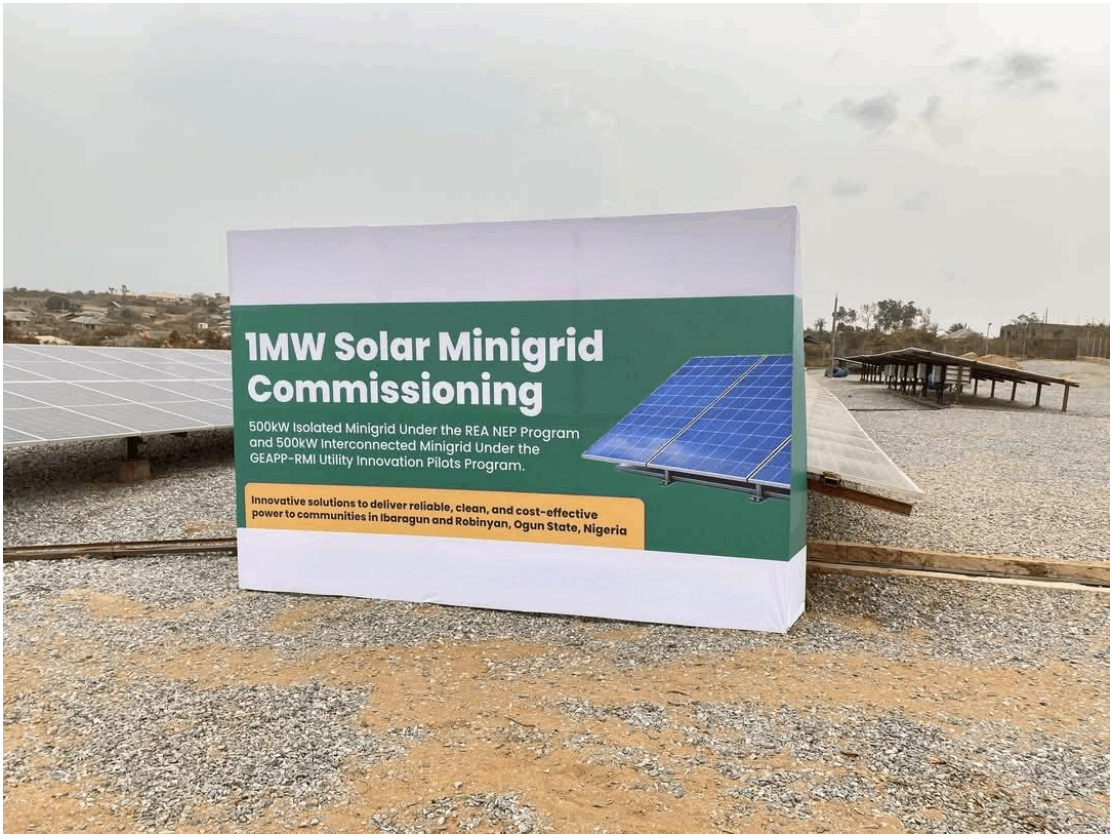
Case Study: ATESS Transforms Nigerian Communities with a Solar Mini-grid



