PLANNING + EXECUTING THE REMOTE MICROGRID

AUTHORS

Ben Widmer, Product Certifications and Commissioning
Jam Nicole Cristobal, Product Marketing Manager

AFFILIATIONS

BLUE planet ENERGY

INTRODUCTION

The objective of this poster is to showcase the successful deployment of a hybrid solar and storage microgrid to replace diesel generators in the remote village of Shungnak, Alaska, incorporating insights from a case study conducted by Blue Planet Energy. The research aims to provide a comprehensive overview of the technical and operational aspects of the energy system, including system design, integration, energy management strategies, and performance evaluation. Additionally, the objective is to demonstrate the benefits of this renewable energy solution, such as reduced reliance on diesel, lower operating costs, environmental sustainability, and improved energy access for the remote community. By presenting these findings, the poster seeks to contribute to the knowledge base and promote the wider adoption of microgrid systems in similar remote locations, providing a sustainable energy alternative for isolated communities.

METHODOLOGY

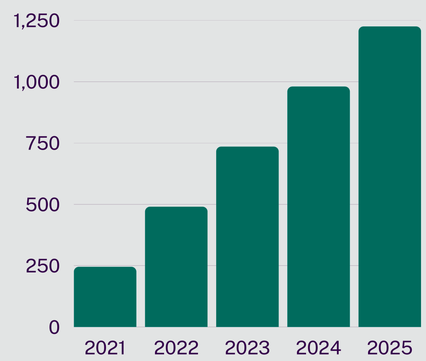
This research employed a combination of applied research, qualitative analysis, and interviews with key solution providers and village residents. The applied research focused on understanding the components of a microgrid including the utility grid, facility loads, local power generation, combustion generator, solar PV, wind turbine, battery energy storage system, inverter(s), and monitoring and control system. Interviews were conducted with Alaska Village Electric Cooperative (AVEC), Northwest Arctic Bureau, product manufacturers, the project EPC, and village residents. The qualitative data collected provided insights into the feasibility and effectiveness of the solar and storage microgrid. Additionally, information from the Shungnak Case Study by Blue Planet Energy enhanced the understanding of the technical and operational aspects of the implemented system. This methodology offers valuable insights for future remote microgrid projects.

RESULTS

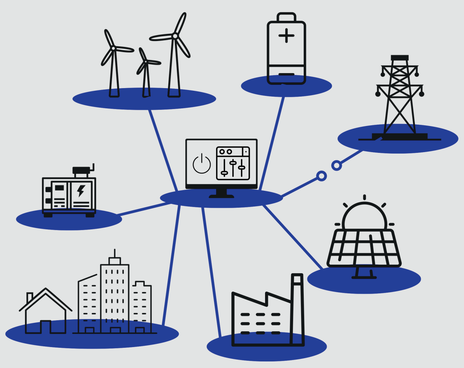
The research study in Shungnak, Alaska, showcased the successful implementation of a solar-plus-storage microgrid system. With (12) Blue Planet Energy Blue Ion LX batteries totaling 384 kWh capacity, integrated with a 225 kW solar array, microgrid controller, and diesel generator, the system provided reliable and resilient energy. It reduced carbon footprint, fuel costs, and the need for ongoing generator maintenance. The microgrid controller enabled coordinated operation and 'diesels off' functionality, optimizing power usage. The study demonstrates the feasibility and benefits of this renewable energy solution, offering valuable insights for similar remote communities facing high fuel costs and extreme weather conditions.

ANALYSIS

- The implementation of the solar-plus-storage microgrid solution in Shungnak has resulted in significant cost savings for the community.
- The system is estimated to save the community approximately $200,000 per year on fuel costs, translating to substantial financial benefits.
- The microgrid has reduced the reliance on diesel generators, leading to savings of approximately 25,000 gallons of fuel annually.
- The financial aspect of the project involves a unique ownership structure, with the utility company AVEC owning the generators and purchasing energy from the community. This arrangement allows the village to sell the value of the solar-plus-storage system to the utility company, further contributing to cost savings.
- The microgrid has demonstrated its effectiveness in terms of operation, with 733 generator-off hours, indicating reduced dependency on diesel generators.
- The system has also proven its reliability by preventing blackouts on 12 occasions and brownouts on over 100 occasions, showcasing its ability to maintain stable power supply during generator faults.
- Beyond the immediate financial and operational benefits, the successful implementation of the microgrid in Shungnak provides a replicable framework that can be adapted for similar remote communities facing similar challenges.



Annual CO2 Offset (Tons)



Microgrid Diagram
(Option to connect with our without the grid/utility)

CONCLUSION

Adding a hybrid solar + storage microgrid to remote diesel-based communities improves reliability, saves money, and helps the planet. The successful deployment of a solar-plus-storage microgrid in Shungnak, Alaska, showcased its effectiveness in reducing reliance on diesel generators, resulting in significant cost savings of approximately $200k per year and a reduction of 25k gallons of fuel consumption annually. This sustainable solution enhances energy resilience, minimizes environmental impact, and demonstrates the potential for similar remote communities. The reliable performance of the microgrid, coupled with preventive measures against blackouts and brownouts, underscores its ability to provide a stable power supply in challenging conditions. This research supports the adoption of solar-plus-storage solutions, promoting improved energy access and a greener future.

RELATED RESOURCES

Blue Planet Energy. "Solar+Storage Replaces Diesel in Remote Alaskan Village." Blue Planet Energy, n.d. Accessed June 1, 2023. https://www.blueplanetenergy.com/post/solar-storage-replaces-diesel-in-remote-alaskan-village.