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Laboratories



Sandia's Energy Storage Program: Demonstration Project Challenges



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What We Do:

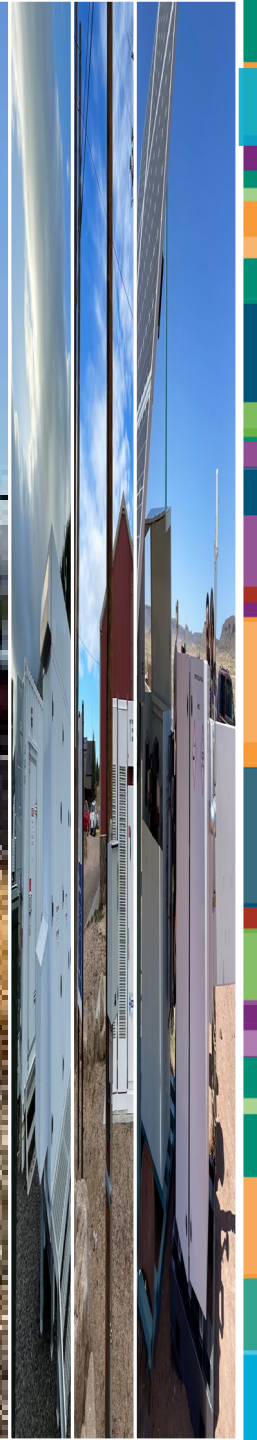
Support communities, state energy offices, utilities, academia, and the overall ES industry to demonstrate and validate the use of resilient and secure energy storage systems on and off the grid through demonstration projects.

Sandia's work in innovative demonstration projects advance DOE's goals of facilitating decarbonization of the grid by improving acceptance and understanding of energy storage systems and serving communities by enabling equitable clean energy access.



Sandia Demonstrations Support Academia

Santa Fe Community
College, Santa Fe, New
Mexico



Sandia Demonstrations Support Utilities

Cordova Electric
Cooperative, Cordova,
Alaska



Sandia Demonstrations Supports Communities

Navajo Tribal Utility Authority, Dilkon, Arizona

Sandia Demonstrations Support Resilience



Poudre Valley Rural Electric Assoc., Red Feather Lakes, Colorado

Current Sandia Demonstration Projects Map



State or Territory	Partner
Alaska	Alaska Village Electrical Cooperative
Arizona	Navajo Tribal Utility Authority
Arizona	Native Renewables, Inc
Florida	Seminole Tribe
Georgia	Harambee House
Hawaii	Natural Energy Laboratory of HI Authority
Hawaii	Ho' ahu (ES4SE)
Mississippi	Coast Electric Power Association
New Mexico	Albuquerque Public Schools
New Mexico	Picuris Pueblo
Puerto Rico	Villalba Municipality
South Dakota	Ellsworth AFB West River Electric Association
Tennessee	Electric Power Board of Chattanooga
Vermont	Green Mountain Power



Albuquerque Public Schools – Atrisco Heritage Academy High School – Albuquerque, NM



Project Information:

- Largest energy footprint for any school in the district with a large percentage due to peak load demand charges.
- Future Resilience Hub - The school also functions as a community gathering center during emergencies and hosts an onsite health clinic. Cost avoidance funds will go toward student programs and other expenses for the school.
- 721kW/4hr battery storage and 850kW rooftop PV project to reduce school's demand charges.



Challenges (Interconnection):

- Battery system installation is complete (for over a year) and has completed initial commissioning
- Solar PV systems have been installed and are awaiting "permission to operate" from local utility to complete inspection and commissioning
- Interconnection process delays. Original interconnection request was submitted Sept. 2021 and completed April 2023 (1 ½ years). Utility identified the need to upgrade protection systems due to project. Substation relay upgrades planned to be completed by Dec. 2023.



