadequate infrastructure remains a major obstacle for humanitarian operations as the national grid is outdated, with insufficient generation capacity and weak transmission and distribution networks. Frequent power outages and unreliable supply force many organisations to rely on costly and polluting alternatives like diesel generators [135].

Financial constraints and investment gaps also limit the expansion and modernisation of energy supply. Resource-constrained humanitarian organisations typically struggle to allocate sufficient funding to energy projects while private sector participation is hampered by perceived risks, complex operating environments, and bureaucratic hurdles. High capital costs and limited access to affordable financing further restrict investments in sustainable energy.

Technical and skills limitations also hinder the humanitarian sector's ability to develop and operate sustainable energy systems. Organisations typically lack the internal capacity to design, install, and maintain relatively novel technologies, such as solar and battery systems, compared to more familiar diesel generators. As a result, organisations must rely on external expertise, especially from the private sector, which can be relatively costly or harder to regularly access.

OPPORTUNITIES The current reliance on the inconsistent national grid and costly diesel generators presents an opportunity for renewable energy. Solar and battery storage systems can be designed to supply consistent power, especially for energy demands that occur (or can be shifted to) during daylight hours, such as for water pumping or powering humani-

tarian offices. Once installed, the O&M costs for renewable systems are significantly lower than the recurring payments required for grid electricity or diesel fuel.

Taking advantage of these cost savings is reliant on first overcoming high upfront investment costs. Renewable technologies are expensive, so either grant funding is necessary to cover the initial outlay or long-term financing agreements are required to spread costs over several years. This could be supported through long-term partnerships and financing agreements between humanitarian organisations, many of which are limited by one-year budget cycles, and the private sector which can have greater and more flexible access to capital. These could be through power purchase agreements for example, under which organisations pay a monthly fee or tariff, or other financial mechanisms. These could also cover important issues and costs beyond the initial installation of the system, for example battery replacement and maintenance.

Private sector expertise can also support improving the capacity of both humanitarian organisations and local partners to operate sustainable energy systems. Providing local and international staff with training to better understand, implement, and maintain renewable energy systems can catalyse the increased uptake of sustainable technologies and improve system performance in the long-term. Sharing this expertise, especially with those in the field in complex or high-risk environments, can enable routine maintenance to be managed in-house and allow the private sector to focus on more complex or challenging issues when required. ●

Inadequate infrastructure, inconsistent supply from the national grid, and reliance on diesel generators

Financial constraints within humanitarian organisations, high upfront costs of renewable energy systems, and limited private sector engagement

Limited technical capacity within humanitarian organisations to design, install and maintain renewable energy systems

BARRIER

OPPORTUNITY

Implement renewable energy systems to decrease reliance on the grid and diesel generators

Establish partnerships between humanitarian organisations and companies to facilitate long-term financing, private sector investment, and service agreements

Train local and international stakeholders with the know-how to integrate renewable solutions into daily operations

05

Stakeholders and energy projects



Overview of stakeholders in Nigeria

Sustainable energy in displacement settings in Nigeria is delivered through a wide variety of stakeholders, each with their own mandates, projects, and objectives. Some organisations operate across the country or internationally, whilst others focus on issues in specific displacement settings.

The stakeholders working in Nigeria can be classified into broad categories:

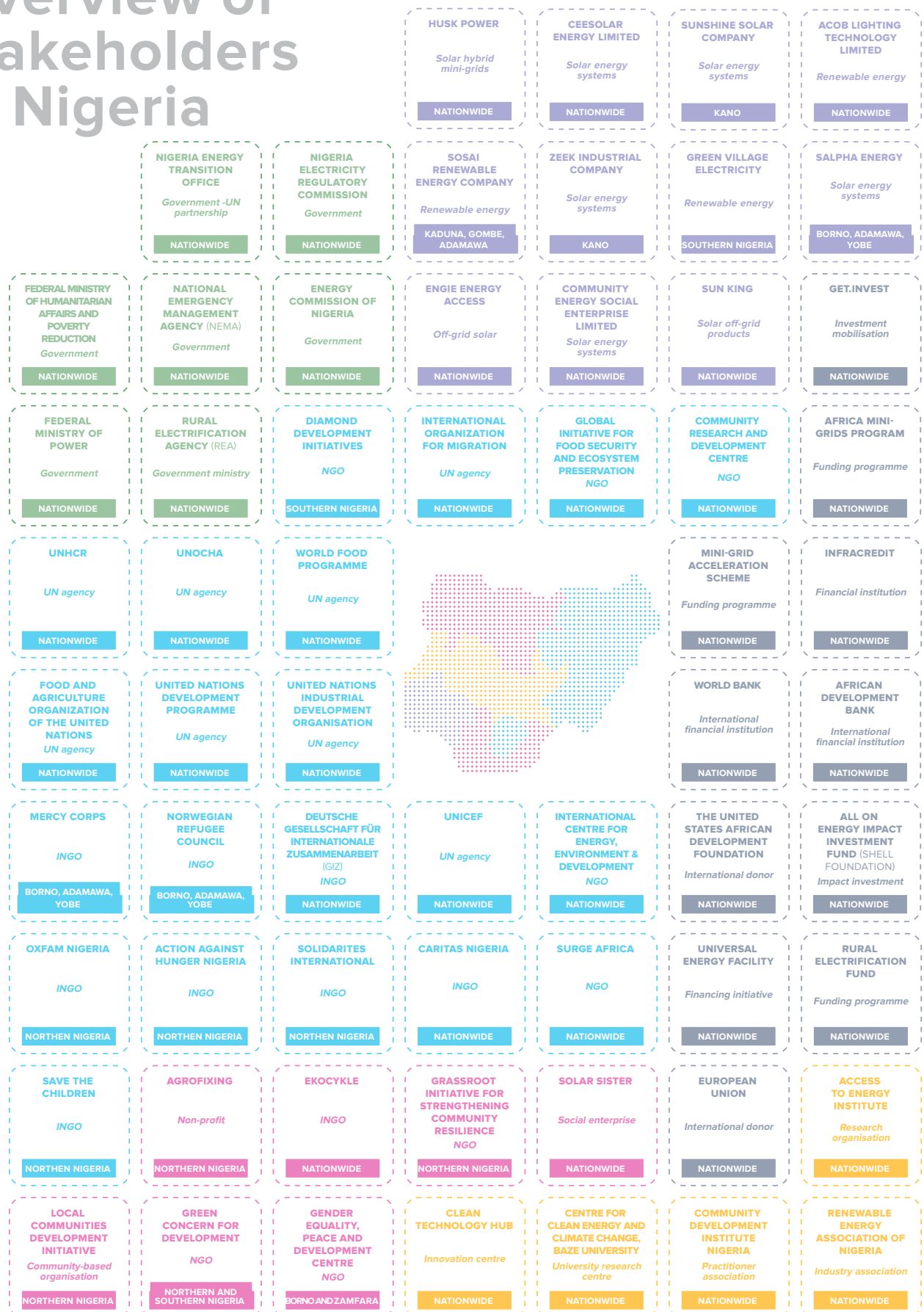
- ◆ **Government ministries** with mandates and responsibilities defined by the Government of Nigeria.
- ◆ **Humanitarian and development organisations** which typically address specific issues including UN agencies operating across the world, international NGOs with projects in Nigeria, and local NGOs working across the country or in certain areas.
- ◆ **Community-focused organisations** which are directed and managed by members of the displaced or host communities or primarily promote local communities and issues.

- ◆ **Private sector** companies which offer energy products or services on a commercial basis.
- ◆ **Finance institutions** which offer access to banking and other financial services to community members and organisations.
- ◆ **Other organisations** with a focus on issues that are related to energy in displacement settings.

This section provides a short summary of the most relevant organisations working in displacement settings in Nigeria, their work, and relevant partnerships. The humanitarian response stretches across many regions of the country, as do the organisations working as part of it, but most of the existing literature and projects focus on work in Northern Nigeria. Similarly, the READS workshop was hosted in this area and so, aside from those operating nationally, this section predominantly focuses on stakeholders operating in this region. The directory of stakeholders included in this section intends to be extensive but not exhaustive. ●

Many different types of stakeholders work together as part of the humanitarian response in Nigeria.

Overview of stakeholders in Nigeria



Stakeholder directory

GOVERNMENT

FEDERAL MINISTRY OF HUMANITARIAN AFFAIRS AND POVERTY REDUCTION

Government

The Federal Ministry of Humanitarian Affairs and Poverty Reduction develops policies to coordinate national and international humanitarian interventions, disaster preparedness and mitigation, and social inclusion and protection programmes. It collaborates with other government ministries, such as NEMA, and with UN organisations such as IOM, UNHCR, UNICEF, and UNOCHA.

NATIONWIDE

NATIONAL EMERGENCY MANAGEMENT AGENCY (NEMA)

Government

National Emergency Management Agency (NEMA) was established in 1999 to coordinate disaster response and relief efforts across Nigeria. It formulates policies for disaster risk reduction, conducts emergency preparedness training, and provides humanitarian aid during crises such as floods, communal clashes, and industrial accidents. The agency also collaborates with international organisations to enhance disaster management strategies.

NATIONWIDE

ENERGY COMMISSION OF NIGERIA (ECN)

Government

Energy Commission of Nigeria (ECN) was established in 1979 to oversee energy planning and policy formulation. It promotes renewable energy, energy efficiency, and diversification of energy resources. The commission collaborates with international agencies to advance sustainable energy solutions and supports research and development in the energy sector.

NATIONWIDE

FEDERAL MINISTRY OF POWER

Government

The Federal Ministry of Power is responsible for policymaking and regulation in Nigeria's electricity sector. It oversees power generation, transmission, and distribution, ensuring stable and affordable electricity nationwide. The ministry implements reforms such as the National Electric Power Policy and the Electricity Act 2023 to improve energy access.

NATIONWIDE

Stakeholder directory

GOVERNMENT

RURAL ELECTRIFICATION AGENCY (REA)

Government

Rural Electrification Agency (REA) is a federal government agency tasked with the electrification of rural and underserved communities. Its mandate is to promote rural electrification, coordinate rural electrification programmes, and administer the Rural Electrification Fund. The Solar Power Naija Initiative, administered by REA, aims to reach 5 million households (approximately 25 million people) by providing new solar-based connections in communities not connected to the grid. It is supported by a NGN 140 billion (\$340 million) intervention facility from the Central Bank of Nigeria, which includes low-interest loans for solar home systems and mini-grid projects. The initiative has also received additional funding support from the Nigeria Sovereign Investment Authority, which provided \$24 million for the assembly and deployment of solar home systems.

NATIONWIDE

NIGERIA ELECTRICITY REGULATORY COMMISSION (NERC)

Government

Nigeria Electricity Regulatory Commission (NERC) is an independent regulatory body which oversees the technical and economic regulation of Nigeria's electricity sector, including licensing operators, setting industry tariffs, and ensuring compliance with service-level agreements. NERC has supported the expansion of renewable energy projects by issuing licences for generation and distribution, and through policy frameworks and environmental standards. Key initiatives include the development of industry codes and standards, market rules, and regulations to foster a stable electricity market.

NATIONWIDE

NIGERIA ENERGY TRANSITION OFFICE (ETO)

Government-UN partnership

The Energy Transition Office (ETO) is a dedicated secretariat established under Nigeria's Presidency to coordinate the implementation of the country's Energy Transition Plan. Launched in 2022, the Energy Transition Plan aims to achieve universal access to clean energy by 2030 and net-zero emissions by 2060, addressing energy poverty and climate change while driving economic growth. ETO focuses on mobilising investments, developing policies, and preparing priority projects across key sectors such as power, cooking, transport, industry, and oil and gas.

NATIONWIDE

Stakeholder directory

HUMANITARIAN AND DEVELOPMENT

UNITED NATIONS HIGH COMMISSIONER FOR REFUGEES (UNHCR)

UN agency

The Office of the United Nations High Commissioner for Refugees (UNHCR) Nigeria aims to provide sustainable solutions for displaced people and focuses on protection, shelter, non-food items, livelihoods support, and cash assistance. It also supports WASH, health, and education as priority sectors. UNHCR works with the Nigerian government to help displaced communities have access to land, develop irrigation systems, tackle food security, and increase rural employment. Additionally, UNHCR supports the establishment of village savings and loan associations, provides climate-adaptive farming training, and assists in infrastructure rehabilitation to foster economic recovery in conflict-affected areas.

NATIONWIDE

UNITED NATIONS OFFICE FOR THE COORDINATION OF HUMANITARIAN AFFAIRS (UNOCHA)

UN agency

The United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA) aims to strengthen the international response to complex emergencies and natural disasters. In Nigeria, UNOCHA works primarily in Borno, Adamawa, and Yobe to coordinate support for nutrition, food security, protection, education, and other humanitarian priorities.

