

CrossBoundary Mini-Grid Innovation Labs East Africa, Zambia and Nigeria

The Mini-Grid Innovation Lab works with minigrid developers to identify, test, and scale innovative prototypes that improve the business model.

As part of these efforts, the Lab is running a prototype to help developers test whether appliance financing can increase consumption, and therefore profitably drive revenue and improve the business model. Early results suggest offering appliances on credit to rural mini-grid customers unlocks latent demand for electricity, and therefore increases revenues.



A NEW GRAIN MILL
CONNECTED TO
ELECTRICITY IN
TANZANIA. PHOTO
COURTESY POWERGEN

THE SITUATION

- Today, rural customers' energy use is too low to generate sufficient revenue for developers to sustainably operate mini-grids
- Consumption is limited by how much people can afford and what they can do with the electricity. Without appliances, customers miss out on the full benefits of electrification, and developers can't sustainably serve them
- Appliance financing could solve this, breaking high upfront costs into more manageable monthly payments. To find and scale a commercial model that works, we must have confidence that appliance financing programs will be profitable, and determine which appliances make them most so

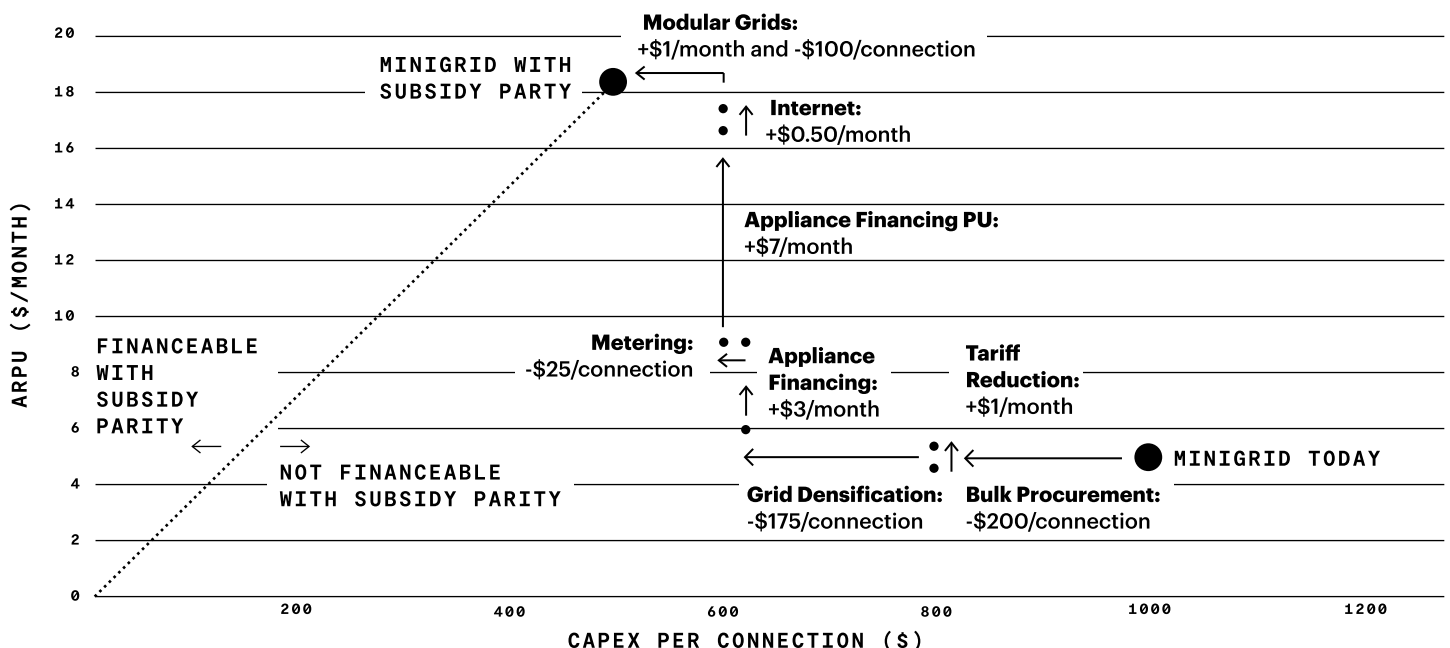
THE SOLUTION

The Lab has three stages of research and pilots on appliance financing, and has sold 663 appliances on credit across 27 sites in East Africa and Nigeria:

- 1.0:** Tests household appliances, such as TVs, fridges, and speakers.
- 2.0:** Tests productive use appliances, such as grain mills and welders, and introduces a payment platform to simplify tracking of loan repayments.
- 3.0:** Tests productive use appliances designed to deliver the output and performance required by rural off-grid customers in Africa, to compete with diesel-powered equivalents.

The Lab has identified eight innovations that together could reduce CAPEX per connection from \$1,000 to \$500 and increase average revenue per user (ARPU) from \$5 to \$17.50 per month

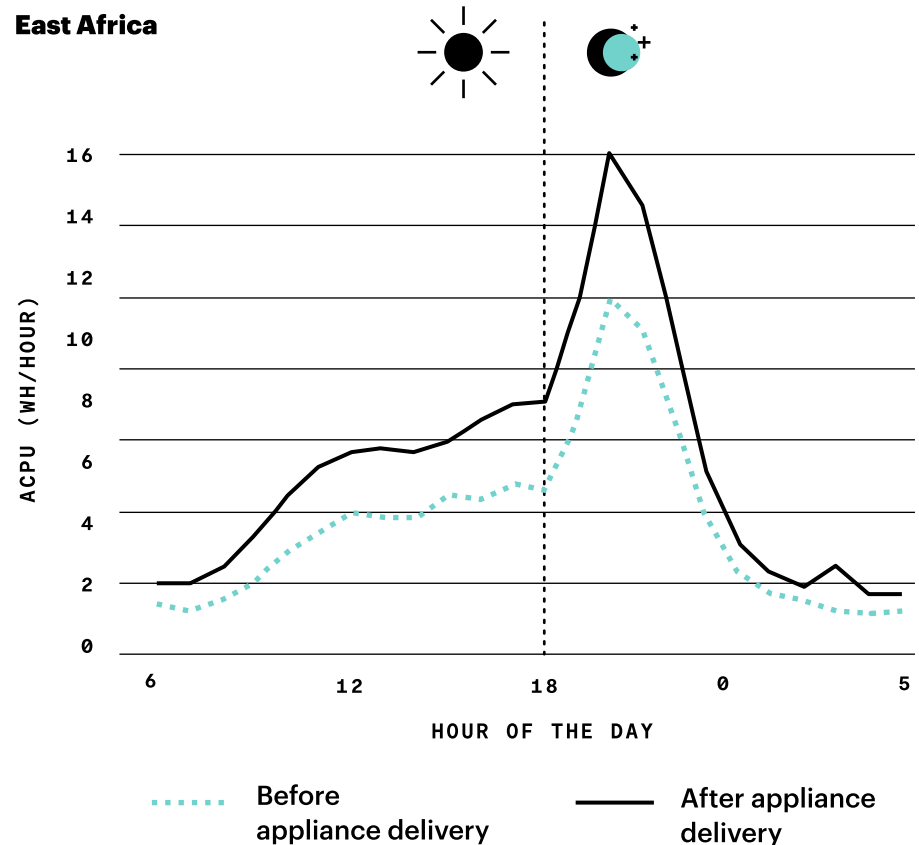
Labs Impact on ARPU and Capex per Connection, by Prototype



THE IMPACTS

- Early results suggest rural minigrid customers are ready to consume more electricity, but don't have the means to put this energy to use. For the first five months following appliance delivery, appliance purchasers in East Africa and Nigeria consumed nearly twice as much electricity
- Household appliances are principally used in the evening, increasing the cost of providing power. Productive use appliances increase daytime load and generate income for users, in turn allowing them to spend more on electricity and appliances
- Provision of accessible finance tapped into a strong latent demand for appliances that shows potential for a much larger-scale positive feedback cycle

Average consumption per user (ACPU) by hour, pre and post appliance delivery, East Africa



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Deploying the Lab's Appliance Financing prototype has proven to increase energy consumption on site, which has in turn grown our revenues. We previously tried running appliance financing schemes, but never had the tools or resources to scale the programs on our own. With the Lab's support, we've reached more customers and a greater variety of customers, thereby generating more data to understand the impact of the program.

