



Global Energy Alliance
for people and planet

Powering hope in Haiti

Innovative solar mesh grids
deliver affordable clean power
and opportunity in
remote regions



5,000+ households
connected to electricity
(up to **25,000** to come)



1,900 jobs created
or improved



\$3.5 million
financing unlocked



At a glance

- Project: Haiti mesh grids
- Location: Haiti
- Duration: April 2023-ongoing

Objective

To scale a new, cost-effective technology that provides reliable, clean electricity in rural and semi-rural areas where the electricity grid doesn't reach.

Outcome and pathway to scale

Within 18 months of launch, more than 5,000 households — an estimated 21,000 people — were connected to electricity. With the help of concessional financing and business and technical support, the project established mesh grids as an affordable, reliable technology to deliver electricity in some of the world's most challenging environments. Along with the development of a stronger regulatory framework, these critical proof points helped shore up Haiti's nascent mesh grid model, unlocking \$3.5 million in follow-on donor financing, a pipeline to get to 10,000 connections and momentum to get to 25,000. A parallel pilot program provided communities with appliances such as freezers and charging devices, increasing the uptake of electricity, building confidence in mesh grid demand, and helping at least 250, mostly female entrepreneurs, to grow their businesses.

The road from the Cap-Haïtien port to Marchand-Dessalines is just 80 miles, but it can take four hours to drive, as Wislet Pierre Jean and his crew know only too well.

Their small truck, with solar panels strapped to the roof, bumps along dry, unpaved roads on a landscape dotted with scrub bushes. A serene, turquoise sea occasionally slides into view. But the rugged route is challenging, and not only for the truck's shock absorbers. With few security check-points, the road is also the scene of gang violence that has plagued Haiti for years.

"This doesn't stop us from reaching the communities who need electricity," says Jean, head of logistics for local energy company Alina Enèji, which is on a mission to deliver power to Haiti's remote off-grid areas.

About 40 percent of Haiti's population live in rural areas like Marchand-Dessalines, which is more than five kilometers away from the electricity grid and isn't part of any mini grid plans. Life is difficult here. Though the community has largely escaped the violence that has overtaken the capital of Port-au-Prince, it suffers from the country's deteriorating economic conditions and political uncertainty.

Haiti still labors under the effects of slavery and colonialism. The country formed the first Black republic in the world, following a rebellion led by enslaved people in 1791. But a crippling "independence debt" imposed by the French — estimated to be around \$23 billion in today's economy — left the country drained of resources and struggling to develop the infrastructure and conditions necessary for a thriving society. Today, just two percent of the country's rural population has electricity, ranking it far below most low-income countries, where rural access reaches up to 30 percent.

Lack of electricity holds back the most basic of needs — healthcare, education and jobs. According to research by the Inter-American Development Bank, based on the country's existing pace of electrification, it would take more than a century for Haiti to reach universal access to electricity.

In the meantime, Haitians innovate to make do. Many rely on kerosene lamps and candles for light. More than 70 percent of the country's annual energy use is estimated to come from sources like charcoal and firewood.

"When a community has access to electricity, everything improves — local economics, health, education, social stability," says Global Energy Alliance for People and Planet's Hali McKinley Lester. "If we can electrify hard-to-reach communities like Marchand-Dessalines, the impact will be immense."



Wislet Pierre Jean, head of logistics at Haiti mesh grid company, Alina Enèji.
Photo: Nadia Todres

But finding the right technology is a challenge. Haiti's nine regional electricity grids serve just under half the country's population. Most are limited to dense urban areas like Port-au-Prince. Due to the fragile state of Haiti's infrastructure and economy, the prospect of grid expansion seems unlikely at the pace needed.

Solar mini grids can supply large amounts of power, but can be expensive and must scale quickly in order to cover upfront costs. Individual home rooftop systems are simple to install and can cater to basic needs, but often don't provide enough energy to run large chillers or other tools critical to support businesses and drive economic growth.

