Sandia National Laboratories

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SANDIA DEMONSTRATION TEAM PROJECTS

02/14/2024

Presented to: Hawaii Public Utilities Commission

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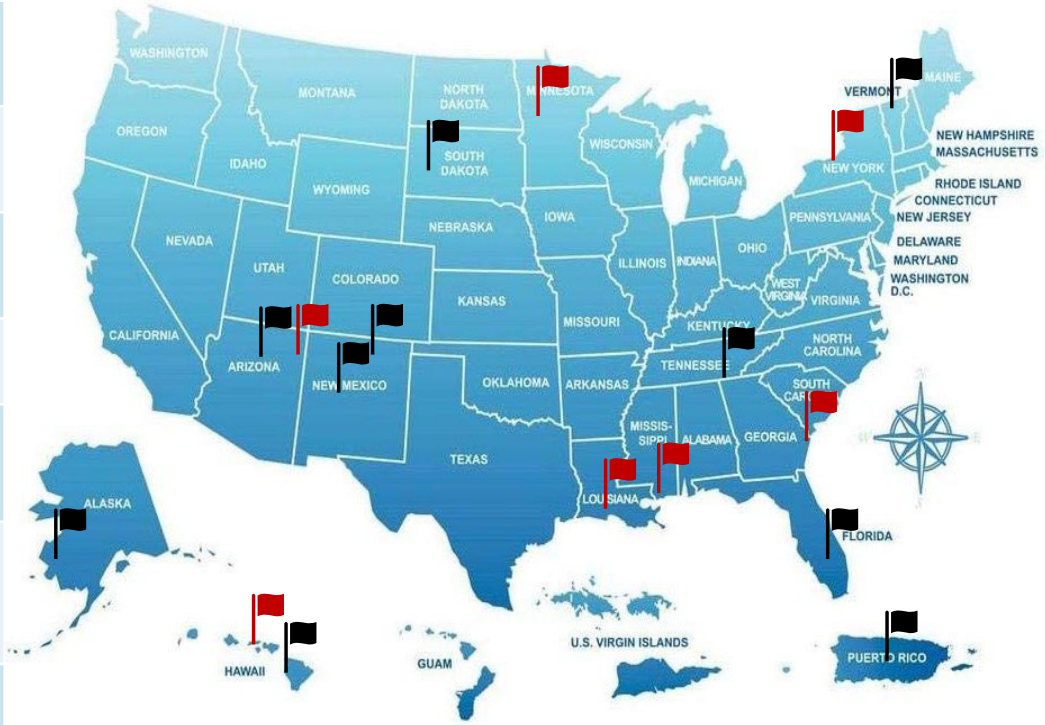
SAND2024-02393PE

CURRENT PROJECTS MAP

State or Territory	Partner
Alaska	Alaska Village Electrical Cooperative
Arizona	Navajo Tribal Utility Authority
Arizona	**Native Renewables (ES4SE)**
Florida	Seminole Tribe
Georgia	**Harambee House (ES4SE)**
Hawaii	Natural Energy Laboratory of HI Authority
Hawaii	**Ho' ahu (ES4SE)**
Louisiana	**Together New Orleans (ES4SE)**
Minnesota	**10Power/8th Fire Solar (ES4SE)**



NOTE: ES4SE Projects in **RED**

State or Territory	Partner
Mississippi	**Coast Electric Power Association (ES4SE)**
New Mexico	Albuquerque Public Schools
New Mexico	Picuris Tribe
New York	**Unity Renewables /Open Door Mission (ES4SE)**
Puerto Rico	Villalba Municipality
South Dakota	Ellsworth AFB West River Electric Association
Tennessee	Electric Power Board of Chattanooga (EPB)
Vermont	Green Mountain Power

ENERGY STORAGE FOR SOCIAL EQUITY (ES4SE)

- Native Renewables
  - 15 off-grid homes for the Navajo Nation and the Hopi Tribe (Arizona)
- Ayika Solutions/Harambee House
  - Community resilience hub in Savannah, Georgia
- Ho'ahu Energy Cooperative
  - 15 off-grid homes in Molokai, Hawaii
- Coast Electric Power Association
  - Resilience for wastewater treatment plant in Hancock County, Mississippi
- Together New Orleans
  - Seven community resilience hubs (lighthouses) in Louisana
- Joule/Open Door Mission
  - Community resilience hub at the Open Door Mission shelter and food kitchen
- 10 Power/8th Fire Akiing
  - Community resilience hub at the Pine Point Elementary school on the White Earth Nation.