NATIONWIDE

WORLD FOOD PROGRAMME (WFP)

UN agency

The World Food Programme (WFP) supports communities across sectors including food assistance, nutrition, resilience, and capacity strengthening. It also provides logistics and communications support for UN agencies and NGOs, as well as the UN Humanitarian Air Service. WFP has implemented energy projects through its Safe Access to Fuel and Energy (SAFE) initiative, launched in 2016, which provided energy-efficient stoves to IDPs in Borno, Adamawa, and Yobe. In 2020, WFP introduced solar-powered water systems to support agricultural activities and enhance food security in IDP camps.

NATIONWIDE

INTERNATIONAL ORGANIZATION FOR MIGRATION (IOM)

UN agency

International Organization for Migration (IOM) supports IDPs impacted by conflict and climate-related disasters with an emphasis on durable solutions for camp coordination, WASH, early recovery and livelihoods, shelter, and other areas. IOM has solarised nine humanitarian hubs in Borno State, transitioning them from diesel-powered systems to include 1.2 MW of solar energy to provide essential services such as air conditioning, water heating, security systems, and IT infrastructure. IOM also supports reintegration and recovery for displaced populations by enhancing community resilience, sustainable livelihoods, and social cohesion, particularly in northeastern Nigeria.

NATIONWIDE

Stakeholder directory

HUMANITARIAN AND DEVELOPMENT

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS (FAO)

UN agency

Food and Agriculture Organization of the United Nations (FAO) Nigeria works to enhance food security, increase the resiliency of agriculture, support healthy and nutritious diets, and manage natural resources sustainably. Through its "Access to Water" initiative, FAO collaborated with Eni and the Nigerian National Petroleum Corporation to implement solar-powered water schemes between 2018 and 2020 in Borno and Yobe. These schemes include boreholes, solar power systems, treatment facilities, and fetching points, which provide clean water for domestic use and micro-irrigation. The initiative has improved access to safe water and supported agricultural activities, benefiting approximately 67,000 people, including from IDP and host communities.

NATIONWIDE

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

UN agency

United Nations Development Programme (UNDP) Nigeria promotes development through supporting the government and implementing sustainable interventions to improve the lives of people of Nigeria, including for energy. The Derisking Renewable Energy for the Nigerian Power Sector project supports the Nigerian government in developing a National Appropriate Mitigation Action for the power sector, focusing on solar energy, which involves policy and financial de-risking instruments to encourage private sector participation. Its Derisking Sustainable Off-Grid Lighting Solutions project focuses on making off-grid renewable energy technologies, such as solar lanterns and home systems, accessible to rural households, and UNDP was also involved in Training Solar Energy Technicians, a programme which trained 200 youths in designing, installing, and maintaining renewable solar energy systems. UNDP also collaborates with the Energy Commission of Nigeria on projects related to energy efficiency, clean cooking facilities, and human capital development.

NATIONWIDE

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION (UNIDO)

UN agency

United Nations Industrial Development Organisation (UNIDO) promotes sustainable industrial development in Nigeria through investments and technology transfer. UNIDO works to enhance industrial productivity, foster renewable energy adoption, and reduce environmental impacts through technical assistance and capacity-building initiatives. Key projects include the implementation of a \$14.6 million 5 MW biomass power plant to support clean energy access and the development of small hydropower plants in rural communities.

NATIONWIDE

UNITED NATIONS CHILDREN'S FUND (UNICEF)

UN agency

The United Nations Children's Fund (UNICEF) is a global humanitarian organisation dedicated to improving the lives of children and families. In Nigeria, UNICEF works to address children's health, education, and protection, as well as mitigate the impacts of climate change on vulnerable populations. Its Clean Energy for Schools Initiative, launched in northern Nigeria in 2021, focuses on providing solar energy to schools in off-grid areas to enhance learning environments and promote sustainable development.

NATIONWIDE

Stakeholder directory

HUMANITARIAN AND DEVELOPMENT

MERCY CORPS

INGO

Mercy Corps is an international NGO which has worked in Nigeria since 2012 to promote peacebuilding, deliver emergency assistance, and support communities to strengthen economic resilience. The organisation has implemented projects to improve energy access in displacement settings, for example by introducing solar-powered solutions in IDP camps to enhance livelihoods, education, and health outcomes. Additionally, Mercy Corps supports economic recovery through initiatives like village savings and loan associations, climate-adaptive farming training, and infrastructure rehabilitation.

BORNO, ADAMAWA, YOBE

NORWEGIAN REFUGEE COUNCIL (NRC)

INGO

Norwegian Refugee Council (NRC) is a humanitarian organisation that provides assistance to displaced populations worldwide. In Nigeria, NRC focuses on providing essential services such as shelter, food security, WASH, education, and legal assistance to IDPs and host communities. NRC is involved in initiatives that aim to improve access to sustainable energy including the Decarbonising Humanitarian Energy Multi-Partner Trust Fund, in collaboration with UNITAR and UNDP, to scale up sustainable energy solutions for displaced communities and host populations. NRC has also supported the supply of solar-powered irrigation systems in Adamawa State established solar-powered charging shops which enabled IDPs to charge their devices and stay connected.

BORNO, ADAMAWA, YOBE

DEUTSCHE GESELLSCHAFT FÜR INTERNATIONALE ZUSAMMENARBEIT (GIZ)

INGO

In Nigeria, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) supports peace and security, economic development, livelihoods, energy, and other areas. It implements the Nigerian Energy Support Programme (NESP), co-funded by the European Union and the German Government, which focuses on renewable energy, energy efficiency, and capacity building to enhance sustainable energy access, particularly for rural and disadvantaged communities. Projects under NESP include electrification planning, training programmes for renewable energy professionals, the development of solar mini-grids, supporting policy development, and promoting investments in clean energy technologies. Its Project Development Programme (PDP), meanwhile, explores sustainable energy solutions for humanitarian agencies in several counties, including Nigeria. PDP provides technical expertise, collects energy data, and develops business cases for the sustainable energy transition and supports implementation through power purchase agreements and leasing models.

NATIONWIDE

Stakeholder directory

HUMANITARIAN AND DEVELOPMENT

SAVE THE CHILDREN

INGO

Save the Children has worked in Nigeria since 2001 to ensure children survive, learn, and are protected. The organisation has implemented Education in Emergencies project which provides solar-powered systems for schools to enhance access to education for IDPs. Through the Health and Nutrition Resilience project, Save the Children has provided solar-powered systems for health facilities, improving healthcare services in conflict-affected areas like Borno and Yobe.

NORTHERN NIGERIA

OXFAM NIGERIA

INGO

Oxfam Nigeria is committed to addressing poverty and inequality through sustainable development. Its Just Energy Transition project supported the installation of solar-powered water systems and energy-efficient cooking solutions in Borno and Adamawa, enhancing access to clean water and reducing reliance on traditional fuels. Additionally, Oxfam has implemented community-based training programmes to promote the adoption of renewable energy technologies and empower local populations to maintain these systems sustainably.

NORTHERN NIGERIA

ACTION AGAINST HUNGER NIGERIA

INGO

Action Against Hunger is a global humanitarian organisation dedicated to combating hunger and its root causes. In Nigeria, the organisation has implemented solar-powered WASH facilities to provide clean water supply and hygiene for IDPs. Action Against Hunger has also rehabilitated and constructed water points, promoted effective hygiene practices, and provided technical support for sustainable livelihoods in Borno, Yobe, and Sokoto.

NORTHERN NIGERIA

SOLIDARITES INTERNATIONAL

INGO

Solidarités International is a humanitarian organisation dedicated to providing emergency aid and sustainable solutions to vulnerable populations affected by conflict, natural disasters, and displacement. In Nigeria, the organisation focuses on addressing urgent needs such as access to clean water, sanitation, and food security, particularly in the conflict-affected regions of the northeast and northwest. Its WASH programme, launched in 2016, has improved access to safe drinking water and sanitation facilities for displaced communities and host populations.

NORTHERN NIGERIA

Stakeholder directory

HUMANITARIAN AND DEVELOPMENT

CARITAS NIGERIA

INGO

Caritas Nigeria supports health, agriculture, governance, education, emergency response, and other areas. Its SAHaRA (Scaling Up Assistance for Hard-to-reach Areas) project, funded by European Civil Protection and Humanitarian Aid Operations through Caritas Germany, promoted renewable energy adoption, distributed energy-saving cookstoves, and advocated for sustainable energy solutions to support vulnerable communities.

NATIONWIDE

SURGE AFRICA

NGO

Surge Africa is a humanitarian and development organisation based in Kano, Nigeria, which is committed to climate resilience and policy advocacy. It leads initiatives such as the Kano Declaration on Climate Change, launched in 2020, which emphasises actionable solutions to environmental challenges in the region. Surge Africa's projects focus on promoting sustainable practices, fostering community engagement, and supporting climate adaptation efforts to create lasting environmental impact.

NORTHERN NIGERIA

INTERNATIONAL CENTRE FOR ENERGY, ENVIRONMENT AND DEVELOPMENT (ICEED)

NGO

International Centre for Energy, Environment and Development (ICEED) is a non-governmental organisation based in Nigeria that promotes clean and sustainable energy access and climate security for Nigeria's poor. This is done through policy and applied research, policy development support, capacity development, advocacy, network building and project-based grassroots deployment of clean and sustainable energy solutions. The organisation focuses on solar energy technologies, clean cooking solutions, market development, and multi-stakeholder collaboration to improve energy security for unserved and underserved communities.

NATIONWIDE

COMMUNITY RESEARCH AND DEVELOPMENT CENTRE (CREDC)

NGO

The Community Research and Development Centre (CREDC) is an NGO that focuses on clean energy and environmental protection and has implemented several solar projects across Nigeria. In 2023, it launched a 20 kW solar mini-grid project in Ijaye, Oyo State that provides sustainable energy to around 100 houses. It had previously installed solar charging stations and conducted capacity building activities in Uniari, Edo State, supported by the Swiss Embassy.

NATIONWIDE

Stakeholder directory

HUMANITARIAN AND DEVELOPMENT

GLOBAL INITIATIVE FOR FOOD SECURITY AND ECOSYSTEM PRESERVATION (GIFSEP)

NGO

Global Initiative for Food Security and Ecosystem Preservation (GIFSEP) is a Nigerian organisation dedicated to addressing environmental challenges and promoting sustainable development. It focuses on renewable energy, climate change adaptation, and sustainable agriculture. GIFSEP implements projects such as providing solar energy solutions for IDP camps and training communities in solar power installation and maintenance, particularly in areas like Owukpa, Benue, and IDP camps in Borno. GIFSEP also engages in initiatives which involve planting trees in schools to enhance nutrition and carbon sequestration and supports climate-smart agriculture practices among smallholder farmers in states such as Nasarawa and Adamawa.

NATIONWIDE

DIAMOND DEVELOPMENT INITIATIVES

NGO

Diamond Development Initiatives is a Nigerian non-for-profit organisation which provides technical assistance for the design, planning, and implementation of development projects including for off-grid energy, agriculture, and livelihoods. It facilitated 105 SMEs in Delta and Edo states to gain access to solar energy, through a combined grant of \$100,000 from the U.S. African Development Foundation and All On, with the goal of promoting economic and environmental sustainability. This included 48 women-led businesses and enhanced both productivity and sustainability.

SOUTHERN NIGERIA

Stakeholder directory

COMMUNITY-FOCUSED ORGANISATIONS

SOLAR SISTER <i>Social enterprise</i>	NATIONWIDE
Solar Sister Nigeria is a gender-focused social enterprise working to empower women and improve energy access in underserved communities across Nigeria. Since 2015, the organisation has recruited, trained, and supported over 2,000 women entrepreneurs in 28 states to distribute clean energy products such as solar lamps and clean cookstoves. Solar Sister has enhanced livelihoods by supporting 300 women in Adamawa and Gombe to establish clean energy businesses, promoting sustainable income generation and reducing reliance on firewood.	
AGROFIXING <i>Non-profit</i>	NORTHERN NIGERIA
AgrofixiNG is a non-profit organisation dedicated to empowering women, girls, and smallholder farmers in northern Nigeria. It focuses on skill development, climate-smart agriculture, and sustainable practices to tackle poverty and promote equitable economic growth. The organisation has implemented projects such as waste-to-resource production systems in agriculture and climate-smart technologies, supported by partnerships with entities like Sasakawa Africa Association. Notable initiatives include contributions to the Agro-Climatic Resilience in Semi-Arid Landscapes project, which runs from 2022 to 2028.	
EKOCYKLE <i>NGO</i>	NATIONWIDE
Ekocykle is a community-based organisation committed to promoting a circular economy in Nigeria. It focuses on transforming waste into valuable resources, offering training programmes on sustainable waste management practices. The organisation leads projects like the Waste-to-Wealth Initiative, launched in 2021, which empowers local communities to combat climate change while creating economic opportunities. Ekocykle aims to integrate environmental conservation with community development for long-term sustainability.	
LOCAL COMMUNITIES DEVELOPMENT INITIATIVE <i>Community-based organisation</i>	NORTHERN NIGERIA
Local Communities Development Initiative provides solar-powered irrigation systems for displaced communities. These systems improve agricultural productivity while offering clean energy solutions to enhance food security and livelihoods.	