”

Olusegun Odunaiya
CEO, Havenhill Synergy



A MINI-GRID CUSTOMER
RECEIVING HIS NEW
FINANCED APPLIANCE.
PHOTO COURTESY POWERGEN

READ MORE ABOUT APPLIANCE FINANCING, AND ALL OF THE LAB'S PROTOTYPES HERE:

www.crossboundary.com/labs

FURTHER READING – OUTPUTS OF THE MINI-GRID INNOVATION LAB

- **MILLING ON MINI-GRIDS: HOW AFRICA'S LARGEST CROP COULD GO DIESEL-FREE**
Learnings from the Lab's second iteration of its Appliance Financing prototype (April 2020)
- **DO SURVEYS FALL SHORT? SOLVING THE CHALLENGE OF PREDICTING MINI-GRID ENERGY USAGE IN AFRICA**
Results from the Lab's machine learning analysis to predict mini-grid customer energy demand (December 2019)
- **LOW ENERGY CONSUMPTION = UNPROFITABLE MINI-GRIDS. IS APPLIANCE FINANCING THE ANSWER?**
Initial results from the Lab's Appliance Financing prototype (August 2019)
- **ARE RURAL CUSTOMERS READY TO CONSUME MORE ENERGY AT THE RIGHT PRICE? NEW MINI-GRID RESEARCH OFFERS INTRIGUING RESULTS**
Initial results from the Lab's Tariff Reduction prototype (May 2019)

EFFICIENT APPLIANCE MANUFACTURE

Efficient injera mitad manufacture Ethiopia 2017-2020

Electric mitads for cooking injera are increasingly used in Ethiopia. Rapid uptake of more efficient models has been driven through developing more efficient technologies, implementing product standards, and training local manufacturers.



INJERA MITADS ON SALE
IN **ETHIOPIA**. PHOTO
COURTESY RMI

THE SITUATION

- As incomes and electrification rates increase, Ethiopia sees increased use of electric mitads to cook injera
- The use of these cookers contributes to high energy bills and peak demand on the national grid
- Local manufacture makes up a significant proportion of the market
- Conventional products have 4kW rated power, 20-minute start-up time, and low efficiency (<55%)

THE SOLUTION

Research projects led by local universities, often with international partners, developed and tested more efficient mitad technologies.

A national product standard was published, establishing minimum quality and efficiency levels.

Local manufacturers have been trained to enable them to improve their processes and increase product efficiency to meet national standards.



GATHERING MATERIALS
PHOTO COURTESY
ZEWGE WORKU

THE IMPACTS

Dozens of manufacturers have received training and technical support to improve their processes, adopt new technology, and provide higher quality appliances for the domestic market. By meeting and exceeding the new product standards, manufacturers are benefiting their consumers and helping limit peak power demand on Ethiopia's grid, freeing up capacity for new connections.

ETHIOPIAN ENERGY AUTHORITY:

www.eea.gov.et

FURTHER READING

- EFFICIENCY FOR ACCESS COALITION
- QUALITY ASSURANCE FOR APPLIANCES AND OFF-GRID SOLAR
VeraSol
- ENERGY EFFICIENT LIGHTING AND APPLIANCES PROJECT
EACREEE



INJERA MITADS AND
ELECTRIC COOKERS READY
FOR SALE. PHOTO COURTESY
ZEWGE WORKU

A PROJECT FINANCE FACILITY FOR MINIGRIDS

CrossBoundary Energy Access (CBEA)

Africa

Launched in 2019

CrossBoundary Energy Access (CBEA) is Africa's first project finance facility for minigrids. The fund invests long-term equity and debt in minigrid projects through a project finance structure, helping to take projects off developers' balance sheets. The facility is a significant step towards a more mature distributed energy market in Africa where developers can access financing to keep developing new projects.

AERIAL VIEW OF A SOLAR
MINIGRID POWERING A
RURAL COMMUNITY. PHOTO
COURTESY POWERGEN
RENEWABLE ENERGY



THE SITUATION

- Minigrids are typically built on developer's balance sheets, exposing investors to all the other risks that a company faces
- Minigrids sell to retail consumers who are receiving electricity for the first time, which makes it difficult to fix or predict revenues
- A typical Individual minigrid capex is ~\$0.1m, well below the minimum \$5m-\$10m ticket size that can justify fixed transaction costs

To grow, minigrid developers need long-term, low cost capital, and long-term de-risked regulatory frameworks.

THE SOLUTION

CBEA's approach to investing in minigrids has three distinctive features to address the barriers to accessing finance for minigrids:

- Isolate minigrid assets from the companies that own and operate them,
- Allocate the infrastructure risks to the assets and operating risks to the operators, and
- Aggregate minigrid assets into large, diversified portfolios that can attract long-term equity and debt.

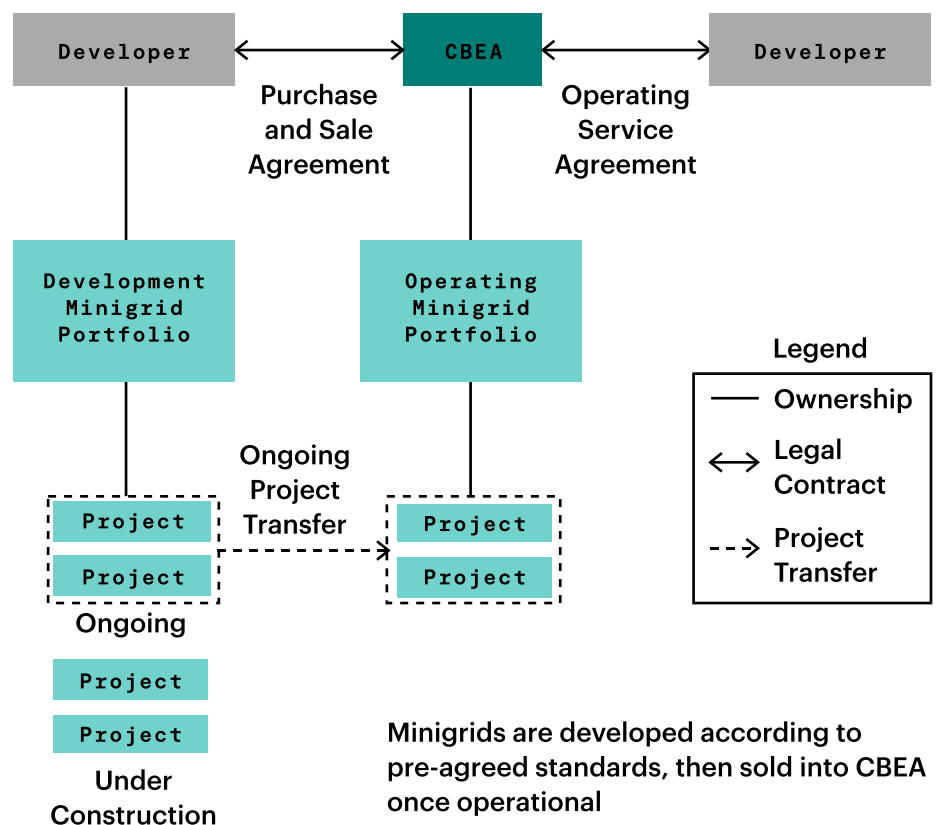


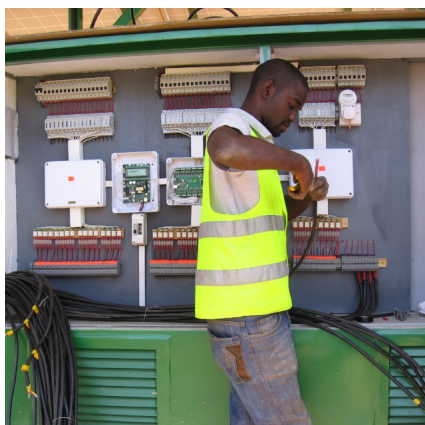
→ [GO TO VIDEO](#)