NATIVE RENEWABLES, INC.

Total Project Cost	$531k
DOE Cost Share	$531k

- There are approximately 14,000 homes in need of power in the Navajo Nation and Hopi Tribe. Native Renewables Inc. has a long history of successfully installing off-grid residential PV/BESS systems in these homes. Due to the size and isolation of the Navajo Nation and Hopi Tribe, installation and maintenance of these system requires significant travel and labor costs.
- Remote monitoring has proved difficult due to the isolation. Extreme temperature constraints, maintenance restraints, capital costs, and recyclability has limited NRI to using sealed lead-acid batteries.

Locations:

Various across the Hopi Reservation and Navajo Nation (AZ, UT, NM)

Project Objectives:

- This project will install an off-grid residential PV/BESS system in a phased approach to 15 homes in the Hopi Tribe and Navajo Nation.
- Retrofit 42 off-grid systems with a battery monitoring system if the first 15 homes are successful
- Phased approach – Install systems at 5 homes per phase over 3 phases to apply lessons learned to future iterations. Each phase would last 1 year.

AYIKA SOLUTIONS/HARAMBEE HOUSE

- The Harambee House in Savannah, GA has been selected for a resiliency hub demonstration project to serve the community in the event of an outage and also to demonstrate the increased resilience and projected benefits that a PV + Storage system can have for LMI households in Georgia.
- The City of Savannah has some of the highest energy burdened census tracts in Georgia, ranging from 2-12%. The project participants hope to pilot a community-led energy burden reduction program to better understand the projected benefits, scalability, and financial mechanisms needed to install a PV + BESS system

Total Project Cost	$60k
DOE Cost Share	$50k

Locations:

Harambee House location in Savannah, Georgia

Project Objectives:

- Proposing storage + solar (7.5kW/4-hr, 3.6kW) for a community resilience hub
- Solar, solar installation, and some electrical upgrades already funded
- Project is to fund and install the BESS and associated equipment (microgrid controller) to combine the solar for use in creating a islanded microgrid

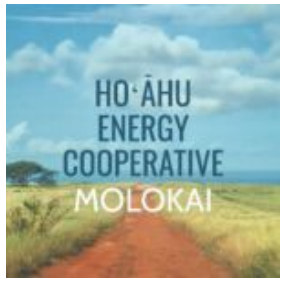
HO'AHU ENERGY COOPERATIVE MOLOKAI

- Molokai is a rural isolated island in Hawaii with a total population of about 7,500, for which 65% identify as Native or part Native Hawaiian. The mean family income for Molokai is between 53-58% of the Statewide mean family income depending on the census tract- with poverty rates of 15-25%.

- 129 out of 514 residents who live on Native Hawaiian Homestead Lands do not have access to the grid. There are many other families not living on Native Hawaiian Homestead Lands who also do not have access to electrical, communications, and other utility infrastructures.

- These systems will provide access to electricity to Native Hawaiian families who currently do not have access to electric infrastructure, goal of reducing or eliminating household burden for gasoline (generator and transportation costs), costs of ice, and transportation costs.

Total Project Cost	$229,500+
DOE Cost Share	$229,500



Locations:

Various locations across the island of Molokai, Hawaii.

Project Objectives:

- This project will install an fifteen (15) nano grid (e.g. off-grid) residential systems (4kW PV and 11 kWh BESS)
- HECM will use recycled 240W PV panels (estimated 10 years of previous installation period) which have already been donated to the cooperative.

