



**Global Energy Alliance**  
*for people and planet*

# Transforming Nigeria's energy system



**30,000** people  
connected to power



**14,000** jobs  
created or improved



**75,000** metric  
tons of carbon  
emissions avoided



**\$287 million**  
additional financing  
unlocked

The clean energy  
revolution empowering  
the world's largest  
unelectrified population





## At a glance

- **Project names:** Interconnected Mini Grids (IMG) and the Energizing Agriculture Programme (EAP)
- **Location:** Nigeria
- **Duration:** EAP: Nov 2021 to May 2025  
IMG: Oct 2022 - present

## Objective

To pilot interconnected mini grids and productive tools to tackle Nigeria's energy access crisis; to increase energy demand, employing a replicable, systems-level approach that could be scaled across the country.

## Outcome and pathway to scale

Between 2022 and 2025, the projects connected 30,000 people to electricity and created or improved nearly 14,000 jobs. Critically, they also established a proof of concept that led to Nigeria including interconnected mini grids and productive tools as core elements of its electrification strategy. This momentum unlocked \$133.6 million in World Bank Group and other funding and second iterations of both projects are now underway. The country is now on track to deliver reliable, clean energy to tens of thousands more homes and businesses, with the potential to transform hundreds of thousands of lives.



In the outskirts of Toto community, Nasawara, 100km south of the Nigerian capital of Abuja, an array of 28 large solar panels cuts a dramatic, angular dash against the red earth of farmland, winding tracks and homes. Supplying an average of 19 hours of electricity a day, the power has brought new life to the community, reviving businesses, powering industry and improving lives.

It hasn't always been like this. Perched on the edge of a crumbling electric grid, Toto was without electricity for 10 years as the utility prioritized surging demand in more densely populated, central city locations. Dependent upon expensive petrol and diesel generators, communities struggled, businesses stagnated and residents began to think about leaving to seek opportunity elsewhere.

The people of Toto were not alone.

With 240 million residents, Nigeria has Africa's largest population, but one of its weakest electricity systems. An estimated 80 million people have no access to electricity. An additional 150 million people lack access that is reliable. The country's aging electricity grid reaches just over **60 percent** of the population and suffers frequent collapses due to a combination of weak infrastructure, inadequate maintenance, inconsistent gas supply and a lack of responsive back up power. Clean energy accounts for **less than a quarter** of energy generation.





In rural areas, where local economies depend on agriculture, lack of electricity impacts virtually every stage of production from irrigation to processing, refrigeration and distribution.

Nigeria loses an estimated **40 percent** of the food it produces in part due to poor storage linked to unreliable electricity. Households experience an average of nearly **seven power cuts a week**, each one lasting 12 hours or more. The burden is particularly borne by women, who make up **60 percent** of the agricultural workforce.

The result: Frustrated businesses and industries, schools and health centers under strain and an economy that falls short of its potential. According to the World Bank, lack of reliable power in Nigeria translates to annual losses of **\$25 billion** — an estimated five to seven percent of the country's GDP.

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At the same time, electricity is generally unaffordable for most Nigerians, more than 40 percent of whom live in extreme poverty. Even where power is available, low uptake limits economic growth and compounds high unemployment.

“It is a mutually-reinforcing cycle,” says Fauzia Okediji, manager of utility innovation at Global Energy Alliance for People and Planet. “Scarce and unreliable supply weakens demand, and weak demand deters investment, inhibiting the urgent call for more supply.”

The situation is only likely to intensify: Nigeria's population is expected to grow to **400 million** by 2050, creating a looming energy deficit that the country is urgently seeking to address.

## Mission 300

Global Energy Alliance's work in Nigeria helped inform Mission 300, an initiative from the World Bank and the African Development Bank in partnership with SEforAll and The Rockefeller Foundation to connect 300 million people in Africa to electricity by 2030. Our work also supports the World Bank's DARES project which aims to mobilize \$750 million to provide new and improved electricity access to 17.5 million Nigerians.