Stakeholder directory

COMMUNITY-FOCUSED ORGANISATIONS

GREEN CONCERN FOR DEVELOPMENT (GREENCODE)

NGO

Green Concern for Development (GREENCODE) is an NGO which works with low-income and vulnerable people to promote environmental conservation and human rights protection. It implemented the Mangrove Conservation Project which includes constructing fuelwood-efficient cookstoves and promoting forest conservation, and it also supports safe access to fuel and energy for IDPs, particularly in Borno State.

NORTHERN NIGERIA

GENDER EQUALITY, PEACE AND DEVELOPMENT CENTRE (GEPADC)

NGO

Gender Equality, Peace and Development Centre (GEPaDC) is a women-led, non-profit organisation dedicated to promoting gender equality, peace, and sustainable development in Nigeria. It focuses on empowering women and girls, addressing SGBV, and providing support to vulnerable communities. GEPaDC distributed charcoal to flood-affected people in Borno and has trained women on briquette-making techniques to promote sustainable energy use and livelihoods.

BORNO AND ZAMFARA

GRASSROOT INITIATIVE FOR STRENGTHENING COMMUNITY RESILIENCE (GISCOR)

NGO

Grassroot Initiative for Strengthening Community Resilience (GISCOR) is a non-governmental, non-profit, and non-political organisation focused on strengthening community resilience. It has implemented energy-related projects such as solar installation and maintenance in conflict-affected areas, including Damboa, Damasak, and Dikwa. GISCOR is part of the Just Transition to Solar Electric Cooking project which introduced the ECOCA cookstove in Monguno. This initiative, funded by multiple international organisations, promotes clean energy solutions by providing solar-powered cookstoves that eliminate the need for firewood or charcoal.

NORTHERN NIGERIA

Stakeholder directory

PRIVATE SECTOR

GREEN VILLAGE ELECTRICITY (GVE) <i>Renewable energy</i>	SOUTHERN NIGERIA
Green Village Electricity (GVE) is a Nigerian renewable energy development company. GVE received a \$100,000 grant from the United States African Development Foundation, facilitated by Diamond Development Initiatives, to implement an 18 kW solar solution for 140 households in Egbeke, Rivers State; this was expanded to a 100 kW system and now supplies over 250 homes and businesses. GVE has implemented 14 solar mini-grids nationwide, with a total capacity of 2.54 MW, reaching more than 10,000 households and supporting more than 2,000 jobs.	
SALPHA ENERGY <i>Solar energy systems</i>	BORNO, ADAMAWA, YOBE
Salpha Energy is a Nigerian renewable energy company which provides solar energy solutions to underserved communities. Founded in 2017 and based in Cross River state, Salpha manufactures solar home systems that power lights, fridges, fans, TVs, and more. It also offers pay-as-you-go financing to help accessibility for low-income households. Through its Light for All Nigerians initiative, Salpha distributed solar home systems to thousands of households in displacement settings to support education, healthcare, and economic activities. The company also supports gender inclusion by training women in the installation and maintenance of solar systems.	
SOSAI RENEWABLE ENERGY COMPANY <i>Renewable energy</i>	KADUNA, GOMBE, ADAMAWA
SOSAI Renewable Energy Company, based in Kaduna, provides sustainable energy solutions to rural communities. The company offers solar dryers and mini-grids to enhance energy access and support agricultural productivity. Its Community Solar Mini-Grid Initiative, launched in 2019, aims to deliver clean energy to off-grid villages whilst the Solar Dryer Programme assists farmers in preserving produce.	
SUN KING <i>Solar off-grid products</i>	NATIONWIDE
Sun King is an international solar energy company which sells solar lanterns and solar home systems across the world. Sun King sells products directly to consumers and has many outlets throughout Nigeria.	

Stakeholder directory

PRIVATE SECTOR

SUNSHINE SOLAR COMPANY <i>Solar energy systems</i>	KANO
Sunshine Solar Company, based in Kano, provides solar panels and energy solutions for both residential and commercial applications. Its Residential Solar Power Program, launched in 2020, has supported households to adopt clean energy solutions while reducing energy costs.	
ZEEK INDUSTRIAL COMPANY <i>Solar energy systems</i>	KANO
Zeek Industrial Company, based in Kano, focuses on fostering economic growth through projects that enhance manufacturing processes and infrastructure development. Its Industrial Solar Integration project, launched in 2021, supports factories and industries in adopting solar energy systems to improve efficiency and sustainability.	
ACOB LIGHTING TECHNOLOGY LIMITED <i>Renewable energy</i>	NATIONWIDE
ACOB Lighting Technology Limited is a renewable energy company founded in 2016 to provide sustainable electricity to underserved and unserved communities. The organisation specialises in solar mini-grids, solar home systems, and energy-efficient streetlights. ACOB has constructed a mini-grid in Tunga, Nasarawa State, under the Minimum Subsidy Tender funded by the African Development Bank Group which aims to provide reliable energy access and increase living standards.	
CEESOLAR ENERGY LIMITED <i>Solar energy systems</i>	NATIONWIDE
CEESOLAR Energy Limited is a renewable energy company specialising in solar system design, construction, and deployment. The organisation provides solar mini-grid solutions, energy services for commercial and industrial clients, and energy management services such as audits and feasibility studies. CEESOLAR is developing a mini-grid in Yalaki, Adamawa State, under the Africa Mini-Grid Program which is implemented by REA and UNDP. This project aims to power PUE appliances such as cold storage units, rice mills, electric two-wheelers, palm processing units, and solar-powered irrigation pumps, stimulating local economies and enhancing livelihoods in rural communities.	

Stakeholder directory

PRIVATE SECTOR

COMMUNITY ENERGY SOCIAL ENTERPRISE LIMITED (CESEL) <i>Solar energy systems</i>	NATIONWIDE
Community Energy Social Enterprise Limited (CESEL) is a solar energy company which also conducts consultancy and community development projects. The Rural Electrification Agency and CESEL collaborated on a project which aims to enhance agricultural productivity by deploying solar-powered irrigation systems across 200,000 hectares of farmland over four years. This initiative aims to support food security and reduce reliance on fossil fuels.	
HUSK POWER <i>Solar hybrid mini-grids</i>	NATIONWIDE
Husk Power designs, builds, owns, and operates solar hybrid mini-grids. It operates 12 sites across Nigeria with an installed capacity of more than 600 kW and has reached more than 50,000 households. In 2021 it signed an agreement under the Nigeria Electrification Project to electrify seven communities with solar hybrid mini-grids across Nasarawa State and provide around 5,000 households, businesses, and community institutions with electricity.	
ENGIE ENERGY ACCESS <i>Off-grid solar</i>	NATIONWIDE
Engie Energy Access is a provider of PayGo off-grid solar products, such as solar home systems, for domestic and productive uses and operates in nine countries across Sub-Saharan Africa. In Nigeria, Engie Energy Access has a partnership with REA to provide subsidies for their solar products to make them more affordable for homes, businesses, and healthcare facilities across the country.	

Stakeholder directory

FINANCIAL INSTITUTIONS

WORLD BANK

International financial institution

The World Bank is an international finance institution that provides loans and grants to governments to promote international development. In Nigeria, the Distributed Access through Renewable Energy Scale-up (DARES) initiative is a \$750 million project to provide 17.5 million Nigerians with electricity via solar home systems and mini-grids. The project, which began in 2022 and is expected to run until 2027, is funded by the World Bank and Nigerian Government and expects to replace 280,000 petrol/diesel generators and support 237,000 small businesses across the country. Other projects include providing six rural communities in Nasarawa State, Nigeria, with solar mini-grids in collaboration with Husk Power Systems which brought electricity to about 5,000 households and 500 businesses in the Doma and Lafia LGAs.

NATIONWIDE

AFRICAN DEVELOPMENT BANK (AfDB)

International financial institution

The African Development Bank (AfDB) is a multilateral development finance organisation which provides financial support to African governments and private companies. In Nigeria, the AfDB supports large-scale renewable energy projects and infrastructure development including a \$1.1 billion investment to provide electricity to 5 million people by 2026 and the NEP, which targets underserved communities through mini-grid and off-grid solutions. The AfDB's Leveraging Energy Access Finance Framework promotes decentralised renewable energy, supporting private sector investments to accelerate electrification efforts across the country.

NATIONWIDE

INFRA-CREDIT

Financial institution

InfraCredit provides local currency guarantees which can act as a catalyst to attract further investment from long-term investors outside of the domestic market. InfraCredit co-finances renewable energy projects across Nigeria including solar-hybrid mini-grids in states such as Akwa-Ibom, Benue, Edo, and Ondo. These projects aim to connect thousands of households and small businesses to electricity, promoting economic growth and social development.

NATIONWIDE

AFRICA MINI-GRIDS PROGRAM

Funding programme

The Africa Mini-Grids Program is a collaboration between the Rural Electrification Agency, the Global Environment Facility, and the United Nations Development Programme. In Nigeria, the programme focuses on deploying 23 mini-grids across six geopolitical zones to enhance energy access for agricultural development. Launched in 2022, the Africa Mini-Grids Program aims to reach over 70,000 people by providing reliable and renewable energy to boost economic activities, improve living standards, and foster sustainable development in rural areas.

NATIONWIDE

Stakeholder directory

FINANCIAL INSTITUTIONS

GET.INVEST

Investment mobilisation

GET.invest is a European programme that aims to mobilise clean energy investments in developing countries. Supported by the EU and other European governments, in Nigeria GET.invest directs stakeholders to funding opportunities for mini-grids, energy efficiency, productive uses of energy, clean cooking, standalone solar, and other applications. It retains a portfolio of fund managers and opportunities which include a variety of different instrument types such as grants, debt, equity, and guarantees. GET.invest aims to bridge the gap between project developers and financiers by providing connections, market information, and connecting stakeholders.

NATIONWIDE

THE UNITED STATES AFRICAN DEVELOPMENT FOUNDATION (USADF)

International donor

The United States African Development Foundation (USADF) is a US government agency which invests directly in African grassroots social enterprises. USADF supports off-grid energy projects across Nigeria including through a grant for Salpha Energy's project in Akwa Ibom State which provided lighting for over 2,000 homes and businesses.

NATIONWIDE

EUROPEAN UNION (EU)

International donor

The European Union (EU), a supranational political and economic union, has promoted renewable energy in Nigeria through financial support for the Nigeria Solar for Health Programme which aims to provide uninterrupted solar power supply to 45 healthcare facilities across five states in Nigeria. Running from 2024 to 2027, the programme seeks to enhance the country's healthcare system by integrating solar energy solutions into public health facilities. In February 2025, the EU announced a \$40 million investment in Nigeria's energy sector, focusing on hydropower and solar initiatives targeted at healthcare facilities and rural electrification efforts.

NATIONWIDE

UNIVERSAL ENERGY FACILITY (UEF)

Financing initiative

The Universal Energy Facility (UEF) is a multi-donor results-based financing initiative under SEforALL that aims to accelerate clean energy access in underserved areas. In Nigeria, UEF has signed grant agreements with 19 clean energy developers to deploy solar and battery storage systems across the country. These projects, such as the Stand-Alone Solar for Productive Use programme launched in 2023, focus on providing reliable electricity to businesses, institutions, and communities.

NATIONWIDE

Stakeholder directory

FINANCIAL INSTITUTIONS

ALL ON ENERGY IMPACT INVESTMENT FUND (SHELL FOUNDATION)

Impact investment

All On is an independent impact investment company, seeded by Shell, which focuses on accelerating access to off-grid energy solutions in Nigeria particularly in underserved and unserved communities. It supports renewable energy technologies such as solar home systems, mini-grids, and other clean energy innovations to provide energy access. Notable projects include the \$11 million commitment in June 2023 to support 25 mini-grid projects through its Demand Aggregation for Renewable Technologies (DART) programme and partnerships including the All On Hub which was launched in 2019 with a \$3.5 million grant from The Rockefeller Foundation to scale off-grid energy businesses. All On also invests in companies, including Green Village Electricity (GVE), to expand solar home systems and mini-grid solutions across Nigeria, with a focus on the Niger Delta.