COAST ELECTRIC POWER ASSOCIATION

Coast Electric Power Association
A Touchstone Energy® Cooperative

- The Hancock County Utility Authority community faces issues related to natural disasters and service interruptions, with an elevated risk index as measured by FEMA, particularly for hurricanes and other storms. Properly treated wastewater is essential to modern life and the Nation's economy, and vital for preventing disease and protecting the environment. Many of HCUA's customers are in a rural, low-to-moderate income demographic. The cost savings HCUA sees in their peak demand charges will help stabilize customer water and sewer rates and provide resilience benefits to critical wastewater treatment infrastructure.

Total Project Cost	$302,400
DOE Cost Share	$302,400

Location:

Kiln, Mississippi

Project Objectives:

- Install 592kWh of lithium-ion battery energy storage at an outdoor location near HCUA's northern plant in Kiln, MS to support small solar farms for three of HCUA's wastewater treatment plants for 1 day of resilience.
- The solar farms being installed through other means (non-ES4SE funded)


HCUA Western Treatment Plant

TOGETHER NEW ORLEANS

- Together New Orleans is working to create a network of neighborhood level resilience hubs across the state of Louisiana. The resilience hubs will provide backup power to maintain critical community services during power outages. Extended power outages during extreme weather or hurricane related weather events are the leading cause of death from disaster in Louisiana and across the Gulf Coast. The primary goal of these resilience hubs is to mitigate the hazards associated with theses weather related outage events in the most socially vulnerable communities throughout Louisiana.

Total Project Cost	$3,186,200
DOE Cost Share	$800,000

Locations:

- Various locations throughout Louisiana:
  - New Orleans, Jefferson Parish, Lake Charles, Shreveport, Alexandria, and Baton Rouge

Project Objectives:

- Install 7 neighborhood resilience hubs in disadvantaged communities across the state

UNITY RENEWABLES / OPEN DOOR MISSION

- Unity Renewables plans to install solar plus energy storage at one of the Open Door Mission's facilities that provides critical community services, emergency shelter, and hot meal provisions in Rochester, NY. In the event of a power outage, the system will be able to supply power to the shelter and commercial kitchen in order to continue providing these services to the community while avoiding reliance on fossil fuel generators.

Unity Renewables LLC
"UR" Renewables Partner

Open Door Mission

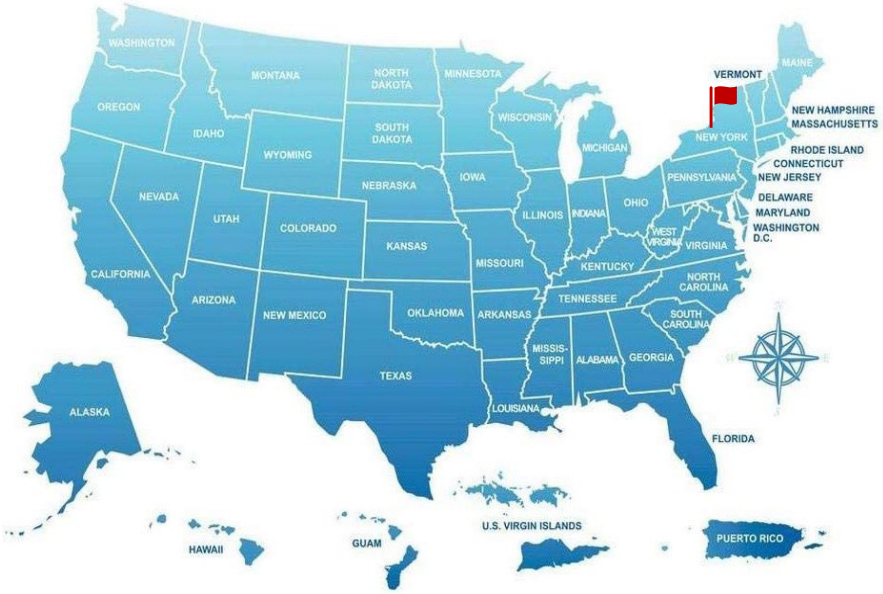
Total Project Cost	$1,100,000
DOE Cost Share	$1,100,000

Locations:

- Rochester, New York

Project Objectives:

- Install 51 kW of solar plus 2.05 MWh (4-hour) of battery energy storage to provide resilience to Open Door Mission's shelter and commercial kitchen



10 POWER / 8TH FIRE SOLAR

10Power and 8th Fire plan to expand the existing 21 kW ground mounted PV array at the Pine Point elementary school and community center on the White Earth reservation. Additional solar PV coupled with battery energy storage will allow the school to become a community resilience center in the event of power outages and supports the White Earth community's goals of energy self sufficiency, reduction in carbon emissions, and reduction of energy costs to the school.

