

INL is helping install a microgrid capable of powering an American Red Cross disaster shelter on Blue Lake Rancheria land during an emergency. (Blue Lake Hotel photo used with permission from Blue Lake Rancheria)



Demonstrating a Secure, Reliable, Low-Carbon Microgrid

Blue Lake Rancheria project could help northern California tribal community

Idaho is collaborating with diverse agencies to build a renewable, self-sustaining microgrid at the Blue Lake Rancheria (BLR), the trust lands of a sovereign Native American tribe in northwestern California. The BLR consists of approximately 91 acres near the city of Blue Lake, 17 miles north of Eureka. The critical BLR facilities include a designated American Red Cross Emergency Shelter. This work will result in development of a first-of-its-kind smart microgrid that can operate while connected to the grid or when “islanded” independently from the utility power supply. The microgrid project will serve as a forerunner to future energy projects benefitting similar communities.

The Project

Successful completion of the project will modernize the

BLR’s power grid to ensure a sustainable and resilient energy future for a Native American tribe. Critical loads on the BLR grid include the tribe’s economic centers and an emergency evacuation center.

The microgrid will include a 409-kW solar photovoltaic array, 950 kWh of battery storage, a 175-kW biomass gasified/fuel cell power system and diesel generators. Operators will manage and control these energy resources with software from Siemens, an engineering company that specializes in industrial automation and control.

The proposed BLR microgrid will be capable of coordinating with the local utility to disconnect from the larger grid and operate independently (islanding), which can increase electricity reliability. The goal is to prepare the community for

a broad range of power system complexities that can arise due to natural calamities, attacks or other unforeseen events.

The project demonstrates how national laboratory assets can be leveraged to build resilient rural communities. A key highlight of this project is the diversity in partnerships forged among a U.S. Department of Energy national laboratory, international companies, a state university and local contractors.

The Partners

A grant from the California Energy Commission’s Electric Program Investment Charge program helped fund the project. Other partners include Humboldt State University’s Schatz Energy Research Center and Pacific Gas & Electric (PG&E).

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The Energy of Innovation



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The microgrid will feature a Siemens Microgrid Management System, a battery storage system from Tesla Motors and controllable demand. INL's involvement enables the community to leverage unique national laboratory assets to make strides in 21st-century energy systems.

INL's Role

The Power and Energy Real-Time Laboratory (PERL) at INL will perform simulations to test the microgrid's ability to participate in one or more PG&E demand-response programs. INL researchers are creating a simulated BLR microgrid environment to simulate several what-if scenarios.

The Real-Time Digital Simulator (RTDS) racks at INL have been configured for dynamic simulations that accommodate Power-Hardware-In-the-Loop (PHIL), Controller-Hardware-In-the-Loop (CHIL) and emulation of real-world grid events. This capability facilitates testing and validation of the Siemens controller and other power system components such as the Tesla battery and power inverter setup. The RTDS also can be used as feedback to improve the microgrid management system controller before deployment.

These exclusive grid emulation and dynamic testing capabilities will be used to minimize risks from technical barriers to establishing the new microgrid. These resources can be used to forecast possible outage scenarios, analyze system response

and fine tune the controller to operate as intended under extreme contingencies such as earthquakes. INL's infrastructure will help resolve device integration issues and minimize deployment risks. INL's distinctive testbed also will be used to train future trainers prior to controller installation.

PERL lab researchers have built a reputation through

pioneering contributions to the power systems community. From establishing geographically distributed co-simulations to developing state-of-the-art front-end controllers for grid devices, INL's active role in grid modernization projects has given its experts a distinct vantage point for the future. More information and a video about the project are on the [Siemens website](#).

For more information

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INL's Power & Energy Systems engineers use a Digital Real-Time Simulator to test hardware and controllers by emulating real-world grid events.