NATIONWIDE

RURAL ELECTRIFICATION FUND (REF)

Funding programme

The Rural Electrification Fund (REF), administered by REA, promotes solar mini-grids, energy efficiency, and sustainability for homes, schools, and small businesses in rural areas. The REF has supported the deployment of mini-grids and solar home systems across various states, including Niger, Ogun, and Katsina, by providing subsidies to cover up to 75% of the initial capital costs for mini-grid projects.

NATIONWIDE

MINI-GRID ACCELERATION SCHEME

Funding programme

The Mini-Grid Acceleration Scheme is a programme implemented by REA to expand access to reliable electricity in rural and underserved communities. The scheme was launched in 2019 and aims to provide reliable electricity to at least 21,000 customers, including residential, public, commercial, and productive users, through solar mini-grids. It is supported by EUR 6 million in funding from the European Union and the German Government under the Nigerian Energy Support Programme.

NATIONWIDE

Stakeholder directory

OTHER ORGANISATIONS

ACCESS TO ENERGY INSTITUTE (A2EI) <i>Research organisation</i>	NATIONWIDE
Access to Energy Institute (A2EI) is a German research organisation which investigates solar energy systems and management platforms to develop and distribute affordable solar solutions. A2EI partnered with Nigerian solar distributor Chromevolt and the Health Electrification and Telecommunications Alliance to provide solar generators to 75 Nigerian PHCs. The solar generators were installed in the North Central Regions of the Federal Capital Territory, Kaduna, Nasarawa, and Niger States and are monitored remotely through Prospect, an open-source data platform.	
RENEWABLE ENERGY ASSOCIATION OF NIGERIA (REAN) <i>Industry association</i>	NATIONWIDE
Renewable Energy Association of Nigeria (REAN) is a non-profit industry association which promotes the interests of sustainable energy companies, project developers, and practitioners. REAN was established in 2016 and promotes the growth of the renewable energy industry in Nigeria by engaging with the public and private sectors to support policymaking and investment. It also aims to promote public awareness of renewable energy technologies, promote professionalism and good business practices, and protect consumers.	
COMMUNITY DEVELOPMENT INSTITUTE NIGERIA	NATIONWIDE
Community Development Institute Nigeria is dedicated to advancing grassroots empowerment through research and training programmes. The organisation focuses on capacity building and sustainable practices to improve community development across Nigeria. The Grassroots Capacity Building Programme provides training and resources to local leaders and organisations to enhance their ability to implement impactful community projects.	
CENTRE FOR CLEAN ENERGY AND CLIMATE CHANGE, BAZE UNIVERSITY <i>University research centre</i>	NATIONWIDE
The Centre for Clean Energy and Climate Change at Baze University in Abuja is a research hub for the advancement of renewable energy adoption and tackling climate change. It engages in interdisciplinary studies that integrate education and practical applications to develop innovative solutions to environmental challenges and bridge academic research with real-world impact to foster environmental resilience.	
CLEAN TECHNOLOGY HUB <i>Innovation centre</i>	NATIONWIDE
The Clean Technology Hub, founded in 2016 and based in Abuja, is an energy innovation centre focused on advancing clean energy access and promoting climate action across Africa. The organisation combines research, development, and incubation of clean technologies with advocacy and policy advisory to address energy poverty and environmental challenges.	

The Decarbonising Humanitarian Energy Multi-Partner Trust Fund

The Decarbonising Humanitarian Energy (DHE) Multi-Partner Trust Fund, implemented by UNITAR, UNDP and NORCAP with seed funding from Germany's International Climate Initiative and managed through the German Federal Foreign Office, aims to accelerate the transitions away from diesel generators and towards cost-effective, sustainable energy solutions in humanitarian response. The Fund also supports approaches that use these energy transitions to facilitate energy access projects for communities in humanitarian settings [136].

Nigeria is both the DHE's first pilot country, following a reprioritisation after the 2023 coup in Niger, and one of the READS target countries. Due to the overlap of focus and the complemen-

tary objectives of generating ideas for community-driven energy access projects in displacement settings and supporting development of community-driven energy access projects in humanitarian settings, the DHE and READS programmes jointly convened a stakeholder engagement workshop involving representatives from state and local government entities, UN agencies, local and international NGOs, private sector companies, and displaced and host community representatives from Sokoto, Kaduna, and Katsina states. The workshop aimed to identify critical energy needs related to community facilities, livelihoods, household electricity and clean cooking, support inclusive energy planning, and identify viable project concepts that could help inform the DHE energy access offer. ●



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Mercy Corps: Delivering clean energy in Northern Nigeria

Supporting sustainable energy in displacement contexts

Mercy Corps has integrated energy access into its humanitarian and development work in Nigeria with a focus on displacement-affected areas in the north. Through a combination of direct distribution, partnership with energy companies, and support for women-led enterprises, the organisation is expanding access to clean cooking and electricity for displaced communities.

Under the Addressing Diverse and Acute Primary Threats (ADAPT) to Human Security in Northeastern Nigeria programme, Mercy Corps distributed over 4,000 improved cookstoves and solar lanterns in Borno State. Insecurity and restricted mobility had made fuel and firewood extremely difficult to collect in the local areas so fuel-efficient stoves helped reduce firewood consumption to benefit the IDPs, new arrivals, and returnees involved in the programme. Mercy Corps constructed 650 permanent two-room shelters in partnership with the Borno State Ministry of Reconstruction, Rehabilitation and Resettlement and ICEED which were equipped with solar systems for phone charging, lighting, and small appliances to improve both safety and livelihoods opportunities. The ADAPT programme also constructed or upgraded 40 boreholes to use solar power and pump up to 20,000 litres of water.

Mercy Corps supported the uptake of energy products through women-led enterprises. In partnership with Solar Sister, the Promoting Rural Resilience through Women-Owned Clean Energy Enterprises project helped 300 women set up livelihoods activities selling solar lighting and clean cooking products in underserved communities across Adamawa and Gombe states. By the end of the project in 2024 more than 2,000 people had gained access to solar energy while 800 partici-

pants had participated in sensitisation on women's empowerment and 350 green jobs had been created. Solar Sister, meanwhile, recorded an increase in revenue of more than NGN 8 million (around \$5,100) as a result of this partnership.

The three-year Creating Resilient Economic Empowerment Through Energy Access (CREETEA) project, completed in 2023, saw Mercy Corps partner with PowerStove, a clean cooking company. The project supported the establishment of a production facility with the capacity to manufacture 2,000 PowerStove units and 15 tonnes of biopellets every month. CREETEA also created distribution hubs with branded kiosks in Gombe and Maiduguri. PowerStove reported an increase in sales and the size of its customer base, reaching 7,000 households during the project period.

Currently, Mercy Corps is leading a \$100,000 pilot project to implement two solar mini-grids under community cooperative models. Supported by Energy 4 Impact and in partnership with REA and Afrilabs, the Empowering Rural Growth through Community Electricity Cooperatives project aims to explore and refine governance, tariff, and business models to support sustainable, locally owned electrification. Activities include cooperative governance training, promotion of gender inclusion, PUE capacity building, demand and service territory analysis, and facilitation of access to financing providers for appliances. The initiative is designed to scale to 70 sites and reach an estimated 90,000 people in the future, ultimately expanding to 300 cooperatives nationwide and reaching up to 375,000 people. >>

Mercy Corps: Delivering clean energy in Northern Nigeria

Challenges of working in fragile settings

As one of the largest humanitarian organisations operating in Nigeria, Mercy Corps is acutely aware of how the fragile security situation affects programme implementation. The safety of Mercy Corps staff and community members, both during its activities and as a result of its work, remains paramount and influences how and where projects can be delivered.

Beyond immediate security risks, displacement contexts suffer from additional challenges, including weakened market systems, limited distribution networks, and rapidly changing circumstances.

Much of Mercy Corps' work therefore focuses on using market-based approaches. Whilst free distribution models can be appropriate to provide rapid assistance to displaced populations (such as through the ADAPT programme), strengthening market systems can bring longer-term benefits. In particular, Mercy Corps highlights the importance of building the capacity of women – especially through providing working capital to start small businesses, as demonstrated by the partnership with Solar Sister – as a key enabler for projects and a strong foundation to strengthen local markets.

Supporting local solutions

Mercy Corps works with local companies to support projects on the ground and help overcome these challenges. Although contexts vary significantly within and between states, Mercy Corps has found that local companies which are familiar with the operational complexities of rural and fragile environments have been able to use their experience to adapt to the needs of communities living in displacement settings. Developing strong ties with local government organisations and public agencies, meanwhile, has also provided crucial support during implementation.

The sector-wide reduction in humanitarian funding has had a significant impact on Mercy Corps' activities. The organisation has consolidated

its Nigeria and Liberia offices to strengthen its presence across West and Central Africa and it is deepening its relationship with donor governments to expand its work in Nigeria and build on its expertise on energy access.

With the funding environment expected to remain constrained, Mercy Corps is prioritising diversification of both its portfolios and partnerships, with a strong focus on localisation. In contexts where the situation on the ground might change every week, having reliable and adaptable local partners is essential to ensure vital support continues to reach those who need it most. ●

Mercy Corps works with experienced local partners to help build energy markets

IOM: Solarisation of humanitarian operations in Borno State

Supporting critical operations

Reliable power is critical for IOM's humanitarian hubs which offer secure accommodation, office space, internet access, and other facilities for staff from more than 175 humanitarian organisations working in Borno State. Previously, the seven deep-field sites and the main hub in Maiduguri were powered by diesel generators that were estimated to use more than 430,000 litres of fuel per year and, after fuel prices tripled, consumed more than 40% of the hubs' operational budget. They also produced more than 1,800 tonnes of greenhouse gas emissions, 4.3% of IOM's global total, and the supply of diesel in deep-field locations was vulnerable to security challenges and extreme weather.

Efforts to solarise the IOM hubs began in 2023 and were supported by a \$10 million investment from FCDO. First, IOM identified the eight sites to transition to renewable energy, shown in Table 1. IOM's Red Roof Hub in Maiduguri was connected to the national grid and used diesel generators during power outage, whilst the other locations in the deep field relied on diesel generators for major power needs and small solar systems for internet access. Three sites also had larger solar systems but these were not operational.

Implementing sustainable energy systems

IOM undertook energy audits to understand the hubs' present energy usage and opportunities to reduce electricity consumption. IOM staff conducted site visits and assessed loads across the sites for around one month before identifying that the air conditioning systems were responsible for around 80% of power consumption. These were replaced with efficient Energy Star-rated units, alongside other energy efficiency measures. The solar and battery systems were then designed to meet the new lower energy demands of the sites.

Early project discussions focused on the type of implementation model to use. A procurement model had been used for the three existing solar systems but this led to problems: without an ongoing maintenance contract with the equipment suppliers and no technical staff to troubleshoot issues on the ground, the three systems became nonoperational. During the project, however, two of the three systems were rehabilitated following software updates to resolve the compatibility issues between the inverters and batteries.

As a result, IOM conducted a procurement process and awarded a three-year contract to a Nigerian company. Three full-time staff were employed to oversee the project and supervise the installation across the eight sites. Under this model, the company receives payment only if the systems are operational and so it remains incentivised to conduct consistent maintenance.

In total, 1.25 MW of solar and 6.1 MWh of battery capacity were installed, with the largest system at the Red Roof hub in Maiduguri. Generator management and efficient air conditioning units were installed across all sites, with additional efficient water heating in Maiduguri, and the systems provide 100% power availability for all critical loads. The systems also feature intelligent energy management with continuous remote monitoring to identify faults and troubleshoot issues. The solar, battery, energy efficiency measures are expected to decrease diesel usage by around 40%, saving an estimated \$500,000 and 250 tonnes of greenhouse gas emissions per year. >>

IOM: Solarisation of humanitarian operations in Borno State

Challenges and reflections

The most important decision for the project was determining the most appropriate implementation model. Whilst humanitarian agencies and donors alike have typically preferred direct procurement models (including for the three earlier solar systems), power-purchase and leasing agreements are much more common in commercial settings to ensure long-term supply and maintenance. Contracting the solar company to conduct maintenance has helped to ensure that the sites continue to receive renewable energy. Under any model, energy efficiency measures should be implemented first to lower demand and reduce the size of the system required to meet the site's needs.

The operational environment in Borno State caused issues with implementation. Security concerns mean that IOM staff are unable to travel by road to remote sites and instead must use helicopters, which are expensive and not always available. The supplier team, meanwhile, needed to travel by road in convoys which required detailed planning. In addition, the rain and flooding in Borno State meant that the supplier could not reach the sites for several weeks and further complicated implementation.