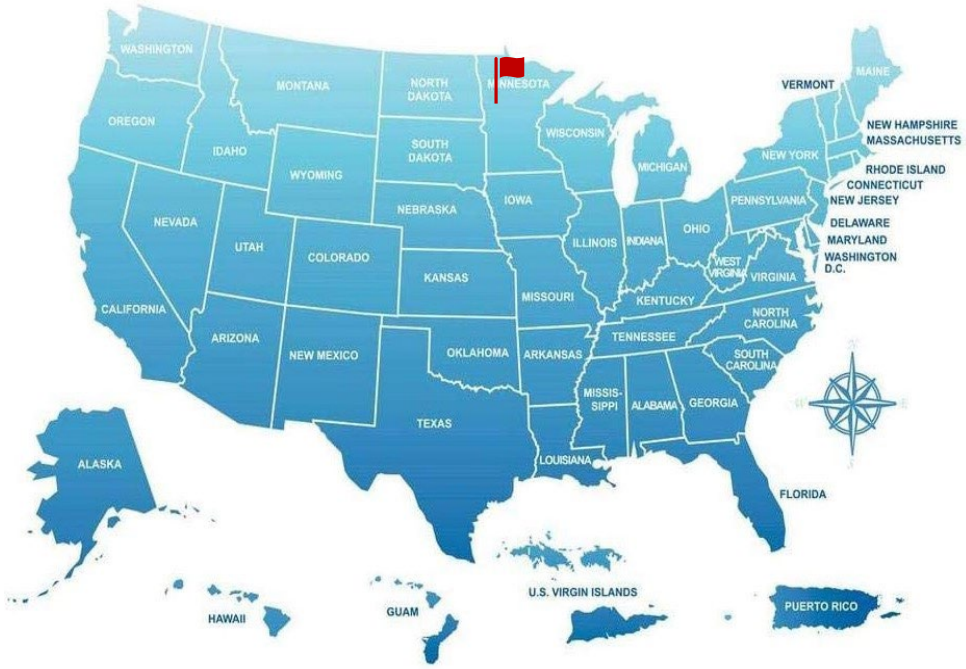
Total Project Cost	$1,750,000
DOE Cost Share	$1,750,000

Locations:

- White Earth Reservation – Ponsford, Minnesota

Project Objectives:

- Install 448 kW solar plus 2 MWh (4 hour) of battery energy storage at the Pine Point elementary school/ community center to create a resilience hub



CURRENT PROJECTS STATUS: NTUA

- **Deployment 1 has been de-commissioned**
  - **The resident in Dilkon have received permanent power from the utility**
- **Equipment from deployment 1 will be re-purposed by NTUA as a mobile PV+BESS unit that will be deployable for temporary power.**