Financial hardship is another major barrier. Haiti is one of the poorest countries in the world. Nearly half the population faces acute hunger. There is little capacity to pay for even the most minimal electricity access. Frequent accounts of political unrest make attracting new investment a challenge.

"This is an extremely tough environment to operate in," says McKinley Lester. "Proving a model in Haiti would provide a blueprint for electrifying hard-to-reach communities in challenging operating environments and fragile markets across the world."



Haiti by the numbers



11.7 million people



60% of the population live on \$3.65 a day



2% of the rural population have access to electricity

With little access to electricity, Haitian families innovate to make do. Many cook on firewood and use kerosene and candles for light. Photo: XXXX

New technology can electrify remote regions

Mesh grids fill a critical gap between individual rooftop systems and larger standalone mini grids. They deliver enough power for most household and small scale business uses, at a cost rural communities can afford, without requiring large-scale infrastructure.

Rooftop solar systems are connected together into clusters and **power is distributed via a low-cost hub-and-spoke system**. Houses that support solar panels are the 'hubs', while houses within a 50m radius form up to 12 'spokes'. Users generate and share power with each other and meters ensure that each home pays only for the electricity they use.

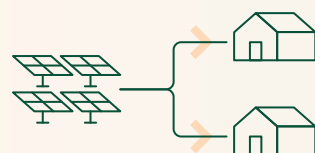
The systems are modular, allowing them to be easily re-configured if demand changes, avoiding high capital costs associated with traditional grid infrastructure. Installation is fast, requires little land and costs around **40 percent** less than other systems. The costs of solar panels and batteries in Haiti have fallen **80 percent over the last decade**, and software improvements allow multiple power sources to be connected to the main panel.

Mesh grids are also less reliant on overhead lines that can be damaged by extreme weather events or vandalism. In 2016, Hurricane Matthew displaced 175,000 Haitians and caused damages estimated at **nearly a third of the country's GDP**. Climate change is expected to increase the frequency and severity of these kinds of storms. Because mesh systems are contained to just a small number of households, outages can be easily and swiftly addressed.

Mesh grids offer a niche, low-cost solution in rural and remote areas that aren't yet candidates for mini grids or existing-grid extension.

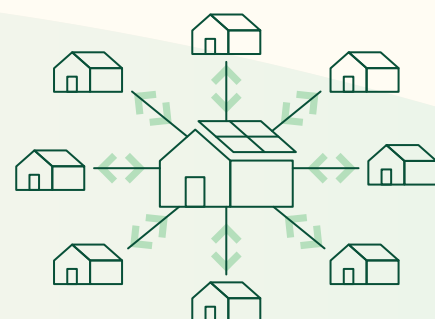
"The majority of last-mile communities all over the world have less than a thousand households," says Euromina Thevnin of Okra Solar, the mesh grid technology company. "Mesh grids provide a way for communities — specifically sparse communities — to have access to affordable and reliable energy."

The benefits of mesh grids



Centralized mini grids

- Requires land purchase and licensing
- 12-18 month deployment times
- Land acquisition requires village-wide consensus
- Not safe for untrained technicians
- Power failure brings down the whole grid
- Operating costs per house \$40-80/year



Decentralized mesh grids

- Doesn't require land
- Can be deployed immediately
- Direct agreement with household and community only
- Can be operated by local trainees
- Issues and outages are isolated
- Operating costs per house \$10-20/year

Accelerating a pilot mesh grid project

When Global Energy Alliance first became aware of the mesh grid work in Marchand-Dessalines in 2021, the community had 35 connections. By 2023, Alina Enèji, in partnership with Okra Solar and Off Grid Electricity Fund, had grown connections to 1,000 households.

