Case Study: Delivering Sustainable Energy Solutions: ATESS' Role in Transforming Casuarito, Colombia

View of the Casuarito Project from above (Picture Source: minenergia.gov.co)

Introduction

At ATESS, we are committed to advancing renewable energy solutions and enhancing the quality of life for communities worldwide. We are proud to present a comprehensive overview of the Casuarito Hybrid Power Project, a groundbreaking initiative that has transformed the lives of residents in an off-grid village Casuarito, Puerto Carreño, Vichada, Colombia. This project, a hybrid solar-diesel system, marks a significant milestone in our mission to provide sustainable and reliable energy to off-grid communities.

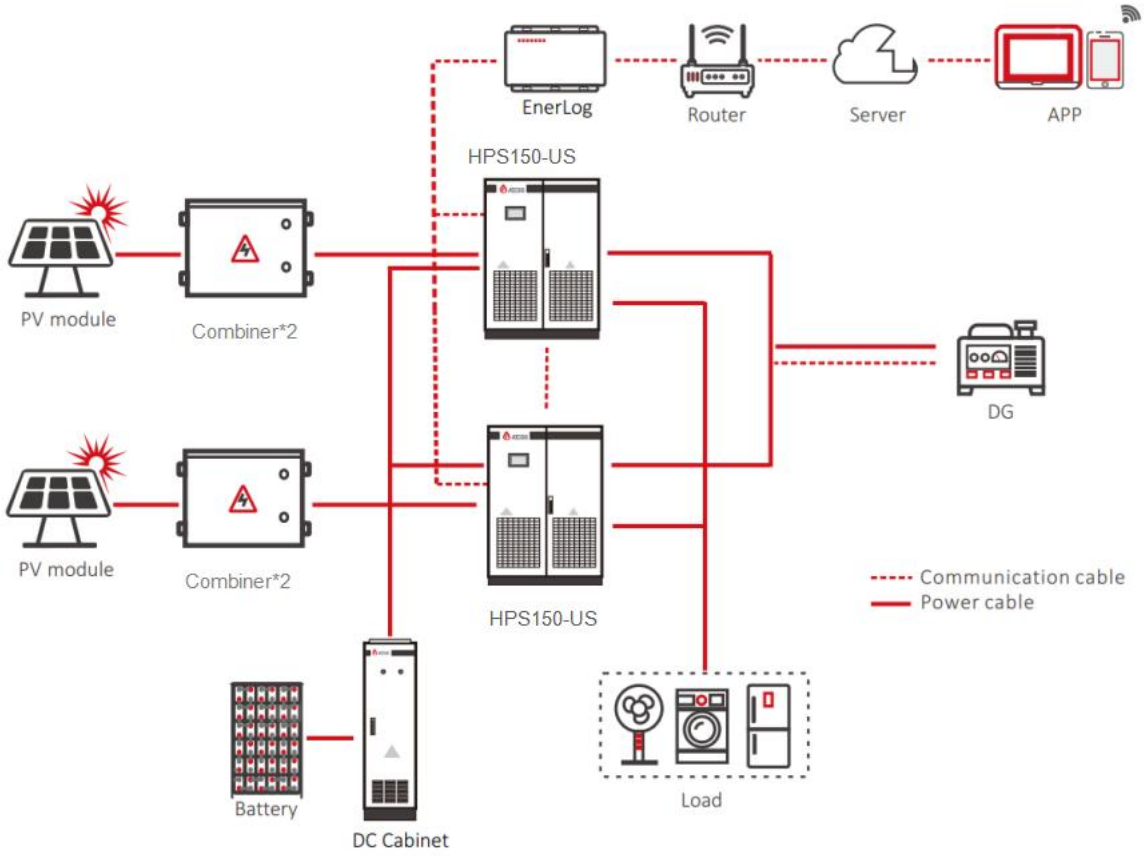
372.6 KWp PV system (Picture Source: elmorichal.com)

Project Overview

Location: Casuarito, Puerto Carreño, Vichada, Colombia
Background: Off-grid village
Beneficiaries: 239 families
Total Investment: Approximately $1.6 million USD

Technical Specifications

Photovoltaic Capacity: 372.6 KWp (810 solar panels of 460W each)
Inverters:Two sets of 150kW ATESS HPS hybrid inverters
Battery System: 1,182.72 kWh ATESS battery system
Diesel Generator: 165 kVA



Hybrid solar-diesel system diagram

System Configuration			
Item	**Description**	**Quantity**	**Comments**
PV Panel	810 solar panels of 460W each	372.6 KWp	EPC
ATESS HPS150-US	150kW hybrid inverter,3 years warranty	2	ATESS
ATESS PV-CB16M	16 in 1 out PV combiner box,1 year warranty	4	ATESS
ATESS Batt-Master Cabinet15R	9 inputs DC battery cabinet,1 year warranty	1	ATESS
ATESS Slave Battery Rack BR100T	Battery rack with BPU,1 year warranty	11	ATESS
ATESS ESS-BM-38.4-200TPB	7.68kWh lithium battery modules,5year warranty	154	ATESS
ATESS Enerlog	Monitoring module,1 year warranty	1	ATESS
Diesel Generator	165 kVA	1	EPC

System Working Principle:

Microgrid construction: A PV+ESS microgrid is directly built using an integrated ATESS all-in-one HPS + BR100T Battery, to ensure the full utilization of renewable PV energy and reduce the use of diesel fuel.