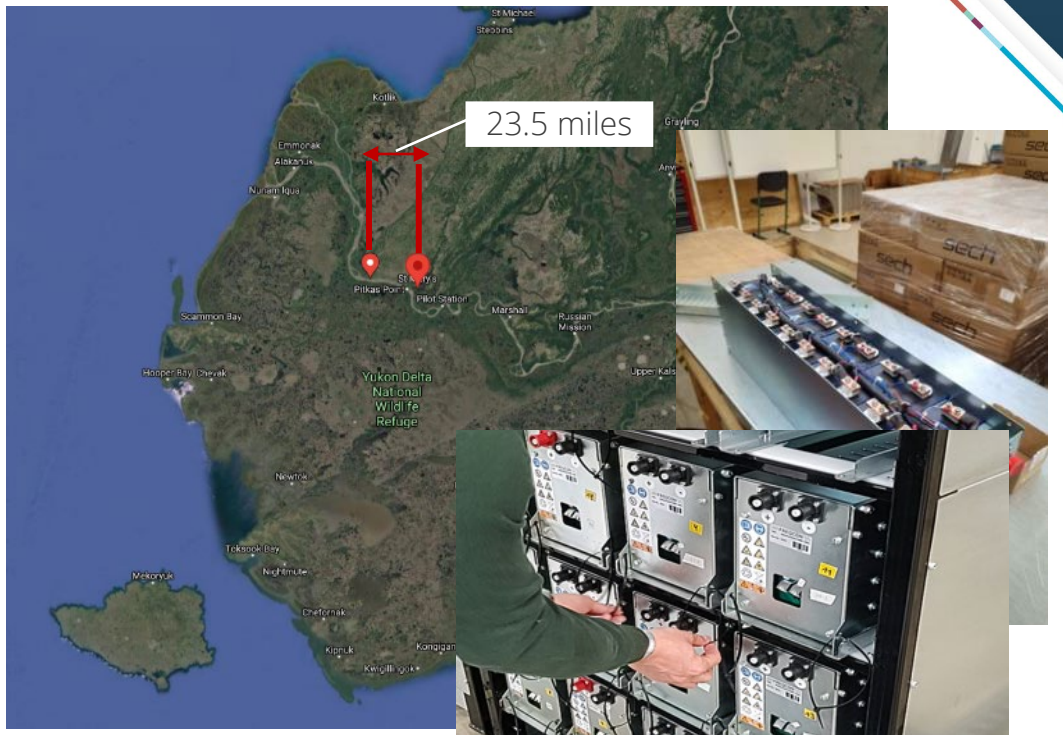
Total Project Cost	$TBD
DOE Cost Share	$106k

- **Deployment 2:**
  - **UEP assessing different inverters to minimize voltage ripple behavior during charge controller MPPT**
  - **Battery modules will be increased from 12 modules to 16 modules**
  - **Enclosure re-design to accommodate additional modules and new inverter**

New conceptual enclosure design

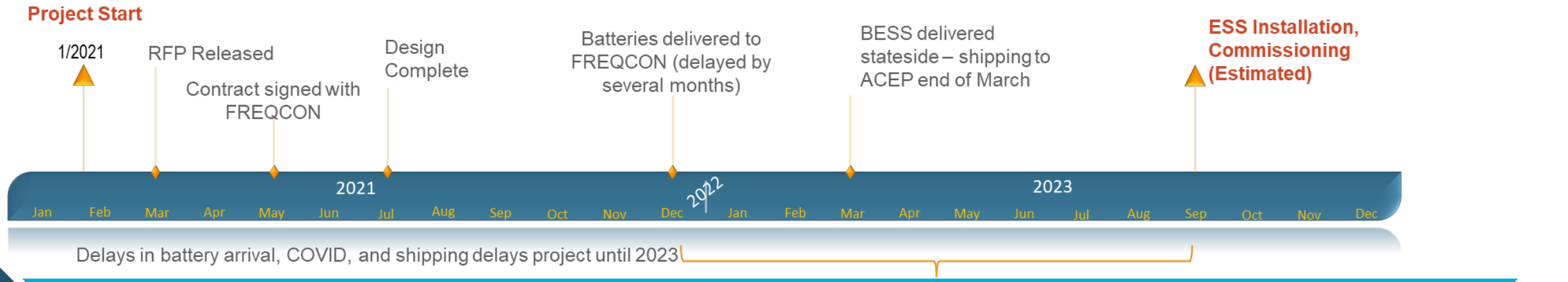
CURRENT PROJECTS STATUS: ALASKA VILLAGE ELECTRIC COOPERATIVE

Total Project Cost	$1.59M
DOE Cost Share	$700k



Current Status:

- BESS equipment shipped to St. Mary's (installation location) on the August barge
- BESS installed and being commissioned