THE IMPACTS

- CBEA owns eight minigrids, with 10 additional operating minigrids in the development pipeline
- CBEA's portfolio has maintained over 92.5% uptime, powering rural households and income-generating activities (e.g. grain mills)
- Since launching in 2019, CBEA has raised US\$18M in blended finance, with the goal to provide first-time power to 100,000 people across Africa

CBEA process: Using project finance to invest in minigrid as infrastructure





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Project finance is an established way to finance large infrastructure projects, but this is the first time it has been applied to rural minigrids in Africa. We believe that this is key to unlocking more than US\$11 billion for minigrids needed from investors to connect at least 100 million people to power.

”

Gabriel Davies

Head of Energy Access,
CrossBoundary

READ THE FULL CASE STUDY HERE:

www.crossboundary.com/energy-access

FURTHER READING ON RESULTS-BASED SUBSIDIES

- **GREEN MINI-GRID HELP DESK: FINANCING**
SE4ALL Africa Hub
- **PROJECT FINANCE MODEL EMERGES FOR AFRICAN
MINI-GRIDS**
Inspiratia 2019
- **INCREASING PRIVATE CAPITAL INVESTMENT INTO
ENERGY ACCESS: THE CASE FOR MINI-GRID
POOLING FACILITIES**
Dimitry Gershenson, Matthew Tilleard, and Jake Cusack,
UNEP 2015

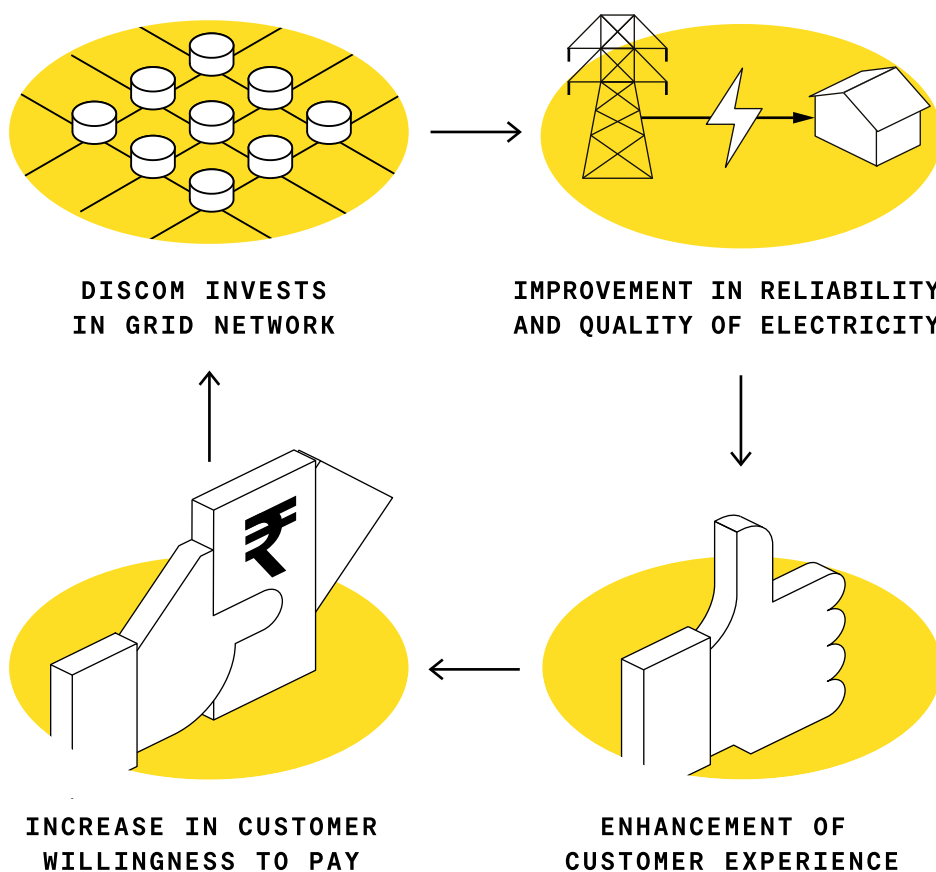
ENERGY SERVICES FRAMEWORK (ESF)

Model Distribution Zone (MDZ) program

State of Odisha, India

Initiated in August, 2019

By increasing community involvement and using cutting-edge technology, this program shows how last mile services to customers can be improved while reducing utility losses and improving electricity distribution company (DISCOM) billing and revenue collection.



THE SITUATION

- Low reliability of utility energy services
- Low customer satisfaction, and as a result, challenges with bill collection
- High distribution company losses

THE SOLUTION

The MDZ worked to improve the reliability and quality of grid electricity supply, enhance customer experience by introducing best in class practices in last mile supply, and engage communities in building localized sustainable business models in rural electricity supply.

As part of this, the Women Self Help Groups (WSHGs) known as Bijuli Didis were trained to become metering, billing, and collection (MBC) agents within the community. Bijuli Didis are responsible for MBC services, grievance redressal, and ensuring customer satisfaction.



A BIJULI DIDI CARRYING OUT BILLING ACTIVITY IN THE COMMUNITY.

THE IMPACTS

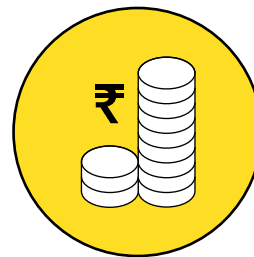
- The program demonstrated a “Model Distribution Zone” approach to improving last-mile service that can be replicated for millions of
- It is expected to improve power reliability for more than 550,000 people
- It will connect 500 micro-enterprises to the grid
- 160 jobs have been created for women



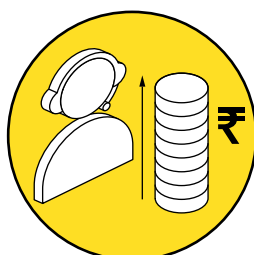
1 Additional 4000 customers started to receive their bills monthly.



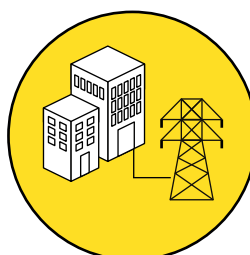
2 Additional 2000 customers started paying their bills on time.



3 Revenue increase of Discom of more than Rs. 1 Crores [added to state exchequer] over the pilot period of six months.



4 Income of nine RRFs engaged as customer service agents increased by **50%** from **Rs 8,000 to Rs 12,000** per month.



5 48 enterprises connected to electricity grid.