The project highlighted the importance of local expertise. Having qualified and knowledgeable staff on the ground meant that they could oversee

the project's implementation as it happened and potentially avoid issues with third-party installers, which might cut corners. They were also able to support the transition from diesel generators (a well-known technology with strong supply chains and local expertise to support it) to renewable energy systems, which are often mistakenly assumed to work perfectly without the need for attention and maintenance. International consultants, meanwhile, could instead be reserved for short-term or globally focused roles. It will take time to build local capacity more widely across the humanitarian sector and so should be supported wherever possible.

Scaling up sustainable energy solutions remains a focus for humanitarian organisations but the sector is still learning how to implement projects within their operational constraints. IOM's solarisation efforts found that implementing energy efficiency measures and investing in local capacity can help to design effective projects and keep them on track. FCDO's funding was critical to implementing the project but moving to a more forward-looking model, through supporting staff on the ground and contracting a local company for maintenance, have helped to support the long-term sustainability of the systems which support humanitarian workers around Borno State. ●

TABLE 11

The IOM humanitarian hubs in Borno State, the capacities of their diesel generators, the estimated fuel consumption and costs before solarisation, and the capacities of the solar and battery storage implemented as part of the project.

SITE	GENERATOR (KVA)	FUEL USE (LITRES PER YEAR)	FUEL COST (\$ PER YEAR)	SOLAR (KWP)	BATTERY (KWH)
MAIDUGURI	1800	404,000	938,000	500	1800
BAMA	145	114,629	266,000	100	500
BANKI	300	159,257	370,000	150	1000
MONGUNO	145	118,056	274,000	100	600
NGALA	145	114,629	266,000	100	550
DIKWA	145	100,270	233,000	100	500
GWOZA	145	109,856	255,000	100	650
DAMASAK	145	100,270	233,000	100	500

06

Potential high-impact projects



Overview of the design process

Effective long-term solutions cannot be implemented in isolation. Close coordination among stakeholders and fostering learning between different organisations is essential to use resources as efficiently as possible and to scale up existing work. Designing potential energy interventions together – bringing together the experience and expertise of many different stakeholders – can help to identify the most impactful areas of programming as well as the potential barriers and enablers that will affect its implementation.

In support of this, the READS workshops featured a session in which groups of diverse participants came together to learn about each other's work and co-design potential high-impact projects, building on the experience gained from existing interventions. Each group focused on a different energy issue with the goal of outlining a viable project opportunity that would directly address some of the greatest issues currently faced in displacement contexts in Nigeria.

By involving a range of stakeholders in the collaborative co-design process, and crucially refugee and host community representatives who are integral to any project design, the project concepts aim to address the barriers and gaps that the participants identified as the most pressing. They draw on approaches that have already been piloted and show potential to be either replicated in different settlements or scaled up.

Following these initial designs, and augmented with elements of others that were identified as viable project opportunities, these ideas have been further developed into the project concepts presented here. These summaries provide an outline of the potential project including:

- ◆ The proposed location and scale,
- ◆ The project activities and potential implementation partners,
- ◆ Enablers and barriers which could affect its realisation,
- ◆ How these projects link to previous work through replication and scaling, and
- ◆ Ideas for community engagement, gender mainstreaming, and inclusivity.

The estimated costs of the projects are included as a guide and will vary significantly depending on their scale and complexity. The project concepts are designed to be a starting point to further develop interventions, scope out potential partnerships, attract investment, and ultimately increase access to sustainable energy. ●

The READS workshops featured a co-design session for stakeholders to develop viable, high-impact projects to increase access to sustainable energy for their specific area.

Important considerations for project design

There are considerable differences across regions of Nigeria and between displaced and host communities. Variations in the amount of existing infrastructure, levels of economic activity, distances to towns, culture, and local needs and priorities will determine what kinds of interventions would have the greatest effect in increasing access to sustainable energy in each location. In all interventions, efforts must be made to address both the needs of host communities and displaced people to not disadvantage one group and to promote social cohesion and peaceful coexistence.

A one-size-fits-all approach will not be able to account for these nuances. Before beginning any of these projects, further research and detailed assessments at the local level will be necessary to better understand the specific and unique situations on the ground. Such assessments should also be independent, objective, and afforded appropriate time and resources to best develop long-term implementation plans. These should be done with

stakeholders that best understand their energy needs and are therefore best positioned to shape the proposed interventions.

Many of the project concepts aim to use market-systems to better integrate the private sector in the provision of sustainable energy in displacement contexts. For this to work in the long term, national or international companies should set up operations with supply chains to outlets in displacement-affected areas – and be adequately supported in doing so, where required – to establish a permanent presence which endures after external funding ends. Local companies, meanwhile, should be supported to conform with national and international product standards to ensure quality for customers. All companies and organisations which implement sustainable energy technologies should facilitate ongoing and independent evaluations to assess their benefits to the user in the field, not just under laboratory or ideal conditions, to monitor their continued usage and long-term benefits. ●

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Community involvement

Displaced and host communities should be involved from the outset when designing sustainable energy interventions as they best understand their own energy needs and priorities. Community members are particularly well-placed project partners owing to their networks and knowledge of the context, and so should have important roles to play in the design and implementation of interventions. Some potential opportunities to involve the community include:

- ✔ Working with community groups and a range of leading figures to gather input on design of intervention plans, and to advocate for sustainable solutions with other stakeholders and within their communities,
- ✔ Consulting with different community segments during the design phase of interventions and for delivery model development, such as through focus group discussions, co-design workshops and community mapping interventions, whilst coordinating with other organisations to minimise overlap and survey fatigue,
- ✔ Hiring community members as sales agents, community mobilisers and product ambassadors,
- ✔ Equitably target both refugee and host community members for employment and sales targets,
- ✔ Providing training and capacity building for community members, such as on the installation or maintenance of energy technologies and customer services,
- ✔ Involving or creating cooperatives to oversee and manage community-wide or public projects and their locations, such as streetlights, and
- ✔ Enabling direct collaboration with humanitarian and development actors, the private sector, and other organisations for project planning, management, auditing and other key activities.

Gender mainstreaming

Sustainable energy interventions could have different implications for women and men. This can be exacerbated when decision makers, typically men, are not the same gender as the primary users of energy technologies, for example typically women with regard to domestic responsibilities. Considering these differences and the effects they may have during both the design and implementation of energy projects can allow them to better meet the needs of all community members and promote gender equality. Gender mainstreaming will vary depending on individual contexts and communities but could be integrated into projects by:

- ✔ Using single-gender focus groups during initial scoping phases to identify gender-specific concerns, for example around the locations of public lighting,
- ✔ Targeting equal opportunities for training and employment for both women and men,
- ✔ Increasing opportunities for training and employment for women in roles that are traditionally seen as “men’s work”
- ✔ Identifying employment opportunities for women which are compatible with family, childcare or household responsibilities, for example near to their homes,
- ✔ Scheduling engagement events at convenient times of the day and/or providing stipends to avoid conflicting with childcare responsibilities and allowing mothers to participate,
- ✔ Offering cooking classes in schools to both boys and girls to raise awareness of clean cooking solutions and encourage both boys and girls to learn how to cook, and
- ✔ Highlighting the needs of different household members during product sensitisation campaigns and encouraging joint decision-making.

Inclusivity strategies

Achieving sustainable energy for all requires understanding and meeting the needs of every member of the community. In displacement contexts some people may have specific vulnerabilities or require different considerations to access sustainable energy, for example if they have a disability. Including these people in project design, and offering strategies for their inclusion during implementation, can mean that energy interventions meet their needs more effectively. Some inclusivity considerations could include:

- ✓ Holding focus groups with people with specific vulnerabilities to ensure an intervention will be accessible to them and meet their needs,
- ✓ Including people with disabilities in trainings and employment opportunities whilst accommodating any specific needs,
- ✓ Engaging with microfinance companies to develop services which make upfront costs more accessible to low-income customers, such as for connections to mini-grids,
- ✓ Using voucher systems for vulnerable customers to access technologies within a wider market-based approach, such as for solar products or improved cooking solutions, and
- ✓ Promoting technologies, products and designs which accommodate users with specific vulnerabilities or disabilities.

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Project concepts

LOCAL PRODUCTION
OF IMPROVED
COOKSTOVES

1/2

BACKGROUND

Most households in displacement settings rely on basic forms of cooking, such as three-stone fires and biomass fuels. This can lead to health issues from smoke, environmental degradation, and protection risks, especially for women and children. Improved cookstoves can reduce fuel use and emissions but they are costly and often unavailable in rural and remote areas. This project aims to support the local production and maintenance of high-quality improved cookstoves tailored to cooking practices.

By establishing stove production centres in displacement settings and training community members, such as women's cooperatives and youth groups, this project will foster local entrepreneurship, promote uptake of cleaner cooking solutions and, reduce negative impacts of biomass use. Microfinance institutions can increase the affordability through flexible payment options. Training will be provided for building and repairing stoves as well as on business skills and financial literacy to community groups, which will use their networks for outreach. The sustainable supply of biomass will be promoted while the stove and fuel solution will be designed to align with cooking preferences and needs. An M&E system will track the uptake, long-term use, health impacts and economic benefits.

ACTIVITIES

Conduct end user needs assessments on cooking practices, fuel use, and local market systems

Engage local stakeholders (NGOs and private sector) and existing community groups to form long-term partnerships

Identify participants with related expertise or strong networks (10-15 per group)

Provide technical training on stove manufacturing, repair, and maintenance

Establish around 10 local production centres in each state

Ensure stoves adhere to international safety and performance standards

Provide business and financial literacy training to support business operations

Establish affordable price points and flexible payment schemes through microfinance institutions

Conduct ongoing promotion and awareness-raising campaigns

Build, sell, and maintain fuel-efficient stoves

Monitor and report stove use, user satisfaction and emission reductions

ENABLERS

High reliance on biomass cooking

Low availability of improved stoves

Existing community groups with potential to provide local knowledge and networks

Linkages to clean cooking and livelihoods policies with a focus on women and youth

BARRIERS

Security risks may limit distribution networks for raw materials and local supply

Requires long-term and large upfront investment in training and facilities

Local groups may require ongoing external support



LOCATION

Borno,
Abuja,
Zamfara,
and Sokoto



Project concepts

PROJECT REACH, TIMELINE AND BUDGET

40 stove production groups
Five years
\$6 million

FURTHER INFORMATION

Training local communities to establish stove manufacturing operations requires long-term investment and support. Setting up workshops, capacity building, and promoting new cooking technologies all take time and must be tailored to local needs and expertise (for example different cooking styles or preferences for specific types of fuel). Promoting the benefits of improved cookstoves will be important to increase their uptake and reduce the overall reliance on biomass fuels. Local maintenance can help stoves last longer, whilst reduced reliance on collecting biomass could help address other concerns such as SGBV and environmental degradation. Building lasting partnerships between all stakeholders will be critical to the success of the intervention.

REPLICATION & EXPANSION

Similar to clean cookstove projects in displacement settings in West Nile, Uganda

Replicates cookstove manufacturing projects such as those in Kakuma refugee camp, Kenya

STAKEHOLDERS AND ROLES

Community groups to build, sell, and maintain stoves and promote use

NGOs to lead training and capacity building

Government agencies to provide permissions and authorisations

Private sector to provide materials and expertise for stove production

Microfinance institutions to offer flexible payments for customers

Donors to provide initial capital and ongoing support

Communication partners and local media to support awareness campaigns and demand stimulation

SCALABILITY

Medium: Replicable in other locations but dependent on long-term funding, technical support and local partnerships.

LOCAL PRODUCTION
OF IMPROVED
COOKSTOVES

2/2

Project concepts

SOLAR IRRIGATION FOR IMPROVED AGRICULTURE

1/2



LOCATION

States across Northern Nigeria (Kaduna, Katsina, Sokoto, Jigawa, Yobe, Borno)

BACKGROUND

Many people in displacement settings rely on agriculture for subsistence and their livelihoods, however productivity is limited by insufficient access to affordable electricity. Solar-powered irrigation systems offer a sustainable alternative but high upfront costs remain a barrier. By supporting private sector engagement and improving access to finance for community members, this project aims to increase access to solar irrigation systems, improve agricultural yields, and increase incomes while supporting local market development.