NATURAL ENERGY LABORATORY OF HAWAII AUTHORITY (NELHA) – KAILUA-KONA, HAWAII

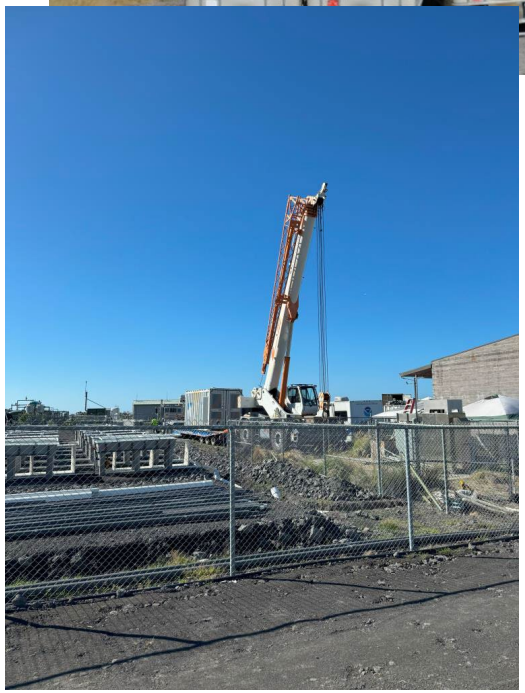
Project Information:

- 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.

Updates/Challenges:

- System has been fully decommissioned and equipment removed from site
- Electrolyte shipped to recycler in Texas

Total Project Cost	$UNKWN
DOE Cost Share (Initial installation)	$275k
DOE Cost Share (Decommissioning and removal)	$250k



ALBUQUERQUE PUBLIC SCHOOLS – ATRISCO HERITAGE ACADEMY HIGH SCHOOL – ALBUQUERQUE, NM

Total Project Cost	$3.2M
DOE Cost Share	$650k

Project Information:

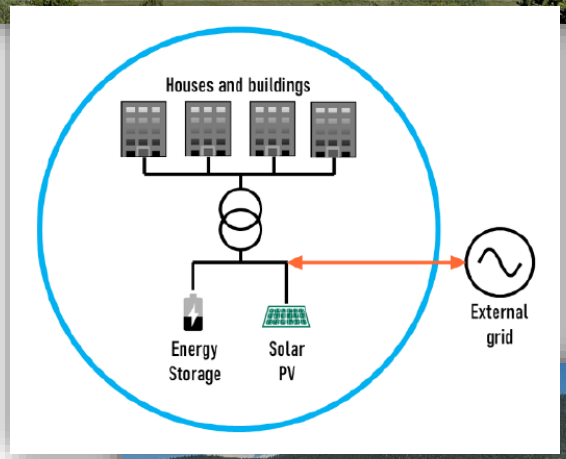
- 721kW / 4hr battery storage and 850kW rooftop PV project to reduce school's demand charges.
- Largest energy footprint for any school in the district with a large percentage due to peak load demand charges.
- Future Resilience Hub - The school also functions as a community gathering center during emergencies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

Updates/Challenges:

- Battery system and solar PV installations are complete. BESS has completed initial commissioning
- After delays in the interconnection study process, the utility identified the need to upgrade protection systems due to project. This work was completed by the end of December 2023 and APS received permission to operate.
- Solar PV and BESS are scheduled for commissioning in February 2024

PICURIS PUEBLO –
NORTHERN NEW MEXICO

Total Project Cost	$TBD
DOE Cost Share	$500k



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 (1MW/4hr) to enable microgrid operation for resiliency when combined with the planned Picuris Phase II Community Solar system
- Support local utility grid operations

Updates/Challenges:

- Construction of the Solar project is currently underway. Grant from DOE Office of Indian Energy
- Need to coordinate with local co-op to define operational plan for the battery
- Currently in contract development with Sandia for cost share funding

MUNICIPALITY OF VILLALBA – VILLABLA, PUERTO RICO

Total Project Cost	~$1M
DOE Cost Share	$1M

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.
- The resilience hub will be able to serve the local community with additional resources such as a continuity of city services, heating/cooling center, water/food distribution, phone charging, etc.
- Villalba is one of five municipalities that formed the Mountain Energy Consortium (CEM) post Hurricane Maria
- Previous microgrid analysis was performed for all of the municipalities as part of a larger effort of Sandia supporting CEM