→ **340 kW+** added to electricity grid [load equivalent ~12 operating minigrids]

→ **100+ tonnes** of less CO2 emissions per annum.

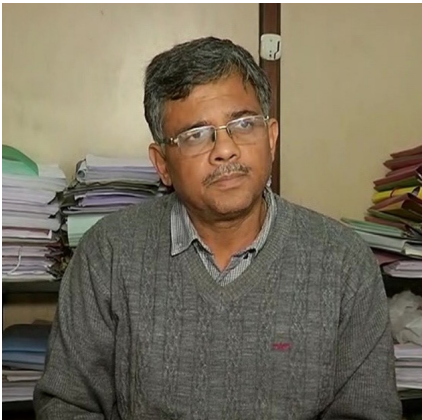


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It is commendable to see the lead that the Odisha government has taken in reforming the power sector over the years. However, apart from enhancing the supply of electricity to the rural areas, it is imperative that the quality and efficiency of electricity and customer service is improved to make electricity distribution viable for DISCOMS.

Mr. Jaideep Mukherji
CEO, SPI

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“

The SPI – TPCODL partnership will aim to design a financially viable roadmap to ensure reliable electricity supply in rural areas, through an innovative community based strategy enabled by technology, in delivering last mile services, to enhance customer experience.

Manoj Kumar Singh
Senior General Manager
(CS & RA), TPCODL

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“

After I became a Bijuli Didi, I have been able to serve the community by helping them pay on time and solving their problems. I feel very proud and the community is very responsive towards me.

Bishnupriya Dash
Member of WSHGs

”

LEARN MORE

www.smartpowerindia.org

FURTHER READING ON SMART POWER INDIA'S WORK

→ [SMART POWER CONNECT: EMPOWERING RURAL COMMUNITIES AND TRANSFORMING LIVES](#)

MINIGRID COST REDUCTION

Mlinda Minigrid Projects Jharkhand State, North Eastern India 2016–2020

Mlinda works in over 40 villages in the district of Gumla, building minigrids to power productive use and institutional loads, with a replicable approach. By driving down equipment costs, optimizing design, and strongly supporting load growth, Mlinda can provide affordable energy for rural communities.



**MINIGRID INSTALLATION
BY MLINDA**

THE SITUATION

- Around 13%, or nearly four million people, in Jharkand state do not have energy access. Another 10 million people are dissatisfied with unreliable grid power
- Across India, around 20% or 240 million people are still without power
- Minigrids could reach many of these people more affordably and reliably than grid extension, but costs remain high

THE SOLUTION

Through its Rural Electrification Program, Mlinda engages communities using standardized site selection criteria. Following load analysis, the program then designs, installs, maintains and monitors the grid, working closely with the communities.

Crucially, Mlinda also has a dedicated business development team to ensure minigrid users have the appliances they need for electrified productive use. The grids are set up for modular expansion.

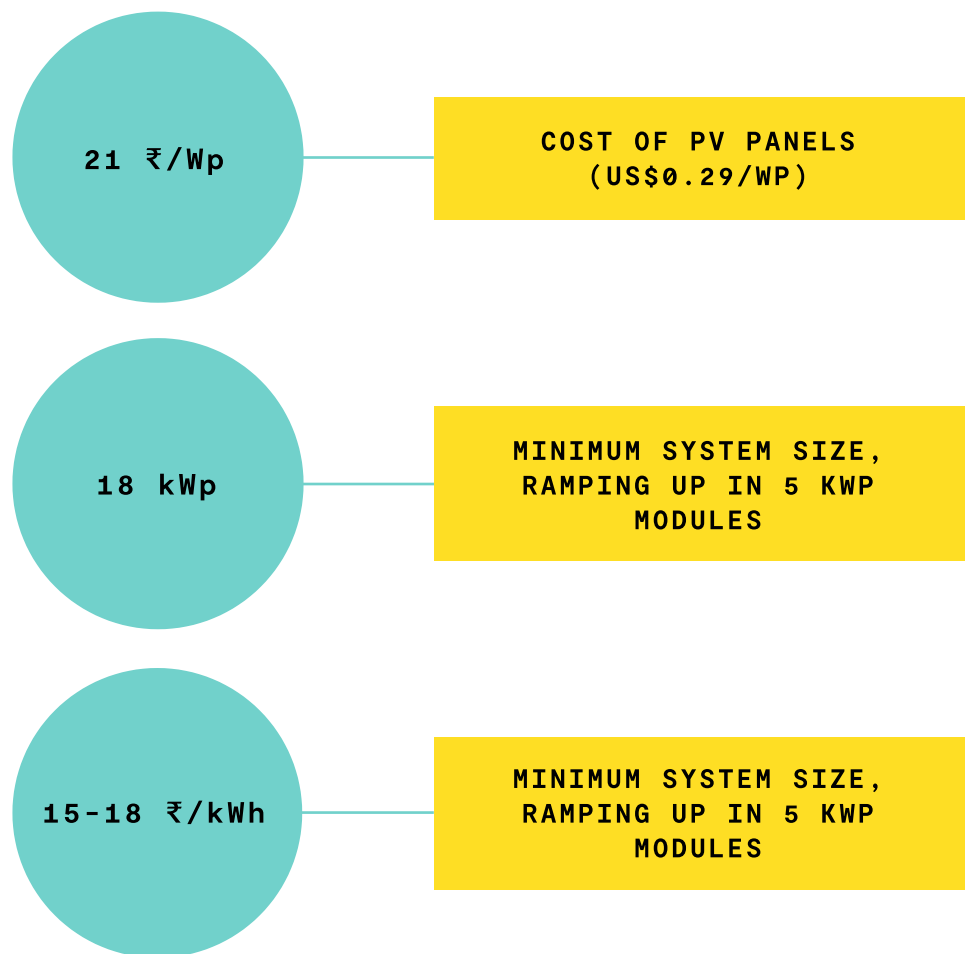


→ [GO TO VIDEO](#)

THE IMPACTS

- 50 villages and 40,000 people now have reliable energy access for domestic needs and productive uses
- Incomes among customers have risen by over 12%
- Minigrid capital costs were reduced by 45% in just over a year as designs were refined
- Engaging consumers drives 2% monthly load growth, allowing modular expansion of the minigrids and dropping costs even further

Graphic of Cost Reduction



MORE INFORMATION

www.mlinda.org

READ MORE ABOUT MINIGRID COSTS

- STATE OF THE GLOBAL MINI-GRIDS MARKET REPORT
Mini-Grids Partnership 2020
- MINI-GRIDS FOR HALF A BILLION PEOPLE: MARKET OUTLOOK AND HANDBOOK FOR DECISION MAKERS
ESMAP 2019
- MINIGRIDS IN THE MONEY: SIX WAYS TO REDUCE MINIGRID COSTS BY 60%
RMI 2018

A ROBUST MINIGRID REGULATORY FRAMEWORK

**Energy and Water Regulatory Commission
Sierra Leone**

Passed in December 2019

Based on strong regulatory frameworks in Nigeria, Tanzania, and at the state level in India, the Government of Sierra Leone developed and approved a minigrid regulatory framework that works for the citizens of Sierra Leone while attracting minigrid developers and investors.



**BATTERIES AND INVERTERS
ON A MINIGRID IN SIERRA
LEONE. PHOTO COURTESY
INENSUS**

THE SITUATION

- Sierra Leone has one of the lowest energy access rates in Africa, at 20%. In rural areas, it is even lower, 5%
- Least-cost mapping suggest that around 2.9 million people could be best served by minigrids
- Prior to 2018, there were fewer than six renewable minigrids in the entire country
- One major contributor to this low number was unclear regulatory risk for developers

THE SOLUTION

A robust regulatory framework modeled on lessons from other African countries and India that includes cost-reflective tariffs, a clear process for licensing and permitting, and a plan for when the grid arrives at an off-grid minigrid site.