ACTIVITIES

- Identify promising markets** for solar-powered irrigation systems
- Conduct market research and community engagement** to assess market potential
- Explore partnerships** with organisations working on agriculture, food security, and livelihoods initiatives
- Develop financing models suitable** for agricultural producers, such as long-term plans or flexible payments which can vary between seasons
- Work with private sector** to strengthen supply chains and establish outlets in displacement settings through local distributors
- Sell and install 250 solar irrigation systems** to local agricultural producers
- Train local technicians** on system installation and O&M
- Explore opportunities** for other agricultural products, such as seeds, fertilisers and post-harvest tools to enhance productivity
- Maintain solar irrigation systems** to ensure longevity
- Monitor system performance**, yield improvements, and economic benefits

ENABLERS

- High community interest** and potential market size
- Limited availability** of solar irrigation technologies
- Linkages** with other programmatic areas, such as food security
- Smart irrigation innovations** such as automated solar systems offer efficiency gains
- Aligns with national strategies** to improve agricultural productivity and food security

BARRIERS

- High upfront system costs**
- Requires flexible and accessible financing** for agricultural producers
- Working in remote areas** with long supply chains and potential security challenges would have the highest impact



Project concepts

PROJECT REACH, TIMELINE AND BUDGET

250 solar irrigation systems

Three years

\$1 million

FURTHER INFORMATION

Facilitating long-term payment plans can increase the uptake of high-cost agricultural technologies such as solar irrigation systems. Payment plans should be tailored to accommodate seasonal or irregular incomes which are common amongst smallholder farmers. Substantial donor capital will be required to cover the upfront system costs: this could be through grants to consumers, either directly or via companies and may require independent oversight from an NGO or the government, or to specialist financial organisations. Linking with other programmes focused on food security can provide co-benefits and unlock opportunities for greater agricultural production.

REPLICATION & EXPANSION

The Solar Irrigation Project, launched by REA and CESEL in 2024, deploys systems across 200,000 hectares to promote sustainable farming and reduce fossil fuel use

Potential to utilise the Smart Solar-Powered Irrigation System, which automates irrigation using solar energy to reduce dependence on traditional methods, which has been piloted in Nigeria

Similar to solar irrigation cooperatives in Melkadida, Ethiopia

STAKEHOLDERS AND ROLES

Private sector to set up operations and to install and maintain solar irrigation systems

NGOs to assess market potential and support community engagement

Microfinance, credit organisations, or banks to provide affordable financing schemes

Donors to provide financing capital

SCALABILITY

High: Solar irrigation systems could be installed in many displacement-affected areas where agriculture is a common livelihood.

SOLAR IRRIGATION
FOR IMPROVED
AGRICULTURE

2/2

Project concepts

SOLAR LIGHTING FOR MARKETPLACES

1/2



LOCATION

States across Northern Nigeria (Kaduna, Katsina, Sokoto, Jigawa, Yobe, Borno)

BACKGROUND

Marketplaces in displacement settings, both in camps and host communities, often lack public lighting. This contributes to safety risks and limits economic activity after dark. Installing standalone solar streetlights can provide reliable lighting in locations without the national grid or a reliable source of power. This can enhance community protection and extend business hours, supporting the local economy. This project could be supported by lighting cooperatives, which would take ownership of and maintain the streetlights and funded by contributions from local businesses.

ACTIVITIES

Engage with community groups and local leaders to identify priority locations for streetlights

Establish an inclusive and diverse committee for oversight and streetlight security

Assess feasibility for local businesses which benefit from the streetlights to provide contributions for their maintenance

Contract a solar company to install the streetlights

Train local technicians and committee members on basic maintenance

Perform periodic check-ups and establish a system for repairs and the availability of spare parts

Monitor operating hours of businesses, safety incidents at night, and performance of streetlights

ENABLERS

High need for public lighting and limited access to reliable electricity

High demand from businesses and communities

Supports other areas of programming, such as livelihoods and protection

BARRIERS

High upfront cost for streetlights

Requires community buy-in and coordination

Risk of vandalism, theft or neglect

Requires long-term funding for maintenance

Businesses may be unwilling to financially contribute



Project concepts

PROJECT REACH, TIMELINE AND BUDGET

20 marketplaces

Two years

\$500,000

FURTHER INFORMATION

Street lighting is a public good that benefits the community. However, in the absence of clearly defined responsibilities, lights may be subject to vandalism or fall into disrepair. Ensuring that a local committee is responsible for the safety and maintenance of the lights will be critical to protect them from damage and support long-term functionality. Initial costs will likely need to be covered by donor funding due to high upfront investment, but the community could provide small regular payments into a collective fund for spare parts and maintenance. Some types of streetlights also feature power outlets for charging mobile phones and can provide important additional benefits to the community.

REPLICATION & EXPANSION

Replicates streetlight cooperatives established by the Renewable Energy for Refugees project in Rwanda

STAKEHOLDERS AND ROLES

Community groups and local leaders to identify streetlight locations and support outreach

Streetlight committee to manage oversight and minor maintenance

NGO to support training and community engagement

Local businesses to provide contributions for maintenance, if viable

Companies to install the streetlights and provide spare parts when required

SCALABILITY

Medium: The intervention could be replicated in many communities throughout Northern Nigeria.

SOLAR
LIGHTING FOR
MARKETPLACES

2/2

Project concepts

SOLAR POWER FOR SCHOOLS

1/2



LOCATION

Northern Nigeria (Kaduna, Katsina, Sokoto, Jigawa, Yobe, Borno) and **North Central Nigeria** (Niger, Kwara, Kogi, Benue, Nasarawa, Plateau, Abuja)

BACKGROUND

Electricity access is critical for boosting educational outcomes in displacement settings. Reliable energy is required for powering electronic devices, accessing the internet, and lighting for studying after dark. However, many schools, have limited or no access to a reliable grid connection and instead use solar lanterns or solar-powered radios, if anything at all.

Small-scale solar systems can provide cost-effective and reliable electricity tailored to each school's needs and boost educational outcomes for students. These could have the greatest impact for primary and secondary schools in remote areas, which can maximise educational impact and support displaced and host communities.

ACTIVITIES

Assess electricity needs and requirements of different types of schools (such as day schools and boarding schools)

Establish partnerships with relevant stakeholders such as the Ministry of Education and education-focused NGOs

Identify categories of solar system sizes that would be suitable for different types of schools

Identify and select schools based on need and potential impact

Procure solar systems from private sector through a tender process

Install systems and provide training for school staff on day-to-day operation

Set up O&M protocols through service contracts or trained local technicians

Monitor and evaluate system impact on educational outcomes

ENABLERS

High demand for reliable electricity in schools in remote and underserved areas

High solar irradiance across project locations

Large number of potential sites for implementation

Schools can provide oversight for maintaining the systems

Supports other areas of programming such as education

BARRIERS

High upfront costs and need for long-term funding for maintenance and spare parts

Potentially limited local expertise for O&M

Risk of poorly-sized if energy needs are not well understood or change over time

Logistical challenges in remote locations



Project concepts

PROJECT REACH, TIMELINE AND BUDGET

200 schools

Three years

\$2 million

FURTHER INFORMATION

Energy needs and consumption patterns vary by school type. Grouping schools into categories can standardise needs assessment and system design process for faster implementation. Whilst this would accelerate deployment, it can potentially also lead to over- or under-sizing of systems, which can be mitigated through regular monitoring.

In addition to providing electricity, solar systems can also be used for educational purposes to teach students about renewable energy, sustainability and climate resilience. To support the longevity of the systems, recurring funding would be required for maintenance and spare parts (such as replacement batteries). Procurement processes should include warranties and long-term technical support to guarantee system durability.

REPLICATION & EXPANSION

Complements the Energizing Education Programme, which targets universities and teaching hospitals

Similar to the Renewed Hope Solarization Project which demonstrates the feasibility of solar-powered solutions for schools

STAKEHOLDERS AND ROLES

NGO to oversee the programme, develop stakeholder networks, and conduct research and monitoring

Private sector to supply, install and maintain systems

Schools to conduct day-to-day operations and report system malfunctions

Government to provide permissions and authorisations

Donors to provide upfront capital for system procurement and long-term funding for O&M and monitoring and evaluation

SCALABILITY

High: Straightforward to expand the reach of the project dependent on available funding.

SOLAR
POWER FOR
SCHOOLS

2/2

Project concepts

ENERGY EFFICIENCY UPGRADES FOR HUMANITARIAN OPERATIONS

1/2

BACKGROUND

Humanitarian operations often rely on diesel generators and inefficient electrical infrastructure which leads to high operational costs, carbon emissions, and unreliable power supply. Despite substantial investments by humanitarian actors, long-term sustainability remains a persistent challenge.

This project seeks to minimise energy waste and reduce operational costs by integrating clean energy solutions into existing humanitarian facilities. These include solar energy systems, efficient lighting technologies, smart energy monitoring tools, and behaviour change measures.

The project focuses on upgrading existing infrastructure to maximise the impact of previous investments and accelerate the transition to sustainable energy practices. It supports national and organisational goals to enhance energy security, encourage the adoption of renewable energy, and contribute to global sustainability targets while offering a replicable model for greening humanitarian operations.

ACTIVITIES

Identify suitable humanitarian facilities for energy efficiency upgrades

Coordinate with partner organisations and sign agreements for implementation

Conduct energy audits to identify inefficiencies and opportunities to improve

Procure and ensure instalment of energy-efficient technologies such as efficient lighting, energy saving appliances, efficient water pumps, smart meters, and interactive online platforms to track energy consumption patterns

Train facility managers and staff on sustainable energy use and how to properly utilise energy reporting platforms

Promote energy saving behavioural change through awareness raising campaigns and interactive communications

Establish an O&M routine for equipment and processes for reporting issues and faults

Monitor and evaluate energy savings, cost reductions and environmental impact

ENABLERS

Technical expertise on energy efficiency by private sector

Builds on existing work and priorities of humanitarian agencies

Strong motivation amongst organisations to implement solutions

High donor interest and alignment with agenda on greening humanitarian operations

Strong stakeholder engagement and government collaboration

BARRIERS

High initial costs for retrofitting existing infrastructure

Limited awareness and familiarity with energy-efficient technologies

Lack of high quality, energy-efficient appliances in markets located at conflict zones that are instead mostly dominated by cheap and low-quality equipment



LOCATION

Borno, Adamawa, and Yobe, and other northern states



Project concepts

PROJECT REACH, TIMELINE AND BUDGET

20 facilities

Three years

\$1.5 million

FURTHER INFORMATION

This project supports national and organisational commitments to improve sustainability and promote climate action, reduce emissions, and improve efficiency in the humanitarian sector. It also aligns with Nigeria's energy transition efforts and humanitarian best practices. Similar initiatives are underway in Nigeria and across the world and so this project could be readily adapted to align with other programmes.

REPLICATION & EXPANSION

Successful models can be scaled or replicated in other humanitarian operations in Nigeria

Adaptable frameworks allow implementation in different regions globally

Potential integration with broader sustainable energy programmes and climate strategies

STAKEHOLDERS AND ROLES

Humanitarian organisations such as UN agencies, INGOs, and NGOs to lead the project by identifying facilities for upgrades, overseeing energy audits and retrofitting, and facilitating training and awareness campaigns for their staff, and monitor and evaluate project outcomes

Government at federal, state, and local levels to provide policy support, facilitate regulatory permits, align project with national energy and climate strategies while fostering collaboration among local agencies

Donors to offer funding and technical assistance, support best practices, and facilitate knowledge sharing

Private sector service providers to conduct energy audits, supply and install efficient solutions, provide maintenance and after-sales services and provide technical training to local staff

Community leaders and end users to participate in training, promote energy conservation behaviours, and provide feedback on project impact and sustainability

SCALABILITY

High: The model can be adapted to different humanitarian contexts and modular solutions support flexibility in implementation.

ENERGY EFFICIENCY
UPGRADES FOR
HUMANITARIAN
OPERATIONS

2/2

Project concepts

GREEN FINANCING MODELS FOR HUMANITARIAN OPERATIONS

1/2



LOCATION

Nationwide with initial focus on humanitarian operations in Northeast (Borno, Adamawa, Yobe), Northwest, and North Central Nigeria

BACKGROUND

Humanitarian energy operations in Nigeria predominantly rely on diesel generators, resulting in high operational costs and greenhouse gas emissions. Despite growing interest in renewable energy solutions, humanitarian actors face major financial barriers due to high upfront costs, a lack of tailored financing options, and risks perceived by private investors. In addition, traditional grant funding alone is insufficient to meet the scale of energy needs in displacement contexts.

To overcome these challenges, this project proposes the development of green financing models for humanitarian organisations (such as blended finance) which could combine grants, concessional loans, and results-based financing. These models can lower financial barriers, de-risk investments, reduce costs, and attract private sector engagement. This project can also build on global best practices and existing blended finance solutions in humanitarian settings, tailored to Nigeria's complex humanitarian and energy landscape.