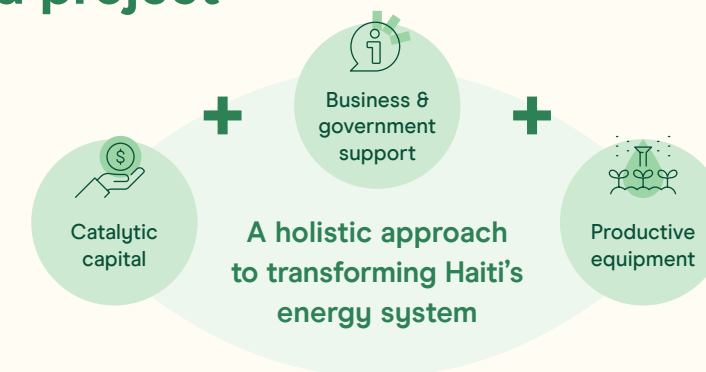
But the pace of growth was slow and attracting follow-on capital was hard. Many would-be investors deemed the risks too high and were yet to be convinced of the returns.

"We were so small we couldn't get the conversations started," said Driko Ducasse, founder of Alina Enèji (see sidebar, page 6)

It was clear that to attract further investment, the work would have to scale further and faster, proving the viability of both the company and the technology.

Global Energy Alliance's intervention centered on a well proven model: intervene in a market that is promising but stalled, and combine concessional capital, technical support, critical tools and cross sector coordination to unlock bottlenecks and enable scale.

In rural Haiti, rooftop solar systems are a connected together in 'mesh grids' - a fast-to-deploy, resilient solution to bring electricity to remote, off grid communities. Photo: Nadia Todres



To help jumpstart Alina Enèji's ambitions, Global Energy Alliance provided both a direct grant to ease immediate cash flow challenges, and a returnable grant due for repayment when the company became cash positive — projected to be in 2027.

At the same time Global Energy Alliance helped Alina Enèji set formal business policies and procedures with customers and employees — essential practices that investors would expect.



“Global Energy Alliance stepped in at a pivotal moment,” said Ducasse. “We had the infrastructure in place, but they helped us formalize the business and our operations.”

With new funding secured, installations starting expanding, with an initial focus on the area around Gonaïves, a city on Haiti’s west-central coast where many households have electricity for as little as two hours each day; and Plaisance, an isolated area in the north of the country, that lacks any access to electricity at all.

Meanwhile, Haiti’s government sought help to formulate regulations for emerging power technologies. Global Energy Alliance funded specialists to work alongside the country’s National Energy Sector Regulatory Authority and the Ministry of Public Works, Transport and Communications. These experts helped the agencies devise a regulatory foundation for off-grid energy systems, informed in part by Alina Enèji’s pilot.

A powerful homecoming

After obtaining his MBA from the University of Chicago’s Booth School of Business, Driko Ducasse knew exactly where he wanted to be: back in the country of his birth, bringing electricity to remote areas of Haiti.

Born of a business-school project, Alina Enèji is Ducasse’s effort to provide affordable, reliable, clean electricity to underserved rural communities.

“I have a certain type of knowledge and I will attempt to apply it to help Haiti the best that I can,” 35-year old Ducasse said.

Raised in Miami, Ducasse hadn’t initially planned on building a solar business in Haiti. But in 2015 he returned to Haiti for his mother’s funeral and saw a country wracked by political unrest and struggling to recover from a devastating 2010 earthquake.

Determined to make a difference, Ducasse began working on a business plan for Alina Enèji. He began installing mesh grids in Haiti in 2021.

The company encounters frequent and unusual hurdles. A few years ago, a gang stole solar panels from a truck. A worker recognized one of the gang members and made a few calls. The gang immediately understood the value of solar to the community, and the panels were quickly returned.



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On another occasion, a gang cut cables that connected electric meters with telecommunications towers.