MINIGRID IN **SIERRA LEONE**. PHOTO COURTESY INENSUS

THE IMPACTS

- As a result of increased confidence from these regulations and investor support, progress in the sector has accelerated
- In total, 46 minigrids are operational and providing electricity to customers at a tariff approved by the regulator
- Another 27 minigrids are under different stages of construction in 2020, and a total of 94 minigrids are planned

Sierra Leone minigrid regulations and their impact on minigrid development

INNOVATIVE REGULATORY COMPONENT

IMPACT

Tariff
Evaluation
Approach

Flexibility around the timing of tariff evaluation allows for typical initial fluctuations in expenditures but eventually provides long-term predictability.

Calculating Asset
Depreciation

Using annuity-based depreciation instead of straight-line depreciation to determine allowed revenue helps operators charge a flat tariff in the initial years of operation while electricity demand increases.

Performance
Related Profit
Margin (PRPM)

For a highly subsidized minigrid project, the private operator does not have any scope for margin since the calculated return is very low. Using PRPM per kWh allows the operator to earn a small margin over its operational services, even in the case of high subsidy projects.

Clear Guidelines

The operator is compensated if the national grid arrives within the project's lifetime.

Regulation of
Market Entry

Minigrid operators with distributed power up to 10 MW in total are eligible to obtain a **full minigrid license, which simplifies the permitting required for the development of individual sites** and encourages private investors to enter the market.



“

The Mini Grid Regulations in Sierra Leone which were approved in 2019 have provided the legal framework for the development of mini grids in the country. They also created a conducive environment for attracting investments by private sector players and donor participation, thereby increasing the general population's access to electricity.

”

Brima Bah

Director Economic
Regulations, SLEWRC

SIERRA LEONE'S ELECTRICITY AND WATER REGULATORY COMMISSION'S MINI-GRID REGULATIONS: CASE STUDY HERE:

www.ewrc.gov.sl/mini-grid-regulations-2018-2

FURTHER READING

- GREEN MINI-GRID HELP DESK: HELP DESK FOR POLICYMAKERS AND REGULATORS
AFDB
- MINIGRID MARKET ASSESSMENT: SIERRA LEONE
Green Mini-Grid Market Development Programme 2019
- POLICIES AND REGULATIONS FOR RENEWABLE ENERGY MINI-GRIDS
IRENA 2018
- PRACTICAL GUIDE TO THE REGULATORY TREATMENT OF MINIGRIDS
NARUC 2017
- THE MINI-GRID POLICY TOOLKIT
EUEI 2014

REACHING THE LAST MILE IN NEPAL

Reaching the last mile through integrated electrification planning

Nepal's ambitious electrification program includes public and private actors, working alongside communities and local government to reach deep rural areas and provide energy solutions for economic development.

A SOLAR INSTALLATION IN
NEPAL. PHOTO COURTESY
SEFORALL



THE SITUATION

- Nepal has increased electrification rates from 51% to 96% over ten years, largely through grid roll-out
- There is a need for increased financing and construction of renewable energy other than hydropower
- To reach the last 4% of the population, often in mountainous regions, new solutions must be deployed

THE SOLUTION

Accelerating renewable energy deployment both on-grid and off-grid is a priority for the Government of Nepal, with a focus on providing clean power to the poor and disadvantaged, including marginalized communities.

Integrated electrification planning allows coordination.

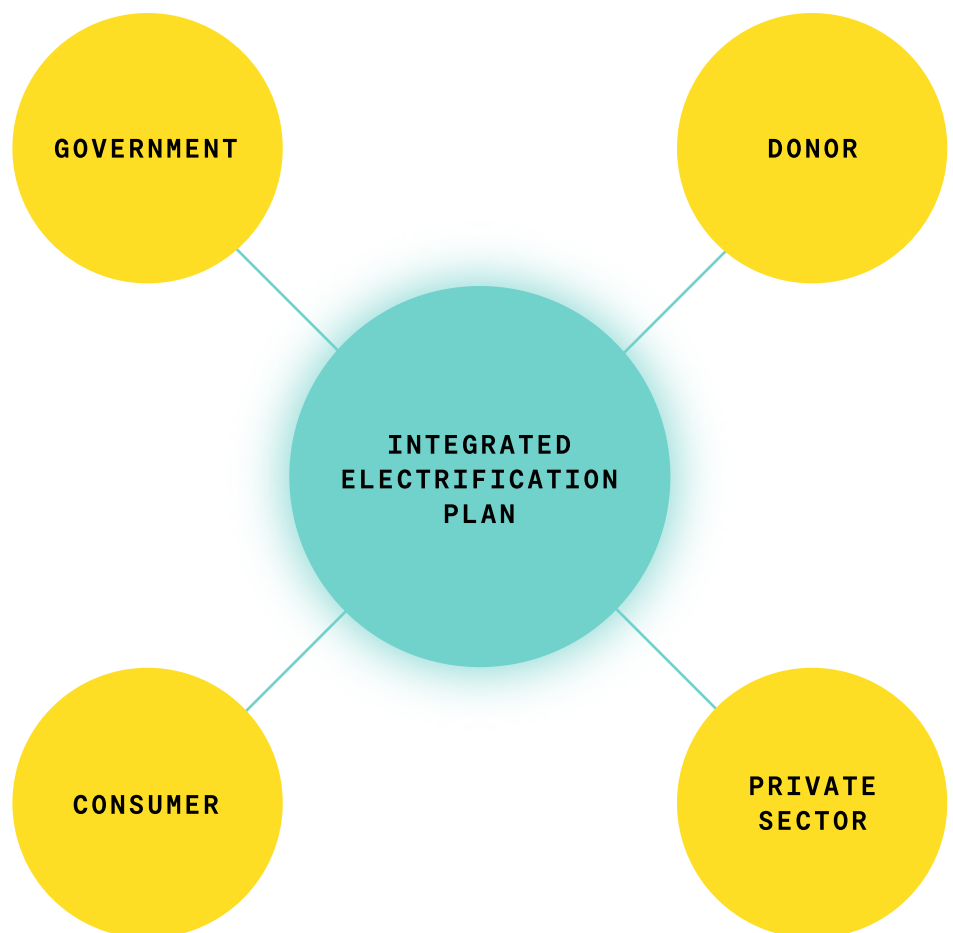


→ [GO TO VIDEO](#)

THE IMPACTS

- The Government of Nepal's 2017 Small Scale Renewable Energy Framework harmonizes regulations and opens space for the private sector to work alongside government, deploying new solutions to help reach universal access
- Community-owned minigrids have become possible, and complement the traditional grid, rather than competing
- Local governments are playing a major role in program design, drawing on deeper understanding of local context and demand

Actors Involved in Integrated Electrification Planning





“

We are supporting the private sector in coming up with innovative, digital financial solutions to reach the last mile, and together with the local government entities, federal government entities, and the private sector, there is so much that can be achieved.

Monisha Shrestha
Fund Mechanism
Manager, UNCDF Nepal

”

LEARN MORE

www.seforall.org/integratedelectrification

FURTHER READING ON RESULTS-BASED SUBSIDIES

→ INTEGRATED ELECTRIFICATION PATHWAYS
FOR UNIVERSAL ACCESS TO ELECTRICITY: A PRIMER
SEforALL 2019

Nigeria's Performance-Based Grant (PBG) Results-Based Financing program

By providing developers a US\$350 grant subsidy per household connection to cover capital expenditures after 90 days of service, Nigeria's Rural Electrification Agency (REA) has attracted qualified developers and investors who have committed US\$40 million as of 2020. A quick, predictable process has been invaluable for developers.