ACTIVITIES

Conduct market assessments and stakeholder consultations to identify financing gaps and opportunities

Develop blended finance frameworks incorporating grants, concessional finance, results-based financing, and risk mitigation instruments

Provide technical support for green financing models in 20 energy projects in displacement settings such as solarisation and energy efficiency upgrades

Deliver capacity building and technical assistance to humanitarian actors and private sector partners on financing and project development

Establish monitoring and evaluation systems to track financial performance, impact, and scalability

Develop knowledge products and advocacy materials to promote green financing adoption and institutional learning

ENABLERS

Growing international and donor commitment to decarbonising humanitarian operations

Ongoing coordination and collaboration mechanisms across humanitarian and development partners

Increasing private sector interest in renewable energy investments in Nigeria

Existing policy frameworks supporting renewable energy and climate finance

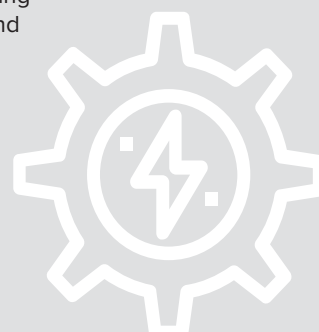
BARRIERS

Limited familiarity with innovative financing instruments among humanitarian actors

Perceived investment risks in conflict-affected and displacement settings

Regulatory and market barriers hindering private sector participation

Need for sustained donor support to provide initial grant funding to support de-risking mechanisms



Project concepts

PROJECT REACH, TIMELINE AND BUDGET

20 projects

Five years

\$4 million

FURTHER INFORMATION

Green financing models offer the opportunity to raise funds for clean energy initiatives whilst also contributing to organisational and national climate goals. In the resource-constrained humanitarian sector, it is critical to identify new ways of raising the capital necessary for energy projects whilst moving to new models for long-term financing, including through blended approaches. These can help to bring private sector expertise and efficiencies to projects and help to scale up more rapidly if successful financing models can be demonstrated.

REPLICATION & EXPANSION

Financing models piloted in Nigeria can be adapted and scaled across other countries

Several humanitarian organisations have begun to develop in-house models for green financing

Successful frameworks can inform national policies on climate finance and humanitarian energy investments

Successful models could be extended to other sectors such as education, health and water services in displacement settings

STAKEHOLDERS AND ROLES

Humanitarian agencies to coordinate and implement the project, engage with stakeholders, provide technical guidance and capacity building, and facilitate monitoring and evaluation

Private sector investors and renewable energy companies to provide investment, delivery energy solutions, and support the development of financing mechanisms

Government entities such as Ministries of Environment, Finance and Power to provide regulatory support and facilitate policy implementation

Donors and development partners to provide grant funding and risk mitigation support

SCALABILITY

High: Modular financing instruments are adaptable to different project sizes and contexts. There is potential to catalyse significant private sector investment and accelerate the energy transition in humanitarian and fragile settings across Nigeria and the wider region.

GREEN FINANCING
MODELS FOR
HUMANITARIAN
OPERATIONS

2/2

Project concepts

SOLAR SYSTEMS FOR PRIMARY HEALTH CENTRES

1/2



LOCATION

Northeast, Northwest, Niger Delta, and North Central

BACKGROUND

Across Nigeria, nearly 40% of primary health centres (PHCs) lack access to reliable electricity which hinders their ability to provide essential services including emergency and maternal care, nighttime consultations, diagnostics, and vaccine and medication storage. Clinics with electricity access usually rely on costly and polluting diesel generators or are forced to operate without any power.

Solar energy systems can offer a sustainable and cost-effective solution for providing clean, reliable electricity to PHCs which would allow them to improve healthcare outcomes and reduce the reliance on diesel generators. The project could be implemented in four phases: in the Northeast (Borno, Adamawa, and Yobe) where there is a high need due to conflict and displacement; in the Northwest (Katsina, Zamfara, and Sokoto) where there are high levels of poverty and insecurity; followed by the Niger Delta (Delta, Bayelsa, and Rivers); and the North Central region (Benue, Plateau, Nasarawa).

ACTIVITIES

- Conduct detailed energy assessments** at selected PHCs
- Work with healthcare staff** to identify high-priority applications of energy
- Engage with the private sector** to design and install solar energy with battery storage
- Provide medical equipment** to the PHCs lacking electricity access and powered devices
- Select and train focal points** from healthcare staff on O&M
- Engage local communities and government health authorities** to encourage local buy-in for the project
- Establish remote energy monitoring systems** to ensure optimal performance and prompt maintenance
- Monitor system performance** and health outcomes
- Evaluate potential** for replication and expansion in other areas
- Evaluate potential use of PHCs** as anchor clients and extending lighting systems along nearby roads and walkways to support safe and secure access at night

ENABLERS

- Strong government commitment** to rural electrification and healthcare improvement
- Availability of donor funding** and technical assistance through initiatives like World Bank and SEforALL
- Decreasing costs** of solar and battery storage technologies
- Growing awareness** of the benefits of renewable energy solutions in healthcare settings

BARRIERS

- High upfront costs** limit the accessibility and scalability for PHCs
- Security challenges** and access constraints in conflict-affected regions
- Limited local technical capacity** for maintenance of solar systems
- Logistical barriers** in remote and underserved communities
- Difficulty of ensuring sustainability** of funding for long-term maintenance

Project concepts

PROJECT REACH, TIMELINE AND BUDGET

100 primary health clinics
(25 per phase)

\$4 million

Four years



FURTHER INFORMATION

Providing clean power for PHCs helps to support good health and wellbeing, sustainable energy, and climate action, as well as aligning with national and international policy goals. In order for solar systems to provide long-term benefits for PHCs, it will be necessary to establish clear mechanisms for maintenance and replacement parts, both of which incur ongoing costs. Establishing which organisations are responsible for these, and where the funding will come from, can help avoid systems falling into disuse. In particular, identifying which stakeholder is responsible for battery replacement will be a critical issue in supporting the longevity of the systems beyond the first few years.

REPLICATION & EXPANSION

The project adopts a phased approach, starting with high-need areas and expanding as impact and funding grow. Modular solar system designs can be adapted to clinics of different sizes and energy demands. Lessons from each phase will guide replication in other underserved and conflict-affected areas, allowing integration with broader national electrification and health policies

The project complements and builds on other projects such as Sierra Leone's solar electrification of 43 health facilities, UNDP's Solar for Health programme (1,000+ clinics across 15 African countries), and Power Africa's off-grid solar initiative for 288 healthcare centres

SCALABILITY

High: Through a phased approach, the project can start with regions of greatest need and expand to other areas based on success and available funding. The modular design of solar energy systems means that they can be adapted to clinics of various sizes and with different energy needs.

STAKEHOLDERS AND ROLES

Government health agencies to provide policy support and identify target clinics

Government energy agencies to provide technical guidance and project oversight

Humanitarian and development organisations to provide technical expertise, training on medical equipment, and support coordination and O&M activities

Donors to provide grant funding for solar systems

NGOs to implement projects and engage with communities

Solar companies to design systems, install, and provide maintenance services

SOLAR SYSTEMS
FOR PRIMARY
HEALTH CENTRES

2/2

Project concepts

SOLAR SOLUTIONS FOR ENTREPRENEURS IN DISPLACEMENT SETTINGS

1/2



LOCATION

IDP camps and host communities in Northeast Nigeria (Borno, Adamawa, and Yobe)

BACKGROUND

Communities in Northeast Nigeria face prolonged displacement due to conflict and this severely limits electricity access for small businesses. Many enterprises such as barbers, mobile phone charging points, medicine stores, and shops struggle to operate efficiently without reliable power. This project aims to equip these entrepreneurs with small-scale solar power solutions to enhance their productivity and increase their incomes.

ACTIVITIES

- Conduct energy need assessments** to identify priority business types, their energy demands, and appropriate solar solutions
- Distribute and install solar power kits** designed for needs of small businesses (such as providing electricity for lighting, mobile charging, and small appliances) and provide energy-efficient appliances and equipment (such as fridges, sewing machines, and agro-processing equipment)
- Design and implement flexible financing models** for businesses to ensure equitable access based on operational capacity of businesses
- Support new enterprises**, particularly those established by youth and women, by combining energy access with business training
- Train business owners** on electricity system operation, routine maintenance, and energy-efficient practices
- Establish local solar service centres** that offer repair services, technical support, and spare parts
- Provide training** to businesses on financial literacy, entrepreneurial management, and market expansion
- Facilitate access** to microcredit for businesses to acquire solar systems in collaboration with financial institutions
- Engage with communities** and raise awareness on the benefits of solar energy for supporting business operations
- Monitor increased business revenues**, the number of businesses supported, energy access reliability and satisfaction, and repayment performance

ENABLERS

- High solar irradiance** in the region
- Unreliable or absent grid connections** in target areas
- Strong community interest and demand** for electricity and livelihood opportunities
- Support** from humanitarian and development organisations
- Linkages** with other areas of humanitarian programming, such as livelihoods and resilience

BARRIERS

- Security risks** affect access to some displacement-affected areas
- High upfront cost** of solar systems and limited capital among business owners
- Business failure** or income instability may affect repayment rates
- Technical skill gaps** for system maintenance
- Availability** of affordable solar technologies and local technicians
- Logistical challenges** in delivering equipment to remote or insecure locations

Project concepts

PROJECT REACH, TIMELINE AND BUDGET

Approximately
1,000 small businesses
\$1.5 million
Two years



FURTHER INFORMATION

The project supports Nigeria's renewable energy goals and humanitarian strategies to improve livelihoods opportunities and resilience for displacement-affected communities. Using market systems approaches could help to provide businesses with solar energy, as well as supporting energy companies to expand their presence in displacement settings. This could potentially promote a greater private sector presence in displacement settings and develop the market for similar products in the future.

REPLICATION & EXPANSION

The modular nature of small solar systems makes them highly replicable across other IDP camps, host communities and underserved regions

The project builds on initiatives such as the Powering Agriculture: Smallholder Solar project, which deployed solar-powered solutions to support small businesses and agricultural value chains

Future phases could include broader livelihoods and energy access programmes such as solar-powered cold storage for medicine and other goods

SCALABILITY

High: The project could be widely replicated across different regions and easily adapted to promote various strategies for economic resilience.

STAKEHOLDERS AND ROLES

NGOs to mobilise resources, deliver training, and engage with communities

Solar companies to supply and install systems, and provide technical support to businesses

Government agencies to provide policy support and authorisations

Donor agencies to provide funding and strategic guidance

Microfinance institutions to offer loans and payment plans to business owners

Business owners to operate and maintain systems and participate in training activities

SOLAR SOLUTIONS
FOR ENTREPRENEURS
IN DISPLACEMENT
SETTINGS

2/2

Project concepts

CAPACITY BUILDING AND TRAINING FOR SUSTAINABLE ENERGY SYSTEMS

1/2



LOCATION

Nationwide

BACKGROUND

Nigeria's renewable energy sector is growing rapidly and driven by strong government policies and international partnerships. Despite this, there is limited institutional capacity, inadequate maintenance, and skills shortfalls on the design, installation, and O&M of systems. These factors continue to hinder efforts to scale and sustain sustainable energy solutions, especially in off-grid and fragile settings.

This project aims to develop, grow, and standardise capacity building frameworks that are context-specific, gender inclusive, needs-oriented for fragile settings, and aligned with Nigeria's Energy Transition Plan.

ACTIVITIES

- Conduct skills gap assessments** and tailor curricula based on needs
- Develop tailored training programmes** on renewable energy technologies, grid integration, system maintenance, and circular economy
- Deliver training** for technicians, engineers, and policy makers
- Organise peer-learning workshops** and knowledge sharing events
- Implement training-of-trainers models** to build local training capacity and scale impact
- Facilitate partnerships** for technology transfer with international institutions and private sector actors
- Design training materials** such as toolkits and digital modules for wider dissemination
- Establish monitoring, evaluation, and learning frameworks** to track capacity outcomes.
- Promote gender equity by targeting** at least 50% female participation across training programmes
- Support data collection** and lifecycle tracking for renewable energy components to promote circular economy practices

ENABLERS

- Strong government commitment** under the Nigerian Energy Transition Plan
- Support from key institutions** such as REA and NERC and from international donor support (EU, UK PACT, UNIDO, etc.)
- Existing public-private partnerships** for renewable energy
- Growing institutional awareness** of renewable energy benefits on resilience, climate action and economic growth
- Existing frameworks** that support renewable energy adoption through local content participation and technology transfer

BARRIERS

- Persistent skills gap** and difficulty retaining personnel
- Limited funding** for continuous training and capacity building
- Coordination challenges** among multiple stakeholders
- Security and infrastructure challenges** in some regions
- Limited institutionalisation** of energy training within formal education and vocational training systems



Project concepts

PROJECT REACH, TIMELINE AND BUDGET

Hundreds of engineers, technicians, policymakers, and energy sector stakeholders

\$1 million

Three years

FURTHER INFORMATION

Training and capacity building can strengthen the renewable energy sector in Nigeria and provide improved opportunities for people to learn new skills. These can also support local manufacturing, policy development, and economic growth whilst educating stakeholders on the risks of environmental degradation, electronic waste, and climate change. Training programmes can also be tailored to the specific needs of industries or different regions, including those which host large numbers of displaced people. In the expansion phase, training centres could be established to ensure that knowledge is continually passed on, especially in displacement settings, which could have high turnover of both staff and community members.