Fabian Homi Nubua, an engineer in Shimankar Community, Nigeria.  
Photo: Global Energy Alliance





# An unprecedented opportunity

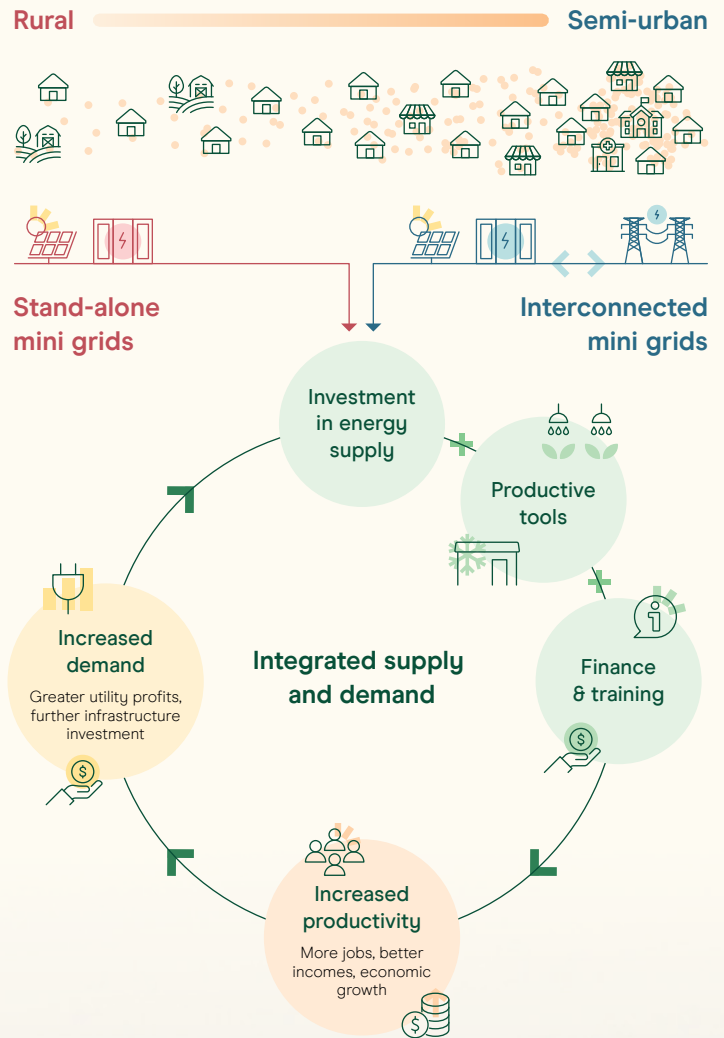
Affordable, reliable, clean electricity has the potential to unlock the energy, talent and economic ambitions of Nigeria's rapidly expanding youth population, and help the country leapfrog from outdated, unreliable fossil fuel dependency into a bright, prosperous, clean energy-powered future.

A **2024 report** by RMI, supported by Global Energy Alliance, found that interconnected mini grids, such as the one in Toto — that combine solar panels and batteries with existing grid infrastructure — could unlock an investment opportunity exceeding \$14 billion by 2034.

The grids can also avoid an annual 33 million metric tons of carbon emissions — more than the **city of Chicago** emits in a year — and set Nigeria on a path to greater energy resilience and economic growth.

In remote, rural areas, where the grid doesn't reach, stand-alone solar projects, when supported by tools such as electric irrigation, mills and cold storage, can power agricultural operations, helping preserve food, grow jobs and ease the burden on women. As tools enable productivity to grow, incomes also grow. Jobs are created and energy demand increases. Growing demand emboldens developers to pursue more projects, driving further investment and growth.

## From supply to demand: Building a thriving energy ecosystem



A solar mini grid providing clean, reliable energy for the Shimankar community in Nigeria. Photo: Global Energy Alliance





# Partnering to unlock Nigeria’s full potential

Mini grids had been tested in Nigeria before, but results had been varied. In remote off-grid communities, many well-intentioned installations languished, under-used because communities lacked the tools, training and finance to use the energy once it arrived.