REA'S MANAGING
DIRECTOR AHMAD
SALIHJO SIGNING
AN EXECUTED GRANT
AGREEMENT WITH A
DEVELOPER. PHOTO
COURTESY REA



THE SITUATION

- Nigeria has a potential US\$8 billion minigrid market, but the sector is still nascent and needs to mature to serve consumers
- The country needs a combination of cost-reflective tariffs and a subsidy serving customers in rural areas
- A track record of slow minigrid deployment and subsidies in other contexts discourages developers and investors, reducing impact

THE SOLUTION

A grant subsidy of US\$350 per connection is made available to minigrid developers after 90 days of providing service to a household.

The service provision is validated by Odyssey Energy's data platform, which collects energy use data remotely via smart meters. A dedicated desk in Nigeria's regulator, NERC, facilitates permitting and licensing, ensuring a smooth process. The program is supported by the World Bank.

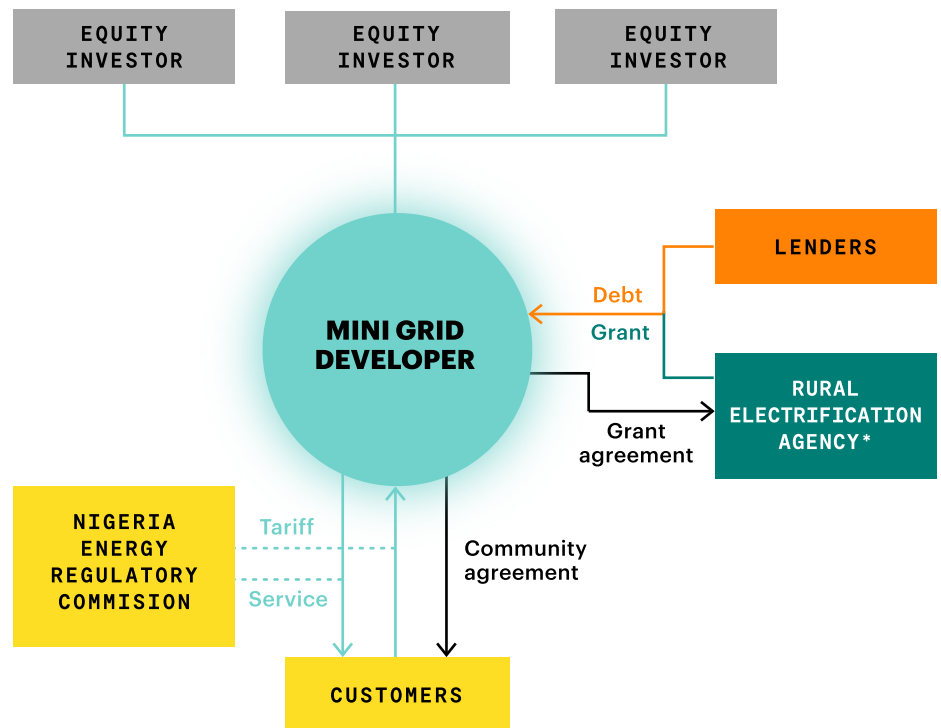


SHIMANKAR 334KW
MINIGRID. PHOTO
COURTESY REA/GVE GROUP

THE IMPACTS

- The first minigrid under the program, constructed by PowerGen, took less than two months from application to commissioning
- Three minigrids have been commissioned, with combined capacity of 200 kW
- Over 3,000 kW of capacity and 32,000 household connections are in the pipeline
- 14 developers are participating in the program, attracting over US\$40 million in financing

Structure of the Performance-Based Grant





“

REA's PBG program has been fantastic. It has helped PowerGen to attract investors with the confidence that a grant subsidy is available and we'll be able to quickly access it.

Moyeen Abiodun
Nigeria Country Director,
PowerGen

”

ACCESS NIGERIA'S PERFORMANCE-BASED GRANTS:

rea.gov.ng/mini-grid-pbg/

FURTHER READING ON RESULTS-BASED SUBSIDIES

- IFC INSIGHTS: INVESTORS FORECAST BRIGHT FUTURE FOR MINIGRIDS IN AFRICA
IFC 2020.
- INVESTOR POSITION PAPER: UNLOCKING PRIVATE CAPITAL FOR MINI-GRIDS IN AFRICA
2019
- RESULTS-BASED FINANCING FOR ENERGY ACCESS: HOW TO DESIGN AND IMPLEMENT PROJECTS: LESSONS FROM THE FIELD
EnDev 2018

SCALING UP MINIGRIDS TO POWER THE UNDERSERVED

RP Renewable Microgrid Ltd. (TPRMG)
Bihar and Uttar Pradesh States, India
September 2020

TPRMG is demonstrating solutions to provide access to clean, affordable, reliable electricity in rural India. Through a scalable model, they plan to build 10,000 minigrids to bring electricity to 5 million households.

TPRMG CUSTOMER: SHRI.
SUBODH KUMAR, 3 KW
BUCKET FACTORY, **BAKHARA**
VILLAGE, MUZAFFARPUR



THE SITUATION

- Despite a growing recognition that ending energy poverty is a major global challenge, the collective efforts of the international community are simply not going far enough, nor fast enough
- Although grid electricity is available in many places, the lack of reliability means that alternative or complementary solutions are required
- Providing reliable electricity to the communities that need it most is one of the best ways for us to end poverty and unleash economic opportunity in our lifetimes

THE SOLUTION

TPRMG has developed a solution for building 10,000 minigrids across rural India. This business model can serve as an example to be replicated globally to create economic opportunity for the worlds' underserved.

TPRMG uses the latest technology innovations, with sharp cost reductions, demand management, and containerized solar minigrid technologies that can be quickly deployed and are specifically designed for rural applications.



→ [GO TO VIDEO](#)

THE IMPACTS

- With economies of scale and technology innovation, TPRMG is already offering electricity tariffs lower than alternative off-grid solutions
- TPRMG has built 60 minigrids in Bihar and Uttar Pradesh over a span of nine months under strict lockdowns and travel restrictions
- A total of 200 minigrids are expected to be completed in 2021
- As the solution scales, it will bring power to five million households, supporting 100,000 rural enterprises and 400,000 farmers, while avoiding one million tons of annual CO2 emissions



TPRMG CUSTOMER: SHRI.
HARIHAR DUTT SHUKLA,
COMMERCIAL SHOP, PATHRI
BAZAR, GONDA



“

Over a period of time, we have brought down [cost] by more than 50%... If the capital cost comes down, then it becomes affordable.

”

Praveer Sinha
CEO, Tatapower

MORE INFORMATION

www.tatapower.com/products-and-services/micro-grids.aspx

FURTHER READING

→ **RURAL ELECTRIFICATION IN INDIA: CUSTOMER BEHAVIOUR AND DEMAND**
Smart Power India 2019



Undergrid minigrid in Mokoloki Community Ogun State, Nigeria Commissioned February 2020

This project demonstrates the technical feasibility and commercial viability of grid-connected “undergrid” minigrids. The model is scalable across thousands of communities in Nigeria alone.