Picuris Pueblo – Northern New Mexico

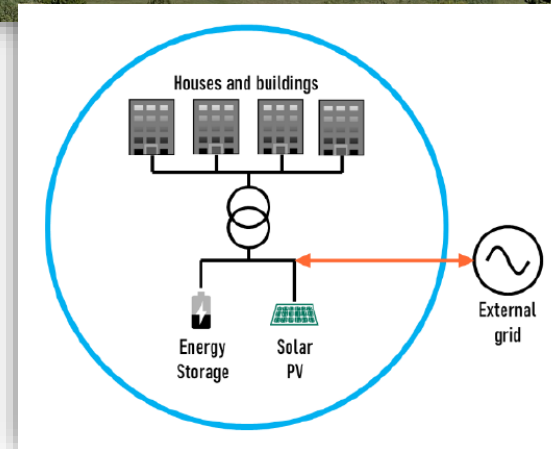


Project Information:

- The Picuris Pueblo is located in San Juan Mountains of Northern New Mexico. Due to their remote location, power system outages are a frequent occurrence and utility maintenance travel long distances to fix damaged equipment and restore power.
- Picuris Pueblo will be installing a battery energy storage system (estimated at least 400kW/4hr) to enable microgrid operation for resiliency when combined with the planned Picuris Phase II Community Solar system

Challenges (Interconnection):

- Need to coordinate with the local co-op to define operational plan for the battery (utilize co-op distribution lines during a grid outage)



Municipality of Villalba – Villalba, Puerto Rico



Background:

- The Municipality of Villalba is creating a local resiliency hub by installing a storage plus solar system at the local theater building. The theater currently serves as a backup emergency operations center for the Municipality.
- Villalba is one of five municipalities that formed the Mountain Energy Consortium (CEM) post Hurricane Maria

Challenges (Too much work, not enough people?):

- Much larger projects/efforts take priority over smaller projects often from a select few individuals

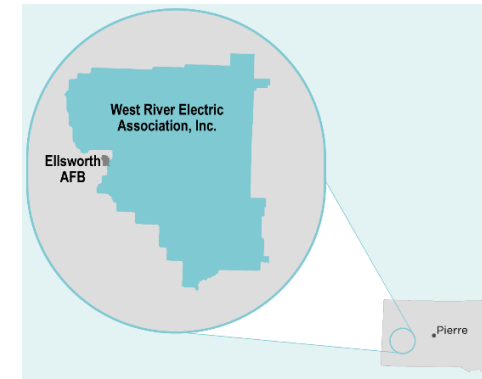


Microgrid Location



Background:

- This project is a National Rural Electric Cooperative Association (NRECA) Rural Energy Storage Deployment Program (RESDP) Project, in partnership with West River Rural Electric Association (WREA), Sandia, PNNL, and Ellsworth Air Force Base.



Challenges (CSR's, Location):

- Location shown is not the original one – location changed due to a change in DOD Unified Facilities Criteria (UFC) stating energy storage could not be located within 100' of a building
- The battery energy storage system supplier has spent most of 2023 designing and building an NFPA 855 compliant application which is difficult and uncommon for smaller energy storage systems of this size today
- Multiple entities involved, National Labs, DOE, DOD, FFA, NRECA, WREA, ...



Natural Energy Laboratory of Hawaii Authority (NELHA)

– Kona, Hawaii



Project Information:

- NELHA installed a 100kW/400kWh UET Vanadium Redox flow battery in Kona, Hawaii for demonstration of its use for renewable firming and other applications. The battery was installed within the NELHA research campus and to be operated by HELCO. The system has operational issues and UET was to replace the initial system prior to going bankrupt. NELHA now has a non-functional system that needs to be decommissioned.



Challenge (Decommissioning):

- Initial bid (\$0 – too good to be true?) from a company resulted in a delay of nearly a year as the company eventually became completely unresponsive
- Secondary bidder had to ‘refresh’ their bid after a nearly year-long delay and is currently working with Sandia as we are decommissioning the same kind of flow battery system at the Sandia NM campus (Sandia’s system is twice as big)
- Sandia sent electrolyte samples to multiple recyclers to find out who and if they can recycle the mixed-acid vanadium electrolyte
 - Only one company we found can do it (with the right permits)



The UET ESS suffered significant damage in 2019, resulting in split seam on the top of main holding tank and the escape of electrolyte and electrolyte vapors from the otherwise closed system. UET patched the seam as seen on left to prevent further escape of vapors.



Sandia flow battery system in Albuquerque, NM – seal failure leading to electrolyte leaking and emergency decommissioning of the system



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Thank You