1 MW solar hybrid mini-grid project

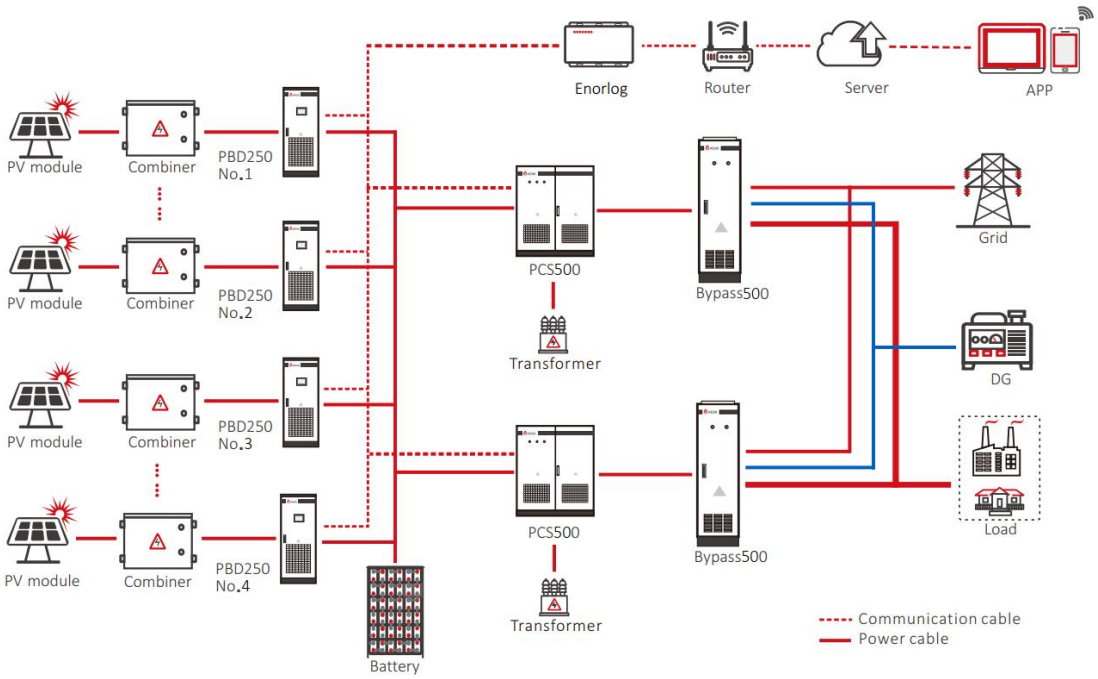
Introduction

The Ibaragun and Robiyan communities in Ogun State, Nigeria, has long faced the challenge of unreliable electricity, limiting economic growth and access to essential services. In response to this energy gap, ATESS, in collaboration with local Nigerian partners and organizations, contributed to the completion of a cutting-edge 1MW solar mini-grid system, integrating advanced ATESS energy storage solutions to maximize efficiency, stability, and sustainability.

A distant view of the container for the ATESS energy storage system

Project Overview

The solar hybrid mini-grid project, located in Ogun State, Nigeria, was designed to address the chronic power supply challenges faced by this underserved region. With a total photovoltaic (PV) capacity of 1.2MWp and an AC power output of 1MW, the system is supported by a robust 1.7MWh ATESS Lithium-ion battery storage solution. The configuration features two ATESS PCS500 bidirectional battery inverters, ensuring seamless energy conversion and grid stability.



System diagram

This ambitious project comprises two key components:

1. 500kW Isolated Mini-Grid: Deployed under the Rural Electrification Agency's (REA) National Electrification Program (NEP), this system provides standalone power to rural households and businesses.

2. 500kW Interconnected Mini-Grid: Supported by the Global Energy Alliance for People and Planet (GEAPP) and RMI Utility Innovation Pilots Program, this integrates with the existing grid to enhance reliability in peri-urban areas.

Officially launched on March 6, 2025, the project now serves over 10,000 connections, including homes, schools, healthcare facilities, and local businesses.

Why Nigerian Communities Needed ATESS Solutions

Prior to this initiative, the Ibaragun and Robinyan communities grappled with an unreliable power supply, forcing residents and businesses to rely on costly and environmentally harmful diesel and petrol generators. Frequent outages stifled economic activity, limited educational opportunities, and strained public services. The installation of the ATESS-powered solar hybrid mini-grid was a direct response to these challenges, offering a sustainable alternative that aligns with Nigeria's broader energy access and decarbonization goals.

Project Detail

At the heart of this project lies ATESS's advanced energy storage and conversion technology:

- ATESS PCS500 Inverters: Two units of our 500kW bidirectional inverters ensure efficient energy management, seamlessly switching between solar generation, battery storage, and grid power. This flexibility guarantees uninterrupted electricity, even during peak demand or cloudy periods.