**MOKOLOKI MINIGRID, OGUN
STATE, NIGERIA
(UNDER CONSTRUCTION)**

THE SITUATION

- A community of 1,000 people, nominally grid-connected
- Community development was limited by poor voltage quality and an average of four hours of electricity service per day
- Many people resorted to expensive diesel generators for back-up power
- The distribution company faced aggregate technical and commercial losses of 70%

THE SOLUTION

A tripartite agreement between the community, the distribution company, and a minigrid developer, to build and operate an undergrid minigrid.



→ [GO TO VIDEO](#)

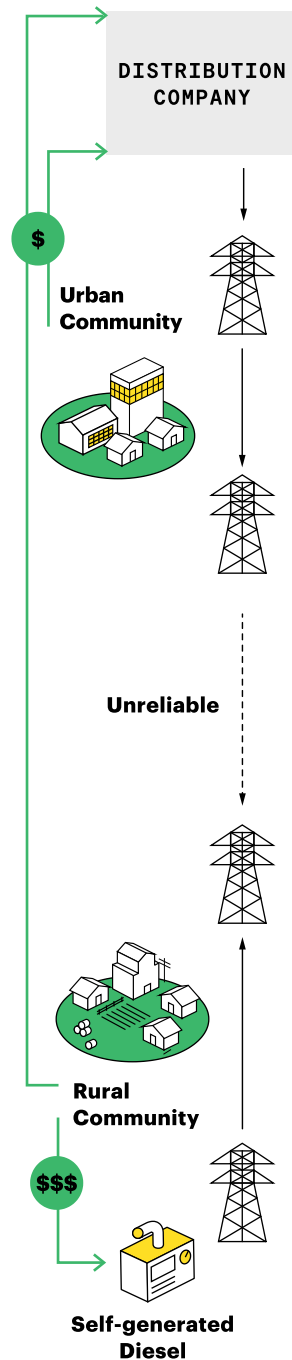
THE IMPACTS

- Customer electricity costs reduced by ₦20/kWh (US\$0.06/kWh)
- Cost-savings for the utility, which can replicate the model elsewhere
- New revenue stream and minigrid market segment for the developer
- 15,000 kg of CO2 emissions avoided in the first three months of operation

CBEA process: Using project finance to invest in minigrid as infrastructure

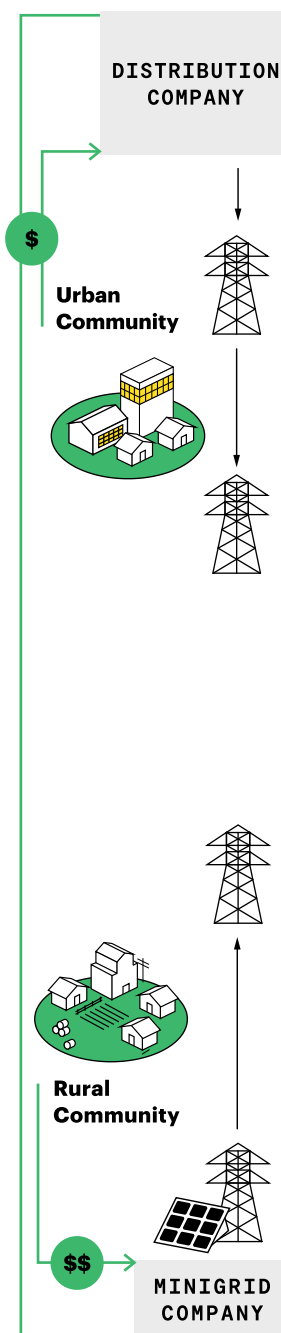
TODAY

Rural users pay up to 10x grid cost for power



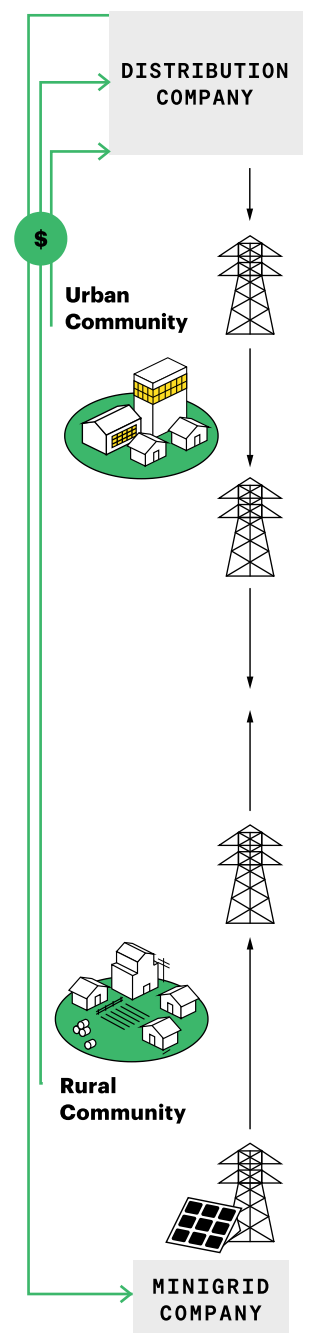
PROPOSED

Rural community saves money
Consistent reliable power



LONG TERM

Additional cost savings
Minigrid becomes distributed resource supporting grid





“

We have many places where this initiative can be replicated... Electricity is the engine room for progress, so [where] minigrids are sited, there would be an economic boost.

Engineer John Ayodele
Chief Operating Officer,
IBEDC

”

FULL CASE STUDY

www.rmi.org/mokoloki

FURTHER READING

- UNDER THE GRID: IMPROVING THE ECONOMICS AND RELIABILITY OF RURAL ELECTRICITY SERVICE WITH UNDERGRID MINIGRIDS
RMI 2018
- ELECTRIFYING THE UNDERSERVED: COLLABORATIVE BUSINESS MODELS FOR DEVELOPING MINIGRIDS UNDER THE GRID
RMI 2019

UNLOCKING TRANSFORMATIVE FINANCE

Smart Power Myanmar's Mini-Grid Equipment Financing Facility Launched in 2020

This initiative provides crucial access to finance for mini-grid developers starting new projects, through collaboration between government and MFIs.

A SOLAR MINI-GRID IN SE
PIN KYUN VILLAGE,
SAGAING REGION, MYANMAR.
PHOTO COURTESY SMART
POWER MYANMAR



THE SITUATION

- Less than 50% of Myanmar's communities, many living in rural areas, have access to a safe and reliable supply of electricity
- Minigrids are a viable source of reliable energy for many remote communities as part of an integrated approach to electrification but high up-front costs hinder project development
- The limited availability of credit increases the cost of capital for minigrid developers, increasing project costs and stifling the ability of developers to grow their businesses and build new minigrids