In more densely populated, peri-urban areas such as Toto, efforts to integrate clean energy into the grid were undermined by financing gaps, contractual complexities and a complicated snarl of institutional hurdles.

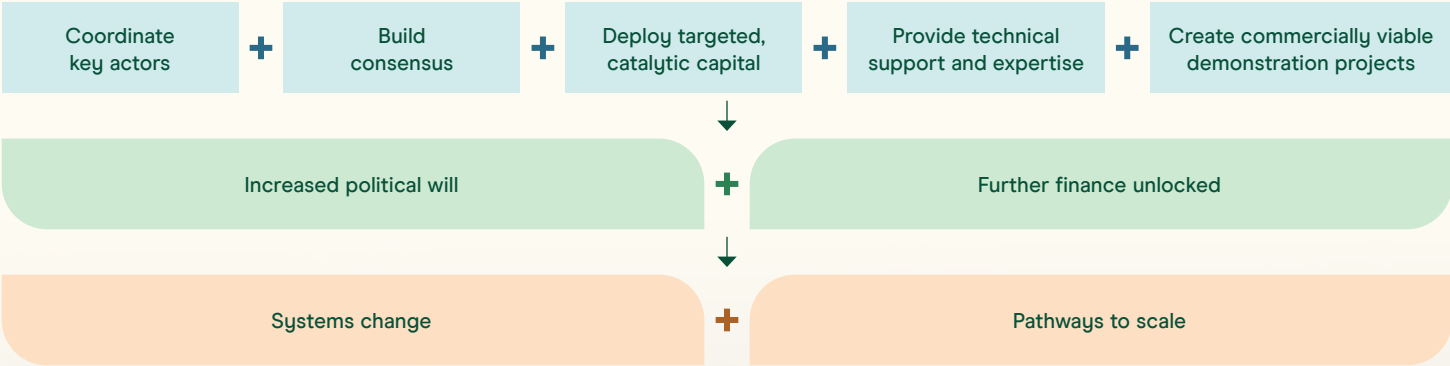
Developers — who build, finance and operate local generation and distribution facilities — were often at odds with incumbent utilities concerned about costs and unconvinced solar was the answer. Local customers, meanwhile, balked at paying for unstable electricity without proven results.

By 2022, when Global Energy Alliance became involved, nearly 20 proposed grid-connected projects — with the potential to reach 100,000 people — were struggling to make progress.

Global Energy Alliance’s model for systems change, which deploys a relatively small catalytic investment while uniting unlikely partners to identify and unlock bottlenecks, was custom made for this challenge.

We knew if we could convene and coordinate Nigeria’s mini grid developers with utilities, galvanize regulators and communities, and provide the necessary training and expertise, we could create pilot projects that worked, prove the case for scale, unlock further finance and change the trajectory of Nigeria’s energy future for good.

## Global Energy Alliance’s approach to systems change





## Breaking down silos

With \$3.2 million in capital, Global Energy Alliance launched projects with three of Nigeria's 11 utilities.

The potential was clear, but the path to delivery was not. Utilities considered interconnected mini grids high risk and hard to finance. The processes for developers and utilities to collaborate were still nascent. And the regulatory framework had yet to catch up.

Working closely with RMI, we embedded dedicated staff within utilities to help them develop new skills and support their journey to mini grid integration from the inside.

During a series of workshops and webinars we helped developers explain their technical and business models to other stakeholders. Representatives from utilities, government and investors sat and worked together — many for the first time — sharing challenges, learning about tendering and deployment and building expertise.

Together, we worked to establish a series of interconnected mini grids that would help generate proof points to demonstrate IMG's viability, unlocking stalled projects and charting a pathway to scale.