Throughout the project, knowledge sharing events could be organised to encourage peer learning. These could be at the national level to address broad policy discussions and regulatory frameworks with distribution companies, renewable energy developers, and regulators; at the regional level to focus on localised energy challenges and opportunities; and at the organisational level to enhance collaboration and capacity-building within specific institutions.

REPLICATION & EXPANSION

Training curricula and tools can be designed for scalability and adaptability across Nigerian states

Training of trainer approach enables expansion beyond initial cohorts

Frameworks can be integrated into national vocational and technical education curricula

The Ministry of Power's NextGen RESCO Leadership Programme, aims to train 130 Nigerians to address the skills gap, emphasising youth empowerment and technical capacity as pillars of energy transition.

Potential to extend programs to other West African countries facing similar challenges

Enables sustainable operation of renewable energy projects nationwide

SCALABILITY

Medium: Through flexible training design and potential integration with formal education and vocational systems, this intervention could be scaled across the country.

STAKEHOLDERS AND ROLES

Electricity distribution companies to implement training in grid integration and maintenance

Distributed energy developers to contribute to technical capacity building

Government agencies to provide coordination at national level and ensure alignment with energy access goals

Ministries with portfolios on power, environment, and education to ensure policy alignment, institutionalise training programmes, and support circular economy and waste management content

International donors to provide funding and technical support

Technical institutions and universities to develop content deliver training

Government organisations to set and monitor compliance with technical standards

Solar companies to support hands-on training, apprenticeships, and technology transfer

CAPACITY BUILDING
AND TRAINING
FOR SUSTAINABLE
ENERGY SYSTEMS

2/2

Project concepts

**RAPIDLY DEPLOYABLE
ENERGY SOLUTIONS
FOR EMERGENCY
SITUATIONS**

1/2



LOCATION

Nationwide, including conflict-affected regions (Northeast, Northwest), flood-prone areas (Lagos, Niger Delta, Benue), and urban centres like Abuja.

BACKGROUND

Nigeria regularly faces emergencies from conflict and natural disasters such as floods. These often disrupt critical power supplies for healthcare and humanitarian operations. Meanwhile, the country's current reliance on diesel generators is costly, polluting, and unreliable during crises.

Deployable renewable energy solutions (such as solar energy systems and portable solar kits) can offer rapid, clean, and dependable energy for emergency response needs. These systems can be temporarily deployed and can be removed or repurposed depending on long-term needs.

ACTIVITIES

Conduct comprehensive energy needs assessments for emergency healthcare and humanitarian facilities across conflict-affected, flood-prone, and urban areas

Design and deploy solar-powered portable systems tailored to the needs of emergency response units and healthcare facilities

Establish a multi-stakeholder technical working group within an existing coordination mechanism to oversee planning, deployment, maintenance, removal, storage, and redeployment of energy systems depending on the needs

Train healthcare workers, emergency responders, humanitarian staff, and local technicians on operation, maintenance, and troubleshooting of solar systems

Set up remote monitoring platforms and rapid maintenance teams to ensure reliability and timely resolution of technical issues

Engage with local communities, government agencies, and humanitarian actors to promote capacity building and system sustainability

Develop strategic partnerships with companies, donors, and international organisations to secure funding, technical expertise, and logistical support

Integrate flood-resilient energy infrastructure and deployable flood barriers in at-risk areas to enhance system durability and emergency preparedness

ENABLERS

High need for reliable power in emergency situations with conventional sources such as grid or diesel often failing during crises

Strong government commitment to disaster resilience and renewable energy adoption

Declining costs of solar and battery technologies

Growing awareness of renewable energy benefits in emergency and humanitarian contexts

Proven successful models such as solar-powered health clinics and innovative flood management solutions like SLAMDAM flood barrier project in Lagos

BARRIERS

Limited technical capacity for installation and maintenance in remote and flood-prone areas

Security challenges in conflict-affected areas

Logistical challenges in transporting and deploying equipment during emergencies

Lack of policy mandates for renewable energy integration in emergency response

Unreliable funding for ongoing maintenance and replacements

Coordination challenges across multiple stakeholders and sectors

Project concepts

PROJECT REACH, TIMELINE AND BUDGET

150 emergency response units

\$4 million

Two years



FURTHER INFORMATION

While pilot projects have demonstrated the success of rapidly deployable sustainable energy systems, challenges with funding, ongoing maintenance, technical capacity, and policy support continue to restrict broader implementation. To address these, this project integrates a technical working group within an existing coordination mechanism, leveraging established platforms of government agencies, private energy companies, and humanitarian partners rather than creating parallel systems. This approach will strengthen existing structures by providing funding and resources to facilitate energy-specific activities, ensuring greater alignment and collaboration among stakeholders. The group will coordinate project planning, deployment, and maintenance activities, ensuring alignment with Nigeria's Energy Transition Plan and climate resilience objectives.

REPLICATION & EXPANSION

Scalable to other regions with similar emergency and disaster risks

Modular and portable systems enable adaptation to various facility sizes and contexts

Can be incorporated into other innovative disaster management technologies and response frameworks

STAKEHOLDERS AND ROLES

Federal and state ministries of health, emergency management, and environment to provide policy support and coordination

Government agencies to provide technical oversight and authorisations

Donors to provide funding and ongoing support

Humanitarian agencies to provide technical expertise and support the implementation of energy solutions

Private solar companies to design, deploy, and maintain energy systems

Local communities and humanitarian actors to operate and maintain systems after deployment

State government and partners to pilot innovative flood management solutions and energy resilience solutions

SCALABILITY

High: The modular design and portable deployment model, alignment with national and regional emergency response, climate adaptation goals, and demonstrated successful pilots supports replication. Opportunities for public-private partnerships and donor engagement offer potential for scaling impact.

**RAPIDLY DEPLOYABLE
ENERGY SOLUTIONS
FOR EMERGENCY
SITUATIONS**

2/2

07

Conclusions



Key issues for energy access

Nigeria hosts more than 3.7 million internally displaced people, refugees, and asylum seekers, most of whom live in camps and alongside host communities across the north of the country. Ongoing conflicts, climate change, and natural disasters continue to displace people, making it challenging to deliver effective support, including energy access.

Access to sustainable energy in displacement-affected areas is typically low. Households in rural and remote areas of Northern Nigeria often rely on basic sources of electricity for lighting, if any at all. The availability of solar products is limited and the grid network suffers frequent outages. Supporting the private sector to expand operations in difficult markets, alongside customer financing, could help scale up electricity access. The continued reliance on traditional sources of cooking, especially three-stone fires, means that firewood is becoming harder to collect and more expensive, especially in areas that host displaced populations. Increasing the uptake of efficient improved cookstoves could help reduce risks associated with fuel collection such as sexual and gender-based violence and environmental degradation.

Businesses also face challenges due to unreliable electricity access and rising diesel prices. Some

schools and hospitals have access to electricity but this depends on the type and location, with many relying on basic lighting services only. Some humanitarian operations, especially offices and boreholes, have replaced diesel generators with solar or hybrid power systems. These successful projects provide useful blueprints for scaling sustainable solutions to other priority areas.

Amongst these challenges lie great opportunities to improve energy access. Households could benefit from solar products and improved cookstoves, businesses could use solar power and efficient appliances to offer improved services, and reliable electricity access in schools and hospitals could enhance access to education and healthcare. Solar irrigation and streetlighting could support other areas of humanitarian programming, such as food security and protection, whilst organisations themselves can scale up their own use of renewable power and reduce energy consumption through efficiency measures. Providing opportunities for displaced people and host communities to be involved with sustainable energy projects through consultation, co-design, and implementation can offer a new pathway for capacity building and co-ordination between communities as well as laying the foundations for long-term success. ●

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The road to sustainable energy in displacement settings

Improving access to sustainable energy will require a concerted effort from all stakeholders working in displacement contexts, with displaced and host community members having a central role in the design and implementation of any intervention.

The READS workshops brought together a diverse range of stakeholders to co-design potential high-impact projects. Whilst these are presented as individual opportunities – and would

each merit investment and implementation on their own – rolling out coordinated interventions addressing several energy themes together could have a truly catalytic effect on increasing sustainable energy access as a whole.

Acknowledging this, and the work of other initiatives, the roadmap below presents a vision of how to improve sustainable energy access in displacement settings in the short, medium, and long term. >>

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The road to sustainable energy in displacement settings

SHORT TERM (2026-2027)

MEDIUM TERM (2028-2029)

LONG TERM (2030+)

OFF-GRID ELECTRIFICATION

Run engagement activities for off-grid solar companies

Provide financing to customers

Establish shared warehousing facilities for companies

Implement solar maintenance and training programmes

Increase types and sizes of solar systems

Diversify appliances to cater to businesses and productive uses

Provide maintenance and servicing

Expand sales outlets to remote areas

Phase out consumer subsidies

Reassess national electrification policies



Conduct cooking needs assessments and focus groups

Provide training on improved cookstove manufacture

Run awareness-raising and public education campaigns

Scale up improved cookstove programmes in remote areas

Support modern cooking options such as LPG

Implement tree-planting programmes for sustainable biomass

Assess the potential of electricity for cooking

Transition away from firewood for fuel

CLEAN COOKING

COMMUNITY FACILITIES

Research the electricity needs of schools and health centres

Implement small-scale solar systems for facilities without power through grant funding

Run training programmes for system installation and maintenance

Install solar streetlights in marketplaces with oversight from community cooperatives

Install larger-scale solar systems to replace diesel usage

Ensure systems are adequately maintained

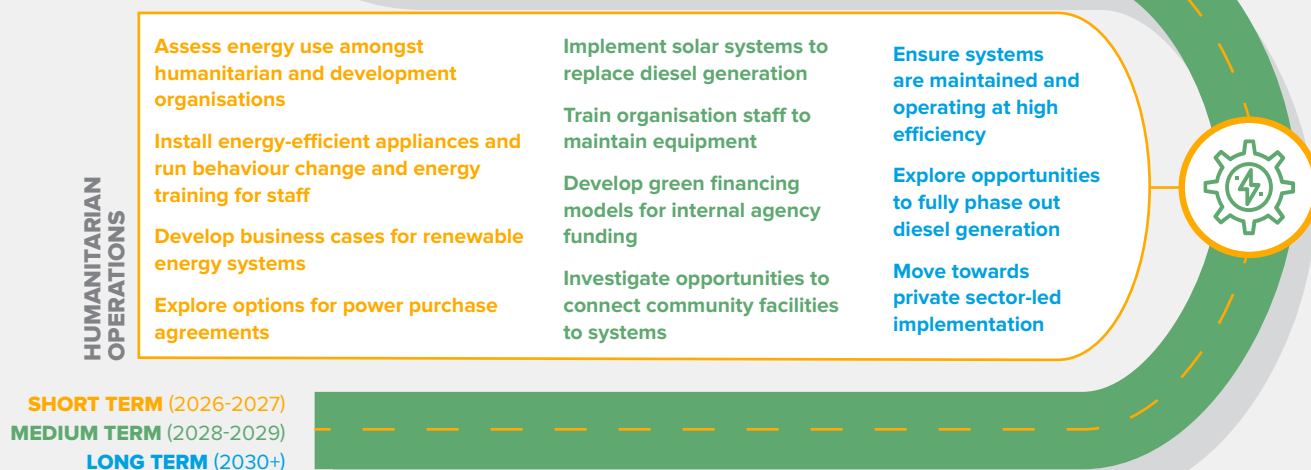
Install lighting in other public spaces

Expand existing solar systems to take on new renewable capacity

Upgrade appliances in schools and health centres to improve services



07 Conclusions



The challenge is significant: achieving access to affordable, sustainable, reliable and modern energy for displaced people and host communities by 2030 will require more projects, activities, partnerships, coordination, and funding than ever before. Promising initiatives which have

overcome persistent challenges have helped to guide the way and provide the first steps towards greater investment, new collaborations, and improved access to sustainable energy in displacement settings throughout Nigeria. ●

All stakeholders will need to play a role, with displaced people and host communities in the centre, to improve access to sustainable energy.

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