THE SOLUTION

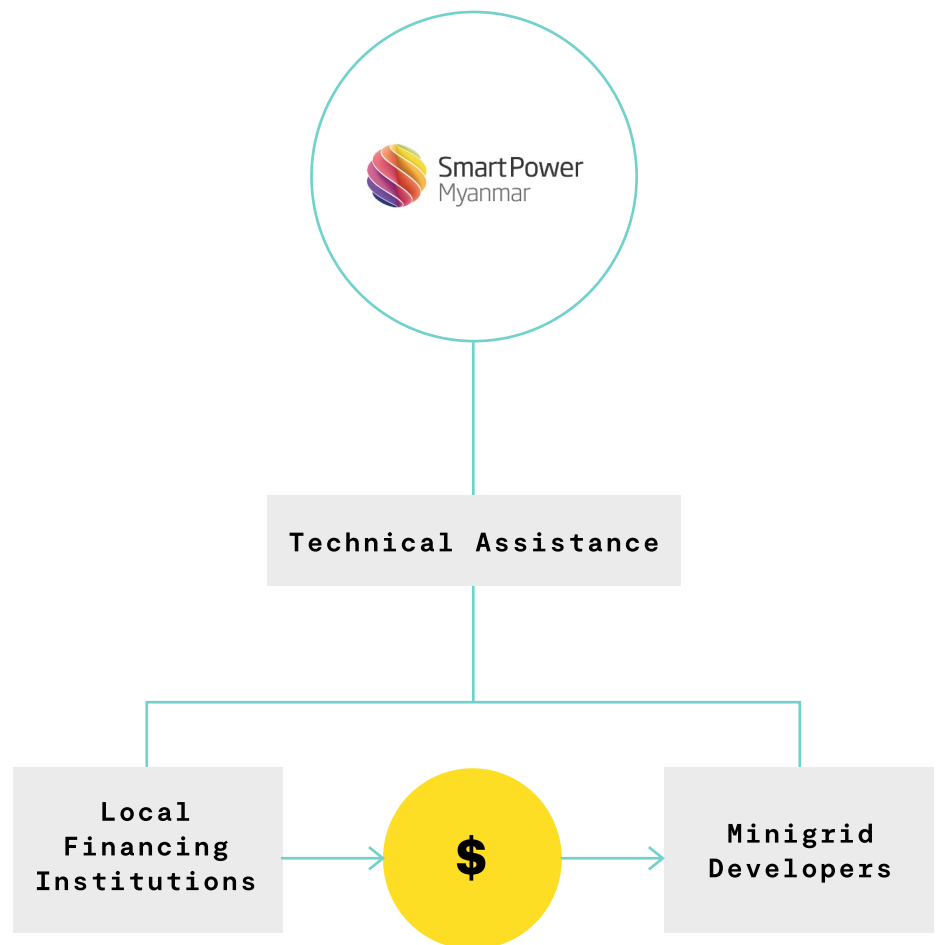
Developed by Smart Power Myanmar, the Minigrid Equipment Financing Facility loans developers the capital they need to accelerate the development of new projects, achieve economies of scale, and develop deeper ties with local commercial banks

MYANMAR CITIZENS BANK (MCB) CHAIRMAN U TOE AUNG MYINT AND SMART POWER MYANMAR CEO RICHARD HARRISON IN JANUARY 2020 AT THE LAUNCH OF MCB'S EQUIPMENT BRIDGE FINANCING FACILITY, AN ADOPTION OF SMART POWER MYANMAR'S MINI-GRID FINANCING FACILITY. PHOTO COURTESY SMART POWER MYANMAR



THE IMPACTS

- US\$18.5 million committed so far to new equipment financing facilities by local banks
- To date, mini-grid developers have accessed enough capital from equipment financing facilities to develop 10 additional minigrid sites and impact over 25,000 lives
- By familiarizing banks with minigrids as an asset class, and by strengthening relationships between banks and developers, the Myanmar Mini-Grid Financing Facility is already paving the way for additional project debt in the future





“

It is very important for us to have advance investment for a project.

Project financing, or bridging loans like equipment financing, allows us to implement our work much more quickly and we can manage parallel projects at the same time.

”

Barani Aung
Managing Director,
Techno-Hill Engineering

LEARN MORE

www.smartpowermyanmar.org

FURTHER READING ON PROJECT FINANCE IN MYANMAR

- **MYANMAR MINI-GRID ACCELERATOR**
Smart Power Myanmar, 2020
- **CLOSING THE FINANCING GAP: ASSESSING OPTIONS FOR DECENTRALISED RENEWABLE ENERGY MINI-GRIDS IN MYANMAR**
Smart Power Myanmar, 2019

GRID-CONNECTED MINIGRID IN AN URBAN MARKET

Abuja Electric Distribution Company (AEDC)

Undergrid Minigrid

Wuse Market, Abuja, Nigeria

**Pilot phase commissioned in 2019,
full completion in 2020**

Grid supply alone was not reliable enough to meet customers' needs, forcing shop owners to depend on expensive, polluting, and loud diesel generators. By combining a minigrid solution with power from the grid, electricity is cheaper and more reliable to shopkeepers. The market will be able to stay open later, contributing to job creation and economic development.

**IN OCTOBER 2019, ABUJA
ELECTRICITY DISTRIBUTION
COMPANY (AEDC), GREEN
VILLAGE ELECTRICITY
(GVE), AND WUSE MARKET
ASSOCIATION SIGNED A
TRIPARTITE AGREEMENT FOR
THE DEVELOPMENT OF 1MW
INTERCONNECTED MINIGRID
AT **WUSE MARKET****



THE SITUATION

- A major market near Abuja, in the Federal Capital Territory of Nigeria, with over 2,100 shops and a combined load of nearly 1 MW
- Though the market is within AEDC's concession area, most shops have their own diesel or petrol generators, spending in total over 20M Naira (~US\$50k) per month on energy
- Market productivity and the availability of perishables is limited by power supply
- Abuja Electricity Distribution Company experiences significant technical line losses and energy theft in the area, making supplying the area with power unprofitable and technically difficult

THE SOLUTION

The Abuja Electricity Distribution Company (AEDC) is partnering with a third-party private developer to install and operate an interconnected solar-battery minigrid in Wuse Market. As it is currently being piloted, under this arrangement, AEDC and the minigrid operator both supply the market with electricity at different times of the day. An agreement between the utility and the developer will ensure that customers receive more reliable low-cost energy, and all three parties save money and time. The project focuses on providing power for productive use, to drive economic impact.



AERIAL VIEW OF WUSE
MARKET, NIGERIA.
PHOTO COURTESY REA

THE IMPACTS

- The first interconnected minigrid tripartite agreement in Africa – a model that will likely be replicated and scaled-up
- A 40kW pilot is already providing reliable power to dozens of shops
- As the project expands, 3,000 diesel fuel generators for 2,100 shops are expected to be replaced with cleaner energy
- Abuja Electricity Distribution Company can increase revenue collection from the site
- The market is expected to increase hours of operation by 30%, increasing earnings for merchants and driving job growth



PORTABLE GENERATORS IN
USE AT **WUSE MARKET**,
PRIOR TO INSTALLATION OF
THE MINIGRID SOLUTION



“

Through such landmark projects, we at AEDC are developing innovative business models that combine grid and offgrid supply to improve service and drive economic growth. The falling price of distributed energy resources and ease of deployment have made such partnerships an attractive option for utilities as we look at prioritizing our limited resources. Through our recently launched initiative, DESSA, we are looking to deploy similar projects at scale across our service territory, potentially unlocking \$150 million in financing and delivering 100MW of incremental clean generation. We are also keen to see such models replicated in other utilities in the country and ultimately, the region.

”

Ije Ikoku

Chief Financial Officer,
AEDC

MORE INFORMATION

READ MORE ABOUT GRID-CONNECTED DISTRIBUTED
ENERGY FOR IMPROVED RESILIENCE AND RELIABILITY

- [REIMAGINING GRID RESILIENCE](#)
RMI 2020
- [TAKING CHARGE: WESTERN AUSTRALIA'S
TRANSITION TO A DISTRIBUTED ENERGY FUTURE](#)
Parliament of Western Australia, 2020
- [SMART, CLEAN NEIGHBOURHOOD GRIDS](#)
Sunrun



ELECTRIFYING ECONOMIES

The Electrifying Economies project

demonstrates the role distributed energy will play in ending energy poverty and catalyzing a green and equitable recovery from the Covid-19 crisis. It draws on the latest data and research from around the world to show how distributed renewables can provide sustainable, affordable, and reliable power for all. The project provides information to support policy makers and investors in taking action today, to realize this potential.



#ElectrifyingEconomies
ElectrifyingEconomies.org