By 2025 we had shepherded four interconnected mini grid projects in the communities of Robinyan, Zawaciki and Wuse as well as Toto. In Robinyan, the IMG pilot has brought reliable power to more than 5,000 residents since it was connected in March 2025. Some 1,000 homeowners and businesses in northern Nigeria's Zawaciki community are now getting as many as 20 hours of electricity each day, up from four hours before the mini grid was installed. And shop owners at the Wuse Market can now continue to trade long after nightfall, thanks to the electricity powering their stalls.

"The interconnected mini grid technology is the perfect solution for underserved areas and commercial hubs like this market," said [Chris Nwachukwu](#) from GVE Projects, the developer at Wuse Market. "This is something that we intend to scale." *(continued on page 8)*



Seamstress Mary Alaele Baelanki at her stall in Wuse Market, Abuja. The market received mini grid electricity in 2024. Photo: TNF Media / RMI article



## Harvesting sunshine in rural Nigeria

Hadidza Yakubu and her family are farmers in Lafia Kpada, a small rural community in central Nigeria, where they grow maize, guinea corn, sesame and soya beans. To earn additional income, she grinds grains into flour for people in the village – a painstaking process that used to require pounding by hand.

Grinding machines arrived in the village about 15 years ago. They were big, loud and challenging to use. It took Hadidza's breath away just to get one started. Finding petrol or diesel to run the machine wasn't easy, either.

Everything changed when Prado Power installed solar power in Lafia Kpada. The developer identified villagers using agriculture processing equipment and retrofitted the machines for electricity powered by the mini grid.

“

**When a mini grid comes to a community like this, it just energizes the entire community.”**

– **Terkuma Ivande**, Prado Power

Agriculture is the backbone of Nigeria's rural regions where millions of households depend on crops, livestock and fishing for their livelihoods. But electricity alone can't deliver a lasting impact if people lack the means to use it.



Farmer and entrepreneur  
Hadidza Yakubu  
Photo: Global Energy  
Alliance



Rural household electricity consumption has long been constrained not only by the lack of supply, but by a lack of access to tools and training to use energy to improve agriculture output. Lack of refrigeration also contributes to food insecurity when fish and produce go to waste.

To address this chicken-and-egg scenario and ensure electricity was being used in a productive way, Global Energy Alliance partnered with Nigeria's Rural Electrification Agency (REA) and RMI in 2021 to implement the **Energizing Agriculture Programme (EAP)**. We invested \$5 million to scale productive use in agricultural communities where standalone mini grids had been installed but were underused. The goal: to raise local incomes and improve community resilience.

Under the program, RMI supported the deployment of energy-efficient electric equipment, including solar-powered cold storage, mills and processing and irrigation technologies, across 40 rural communities. Decisions about the type of equipment were based on the characteristics of the communities' needs, as well as affordability.

In parallel, REA identified more than 120 agriculture-based rural communities, including farming and fishing communities where the provision of clean power could deliver outsized benefits for production, processing and storage. Global Energy Alliance supported REA with staff and expertise to ensure productive use considerations were built into project design.

In Nigeria's north central state of Nassarawa, about 100 fishermen and fish traders are now preserving their catch and reducing spoilage thanks to a 3-ton solar cold room powered by a Husk Power Systems mini grid. The reduction in waste and the ability to sell their fish further afield where it can command higher prices, has increased the average earnings of fishers by 30 percent.

Back in Lafia Kpada, Hadidza's electric mill makes her work faster, easier and safer.

“The solar energy eased my life a lot. We now have peace of mind. What else do I need in this life?” she said.