- 1.7MWh Lithium-ion Battery System: Our high-capacity battery solution stores excess solar energy generated during the day, making it available for use at night or during outages. This enhances reliability and reduces dependence on fossil fuels.

These components, paired with a 1.2MWp solar PV array, deliver a hybrid system that optimizes renewable energy utilization while maintaining grid stability.

ATESS PCS500 battery Inverter

Working Principle

This communities previously relied on an unstable grid and expensive diesel generators. To reduce operational costs and enhance reliability, an ATESS energy storage system was integrated, optimizing energy use and minimizing expenditure.

When connected to the grid, the system operates in Load Priority Mode:

1.PV Power Exceeds Load Demand:

PV primarily supplies the load, with surplus energy charging the battery. If excess remains and anti-backflow is disabled, energy feeds into the grid at a configurable power level.

2. PV Power Below Load Demand:

a. If the battery's State of Charge (SOC) exceeds the grid compensation SOC threshold, PV and battery jointly power the load.

b. If SOC falls below this threshold:

i. Load power below maximum grid import power limit: PV and grid supply the load together.

ii. Load power exceeds maximum grid import power limit: Grid only supplies power up to its defined limit, with excess load met by PV and battery.

3. Battery Discharge Cutoff: When the battery reaches its discharge cutoff SOC, PV and grid jointly supply the load. If load exceeds PV and grid limit, the load forcibly draws from the grid.

Off-Grid Mode

Upon grid disconnection, the system switches to Off-Grid Mode, with the battery discharging to support the load. When the battery reaches its cutoff SOC, the PCS triggers a dry contact signal to activate the diesel generator.

Project Achievements and Impacts

Communities once relied on inconsistent grid power and diesel generators, resulting in high energy costs, frequent blackouts. Since its commissioning in September 2024 and official launch in March 2025, the project has delivered measurable benefits:

Significantly Improved Power Supply: The project provided reliable electricity to over 10,000 residents, generating approximately 545,000 kWh annually and significantly improving the local power supply situation.

Economic Growth: Stable power supply provided development opportunities for local businesses, promoting local economic prosperity.

Improved Quality of Life: Improved electricity enhanced residents' quality of life and improved public services such as education and healthcare.Local residents expressed high recognition of the project, praising its "immediate and lasting clean energy benefits" to the community.

Environmental Sustainability: By displacing diesel generators, the mini-grid promotes climate-aligned growth and supports Nigeria's energy transition. The application of solar and energy storage systems reduces carbon emissions by more than 400 metric tons for each community annually, contributing to

environmental protection.

A Collaborative Triumph

ATESS is proud to partner with Nigerian local partners to bring this vision to life. The CEO of our partner, noted, “The completed mini-grid project will deliver immediate and lasting benefits to the community through reliable, clean energy.” ATESS's technology has been instrumental in turning this promise into reality.

Looking Ahead

The project serves as a scalable model for addressing energy poverty across Nigeria and beyond, aligning with GEAPP's goal to electrify 300 million people in Africa. By combining our advanced PCS500 inverters and Lithium-ion battery systems with solar PV, we are paving the way for a future where clean, reliable power is accessible to all.

Conclusion

At ATESS, we believe energy is the foundation of progress. The solar hybrid mini-grid project showcases how our technology can transform lives, boost productivity, and protect the planet. For more information on how ATESS is shaping the future of renewable energy, visit our website atesspower.com or follow us on social media.

Reference link:

https://energyalliance.org/darway-coast-all-on-geapp-others-announce-the-completion-of-500kw-solar-mini-grid-project-in-ibaragun-community/

https://guardian.ng/news/darway-coast-all-on-others-unveil-500kw-solar-mini-grid-in-ogun-community/

https://thesun.ng/ibaragun-mini-grid-projectll-deliver-reliable-clean-energy-darway-coast-boss/

https://theelectricityhub.com/1mw-solar-hybrid-mini-grid-commissioned-in-ogun-state/

https://www.energyplanets.org/sahara-power-group-ikeja-electric-darway/