Working mode

Off-Grid Mode

1 When PV is higher than load consumption, PV will supply load and charge the battery.

2 When PV is lower than load consumption, the battery will discharge until it approaches the under-voltage limit, then,

1) In the default setting, HPS will stop working, and PV will charge the battery only.

2) If the generator is connected, HPS will start the generator using its relay output, the generator will supply load and charge the battery.

DG Mode

Generator connection (dry contact control)

In off-grid mode: When the battery voltage is approaching the under-voltage limit, HPS will start the generator to supply load and charge the battery. HPS will stop supplying power, only using generator power to charge the battery.

If the generator is started,

1) When PV is higher than the charging power, PV will charge the battery only.

2) When PV is lower than the charging power, PV will priority charge the battery. The generator will supply load, and the generator also allows charging the battery

according to the customer’s requirement.

3) When the battery is full, HPS will stop the generator and switch to off-grid mode.

4) During off-grid mode, the generator allows connection to HPS directly. If the grid and generator need to connect to HPS simultaneously, an ATS will be needed for the connection.

Project Impact

A resident in the communities shared her insights: "Indeed, as a community member, I feel immense joy and pride seeing this project come to fruition. It has significantly improved our lives, enhancing them by approximately 100%. We now have 24-hour electricity, and we hope such projects continue to expand and further develop Casuarito Vichada."

Two sets of 150kW ATESS HPS hybrid inverters

1,182.72 kWh ATESS battery system

Community Benefits

This hybrid power station has substantially improved the quality of life for Casuarito's residents. Previously, electricity was limited to 8-16 hours a day. With the new system, residents now enjoy 24-hour uninterrupted power, facilitating various aspects of daily life and economic activities. The reliable power supply is expected to spur social and economic development in the region.

The banner in Casuarito emphazing "Here is the energy that transforms the progress of Casuarito" (Picture Source: elmorichal.com)

Government and Institutional Support

The project was executed by the Institute of Planning and Promotion of Energy Solutions (IPSE) and the Ministry of Mines and Energy of Colombia, with a total investment of 61.9 billion COP (approximately $1.6 million USD). This initiative is a testament to the Colombian government's commitment to democratizing energy access and promoting a fair energy transition.

Energy Minister Andrés Camacho highlighted the importance of this project, stating, "Through our partnership with IPSE, we have enabled the Casuarito Hybrid Power Plant entirely through public investment. This project allows us to extend energy services to 239 families in this non-interconnected area. This is what energy democratization and a just energy transition are all about, ensuring a dignified life through renewable energy."

Technical and Operational Details

The hybrid power system comprises 810 solar panels, providing a total photovoltaic capacity of 372.6 KWp. The energy storage is managed by 154 batteries with a cumulative capacity of 1,182.72 kWh, complemented by a 165 kVA diesel generator for backup. The expanded distribution network ensures stable and reliable power delivery to all beneficiaries.

Economic and Social Development

The Casuarito Hybrid Power Project is more than just an energy solution; it is a catalyst for economic and social development. The reliable power supply is expected to boost local businesses, improve educational facilities, and enhance healthcare services. Community leaders and residents have expressed their optimism and gratitude for the project's positive impact on their lives.

Sustainability and Future Prospects

This project is a significant step towards sustainable energy development in Colombia. By integrating solar power with advanced battery storage and diesel backup, the hybrid system reduces reliance on traditional fossil fuels and minimizes environmental impact. It sets a precedent for future projects aiming to provide clean and reliable energy to remote and underserved communities.

Conclusion

The Casuarito Hybrid Power Project exemplifies ATESS's commitment to innovation, sustainability, and community empowerment. We are proud to have played a role in transforming Casuarito into a model of renewable energy adoption and look forward to expanding our efforts to other regions in need. We have demonstrated the power of renewable energy to bring about meaningful and lasting change.

The original news link:

https://www.minenergia.gov.co/es/sala-de-prensa/noticias-index/239-familias-de-puerto-carre%C3%B1o-vichada-reciben-central-h%C3%ADbrida-que-impulsar%C3%A1-el-desarrollo-econ%C3%B3mico-y-social/

https://usasolarcell.com/news/2024/05/24/colombian-government-powers-up-casuarito-with-solar-hybrid-plant-energizing-families/

https://elmorichal.com/vichada-puerto-carreno-casuarito-central-solar-hibrida/