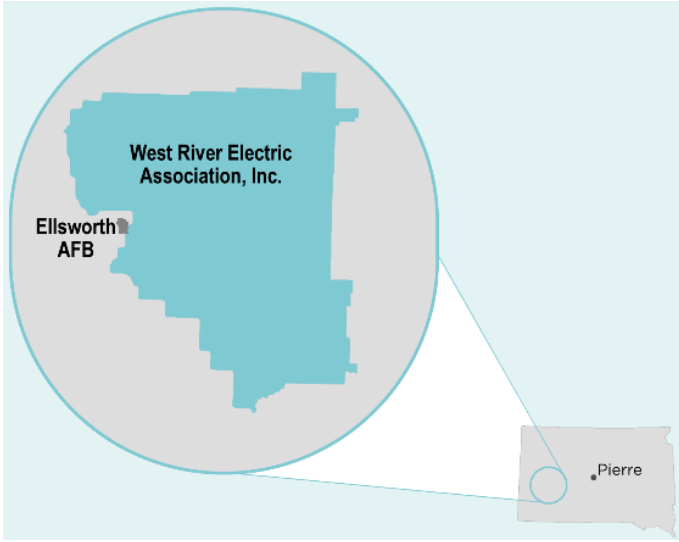
Updates/Challenges:

- Project analysis has been completed
- Sandia cost share contracting completed
- The project is currently in the Request for Proposal (RFP) stage and expects to award and begin construction in 2024.

Microgrid Location

ELLSWORTH AIR FORCE BASE (NRECA) – RAPID CITY, SOUTH DAKOTA

Total Project Cost	$400k
DOE Cost Share	$250k



Background:

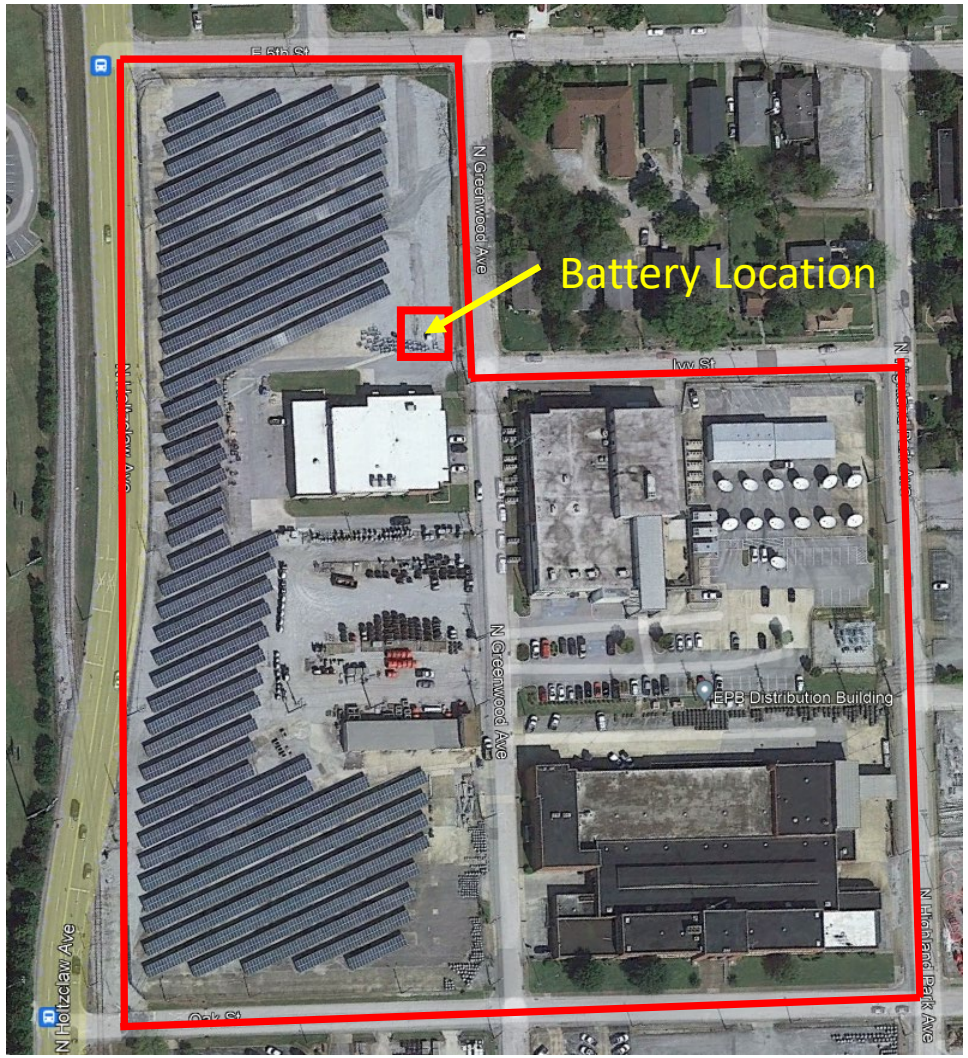
- This project is a National Rural Electric Cooperative Association (NRECA) Rural Energy Storage Deployment Program (RESDP) Project, in partnership with Sandia, West River Electrical Association (WREA), PNNL, and Ellsworth Air Force Base. The project will provide a battery energy storage system to a site for 24/7 operation.