## Our impact

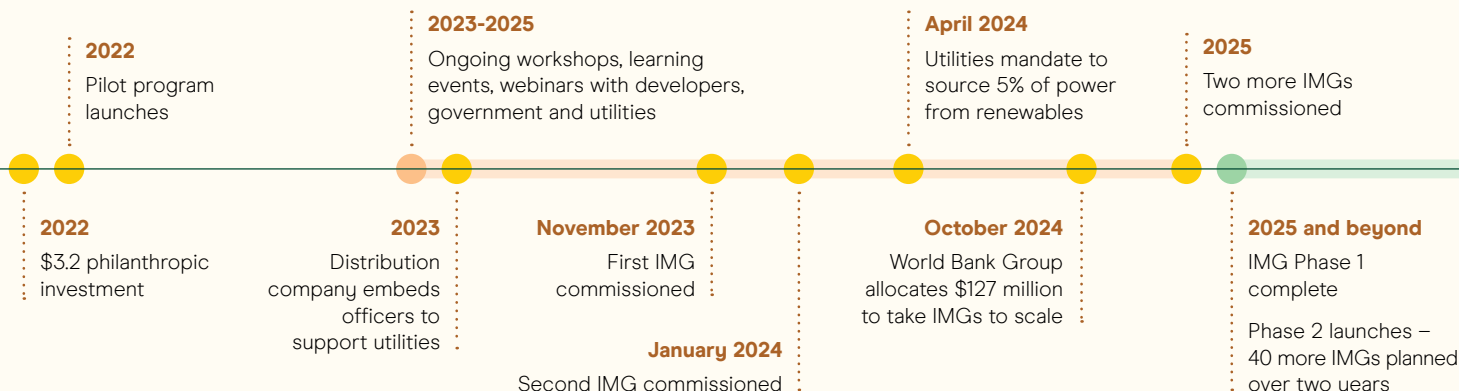
The IMG and EAP (see *Harvesting sunshine*, page 7) projects are already changing the way people live and work. With 30,000 people connected, businesses are expanding and farms are more productive. In total, 14,000 new jobs have been created, and the projects are on track to improve 94,000 livelihoods.

In Toto, where a yoghurt factory, a booming welding business and a new auto shop are all expanding thanks to new energy, an initial 300 new connections has already grown to 1,700 as more customers came on board. The developer, PowerGen, anticipates 3,000 more connections to come. New businesses are opening and homes are springing up as an influx of new residents are drawn by the promise of reliable energy.

At a government level, these crucial proofpoints have repositioned IMGs from a niche experiment to a core element of Nigeria's electrification strategy. Once seen as too costly or complex, they are now accepted as a viable energy alternative, with clear rules, committed capital and real momentum. The utilities we worked with now have dedicated IMG units with allocated staff and financial resources to drive implementation.

In 2024, the Nigerian Electricity Regulatory Commission, informed by the workshops and galvanized by the pilots, issued a new mandate. The mandate required that by 2025, utilities source 10 percent of energy from embedded generation — smaller scale, local distribution networks — with at least half coming from renewables. The policy shift is expected to drive 200MW of renewable energy capacity.

## How we took interconnected mini grids to scale



Persuaded by the early successes, the World Bank Group allocated \$127 million, with the expectation of mobilizing an additional \$190 million in private capital.

At COP30 in Brazil in late 2025, Nigeria's vice president, Senator Kashim Shettima, took the stage to share a bold new vision for the country's energy future.

Highlighting the country's commitment to carbon neutrality by 2060, and its ambitious Global Energy Alliance-supported [Energy Transition Plan](#) that aims to rapidly scale up solar and create 840,000 jobs by 2060, he said: "The Earth speaks in the language of loss and warning. It tells us that our survival is tied to its well-being. These are the cries that have compelled us to gather, from one city to another, in pursuit of one shared purpose – to save the only home we have."

But he also acknowledged that turning this ambition into action would take a village. "No nation can finance climate ambition with goodwill alone," he told leaders from both emerging and established economies. "We need a reliable and equitable architecture that recognises the realities of developing nations and empowers them to deliver on global commitments."

That call has been partially answered. Persuaded by the early successes, the World Bank Group has now allocated \$127 million to support the scaling of interconnected mini grids with the expectation of mobilizing an additional \$190 million in private capital.



## Energizing Agriculture Programme by numbers



**250** communities  
reached



**2300** appliances  
supplied



**\$160 million**  
financing unlocked

The Energizing Agriculture Program also played a pivotal role in embedding productive use practices into Nigeria's energy policy and national investment strategies.