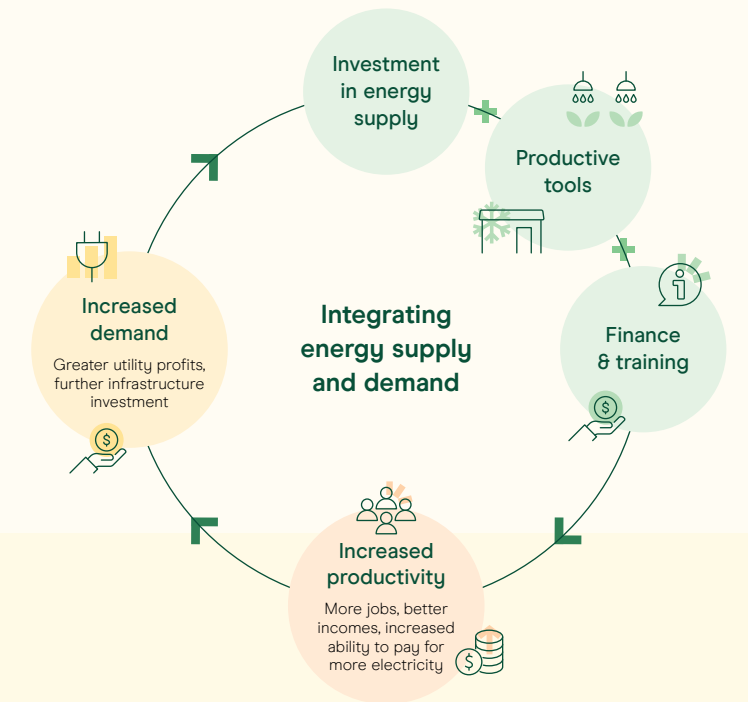
Nonetheless, Ducasse remains upbeat. The company has already unlocked \$3.5 million in investment and is on track to deliver power to 10,000 homes by the end of 2026. The company’s next target is 25,000 homes.

Ducasse hopes his story can inspire Haitians around the world.

“If other members of the diaspora could get invested in Haiti, that would help,” he said. “I’m just trying to do my part.”

The funding also helped pay for basics that could make the government more productive and efficient - from office supplies and laptops to software and training.

“This may seem like very basic support,” McKinley Lester said. “But for a government that operates on very thin margins, these are the tools that will enable progress to continue long after the grant period ends.”



Tools for a productive future

Supplying electricity alone is not enough. To ensure new mesh grids remain commercially viable and drive economic growth, it is also necessary to grow electricity demand from businesses driving economic development in local communities.

In Haiti, early data showed that less than seven percent of Alina Eneji’s customers use electricity for income-generating activities. But those customers generate more than half the company’s monthly revenue — paying up to \$30 a month for electricity compared to just \$2-3 a month for basic users.

By growing the number of customers who use electricity to power small businesses, we could stimulate the market while also helping people improve their own lives.

In 2021, Global Energy Alliance joined forces with the Fonkoze Foundation, a non-profit focused on improving the lives of Haitian women, to run a small pilot project incorporating electric equipment, such as freezers, fans and blenders, into households that receive power from the mesh grids.

According to the Fonkoze Foundation one solar powered appliance can increase business revenue by up to 40 percent.

“Providing access to just one piece of equipment can change lives,” says Carine Roenen, executive director of the Fonkoze Foundation.

Altogether, the pilot provided 250 pieces of equipment to communities. Charles Elidor, who lives in the area surrounding Gonaïves received a freezer that incorporates a charging device. He uses the cooler to store and sell cold drinks, while customers use it to power their phones and tablets for a small fee.

“My freezer business alone can pay for my electricity use,” he says.



✂ “My freezer business pays for my electricity use.” - Charles Elidor, entrepreneur, Gonaïves. Photo: Global Energy Alliance

Our impact: More power draws additional investment

In just 18 months, Alina Enèji had connected nearly 5,000 households across 48 villages — reaching an estimated 21,000 with electricity. With the cost of each new connection at \$545 — roughly a **third of the cost** of mini grids — and operating costs falling from \$5 to \$2.61, the project proved that mesh grids can deliver reliable and commercially viable electricity in one of the world's toughest markets.