Updates/Challenges:

- 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.
- Site construction is complete, and the system originally expected to be commissioned and operational by end of Q4 2023 but delays with the battery enclosure has pushed this into 2024

ELECTRIC POWER BOARD (EPB) - CHATTANOOGA, TENNESSEE

Total Project Cost	$970k
DOE Cost Share	$250k



Background

- EPB installed and commissioned a 1.25 MW, 2.5 MWh battery energy storage system to supplement their existing Community Solar site (1.3 MW) to create a microgrid for the EPB Control Center Campus. The battery system is operational and has been in use for monthly demand reduction.

Updates/Lessons Learned:

- Project is complete and in-service
- Sandia is currently collecting operational data from the project to validate the performance of the system.

CURRENT PROJECTS STATUS: GREEN MOUNTAIN POWER/VERMONT ELECTRIC COOPERATIVES

Total Project Cost	$5.5M
DOE Cost Share	$2M

- **Status:**
  - Access road, transformer vaults, concrete pads, conduit, conductor, all installed Sep, 2023
  - Main and auxiliary transformers delivered Dec, 2023
  - Perimeter fence 75% complete Nov, 2023; roadside facing fence and security gate not installed until crane operations cease
  - All interconnection work (poles, wires, fiber, recloser, etc) completed Nov, 2023
  - ISO-NE Reliability Committee approved project for regional operations Dec, 2023
- **Updates/Lessons Learned:**
  - Awaiting auxiliary transformer installation so that battery installation can be scheduled
  - Electrical contractor has suffered both labor and project management challenges and is running severely behind in their scope of work creating significant project delays
  - Winter weather and snow has finally arrived creating construction challenges

UPCOMING AND POTENTIAL COLLABORATIONS

CapyBara Energy

Background

- Sandia/CapyBara Energy are collaborating on a lab-level demonstration project to test and validate CapyBara's aqueous super capacitor technology

Updates/Lessons Learned:

- Sandia cost share contract is complete, project development underway (safety/test plans, lab set up, etc.)

Total Project Cost	TBD
DOE Cost Share	$150K

IOWA STATE UNIVERSITY

Background

- Sandia and ISU are developing a collaboration on mobile energy storage systems for rural community resilience needs

Updates/Lessons Learned:

- Sandia Scope of Work (SOW) is being developed currently that will lead to a cost share contract

Total Project Cost	TBD
DOE Cost Share	$150K

CAPACITECH

Background

- Sandia and Capacitech are considering a collaboration with a Florida utility to investigate uses for their technology

Updates/Lessons Learned:

- Still in discussions on the collaboration