In 2023, Nigeria's Rural Electrification Agency systematically integrated productive use considerations into its site selection for new mini grids to ensure they are designed and built in places that have the greatest need for energy to create and improve jobs. As a result, the agricultural industry is becoming more productive and efficient. Farmers are now using electricity-powered mills, grinders, threshers, hullers, de-kernelers and huskers. Even field officers who work with farmers are getting to the fields on electric bikes powered by the mini grids instead of noisy and dirty petrol.

In February 2025, Nigeria's Rural Electrification Agency, the UNDP and the Global Environment Facility signed grant agreements to deploy 23 new mini grids for productive use across the country, unlocking more than \$102 million in combined grant and co-financing. Together with a \$50 million investment from the World Bank Group and more than \$8 million in additional private sector financing, participating companies now have expansion plans that will reach 250 communities.



Inside a cold storage facility operated by Coldbox Store and powered by a Husk Power Systems mini grid in the Kiguna community, Nigeria. Photo: Global Energy Alliance

## What's next?

In 2025, Global Energy Alliance launched a second phase of the IMG project, creating the opportunity to build more than 40 IMGs in the next two years. The IMAGINE (Interconnected Mini Grids for Accelerated Grid Integration and Energy Access) project is aimed at accelerating IMGs, deepening regulatory engagement, implementing cutting edge technologies to improve grid performance and developing a framework to replicate the IMG business model.

Building on the momentum of the EAP, in January 2026 Global Energy Alliance launched the Energizing Women and Youth in Agri-Food Systems Programme in collaboration with RMI and the Mastercard Foundation.

The three-year program will deliver affordable, reliable clean electricity directly into the agricultural and food processing industries in Nigeria and Ethiopia. At the same time, it will train women — who make up the majority of the agricultural workforce — to use solar-powered equipment for irrigation, coffee processing, cold storage, milling and other agricultural activities. By enabling dry season farming, local processing and better food storage, the program is expected to improve profitability and local food resilience while creating an expected 17,000 jobs. In addition, it will improve the economic position of women who often face barriers to credit.



## Project partners

### Government, funders and implementing partners:

Rural Electrification Agency (REA), Nigerian Electricity Regulatory Commission (NERC), The World Bank Group (WBG), United Nations Development Programme, Rocky Mountain Institute (RMI)

### Utilities

Abuja Electricity Distribution Company (AEDC), Ikeja Electric (IE), and Kano Electricity Distribution Company (KEDCO)

### Developers

Bagaja Renewables, Darway Coast, PowerGen Renewable Energy, Husk Power Energy Systems,

Prado Power Nigeria Mini-Grid, Releaf Marketplace Nigeria, Solmenz Engineering Ventures Nigeria, ACOB Lighting Technology, GVE Projects, Nayo Tropical Technology

### Data monitoring

Odyssey Energy Solutions

### Productive use equipment providers and distributors

Afrimash, Babban Gona Farmer Services Nigeria, Coldbox Store, ColdHubs, Ecotutu, Energy Excell Systems and Solutions, Farm Warehouse, Koolboks, Metro Africa Xpress (MAX), Muhat Nigeria, One Acre Fund

## About Global Energy Alliance for People and Planet

Global Energy Alliance for People and Planet builds transformative public, private, philanthropic partnerships to end energy poverty and accelerate green economic opportunity. Founded in 2021 by The Rockefeller Foundation, IKEA Foundation and Bezos Earth Fund, we work in more than 30 countries to unlock finance, strengthen institutions and transform markets, delivering progress that goes beyond individual projects to drive lasting systems change.

Through our two interconnected global pillars, **Grids of the Future** — focused on innovation and infrastructure — and **Powering Opportunity** — with a focus on jobs and livelihoods — we work toward our vision: a world where everyone has access to affordable, reliable, clean electricity and the means to use it to improve their lives.