This validation unlocked \$3.5 million in follow-on funding, including a \$1.7 million World Bank loan and \$1.8 million grant from IDB Lab, the innovation and venture arm of the Inter-American Development Bank Group.

With this additional funding, Alina Enèji plans to reach 10,000 households by the end of 2026.

The program's success unlocked \$3.5 million in follow-on funding. Alina Enèji plans to harness this funding to reach 10,000 households.

Alina Enèji is on track to connect 10,000 homes to electricity by the end of 2026.
Photo: Nadia Todres

Mesh grids are also now officially integrated into Haiti's Horizon 2050 national electrification plan which aims to deliver reliable electricity to 250,000 homes and businesses — 60 percent of the population.

"Universal electricity access will not be achieved through traditional grid expansion alone," said Dr. Evenson Calixte, managing director of Haiti's energy regulator, ANARSE. "Mesh grids, mini-grids and solar home systems must become central pillars of our electrification strategy. Through a stronger regulatory framework and coordinated public-private action, Haiti can now accelerate access to reliable, affordable and clean electricity for millions of Haitians."

The model has also unlocked opportunities far away. Mesh grids have been integrated into a \$750 million World Bank Group investment in Nigeria. Okra Solar has teamed up with Nigeria's Rural Electrification Agency to provide mesh grid technology to **100,000** underserved homes — delivering energy to 500,000 people.

Learnings from Haiti helped unlock a plan to deliver mesh grids to 100,000 homes in rural Nigeria.

The path forward: Powering a productive future

With a clear path to profitability and growing demand for power, Alina Enèji is positioned to scale rapidly. If the company achieves its goal of connecting 10,000 Haitian households to mesh grids by the end of the year, it will become cash-flow positive for the first time and have demonstrated a viable commercial pathway for last-mile electrification. This will fuel the company's ability to attract further investment and reach its goal of connecting 25,000 households to power.

Meanwhile, energy uptake in Haiti is growing. Entrepreneurs are using freezers to chill drinks, preserve meat and fish and sell blocks of ice. Others are using solar-powered printers in small businesses. Improved lighting has created a greater sense of community wellbeing. Women are safer being outside at night and shops and businesses are operating after dark.

There is still more work to be done. Many households that began using electric kettles and blenders after mesh grids were installed still rely on biomass and fossil fuels for cooking.

In partnership with Fonkoze, NRECA International, TTA and others, Global Energy Alliance is looking to increase the supply of productive tools and to harness mesh grids to power more demanding industrial uses, such as agricultural processing or water treatment facilities.

Meanwhile, Alina Enèji remains clear-eyed about the challenges ahead. In 2024, fuel shortages caused telecoms providers to phase out the provision of 2G and 3G mobile networks on the island, forcing the company to find new ways to track electricity usage. Transportation and political disruptions continue, and port fees can swing wildly from one day to the next.

Installation sites are often inaccessible by vehicle so installers must carry the solar panels over rugged terrain to remote homes.

But the response of communities when they do arrive makes the struggle worthwhile. In the community of Anse Rouge, resident Maxo Seraphin jumped at the chance to volunteer with the company helping with everything from signing up community members, to carrying panels and helping with installations.

"Even if the journey is a trek, it doesn't discourage Alina from coming out here," he said. "Electricity puts a long, lasting smile on people's faces."

“

Electricity puts a long, lasting smile on people's faces.”

– Maxo Seraphin,
local resident,
Anse Rouge



Project partners



Financing partners

Off Grid Electricity Fund, World Bank Group, Inter American Development Bank

Energy company

Alina Enèji

Technology companies

Okra Solar

Government partners

MTPTC Energy Cell, ANARSE

Technical partners

Trama TechnoAmbiental (TTA), CrossBoundary

NGO partners

Fonkoze Foundation, Haitian Institute of Energy

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.



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