Redwood Coast Airport Renewable Energy Microgrid

Schatz Energy Research Center

The Challenge

As load serving entities, Community Choice Aggregators (CCAs) are required to procure utility scale renewable generation and energy storage to serve their customer base. Investor Owned Utilities (IOUs) are working to transition to the sustainable grid of the future by updating interconnection processes, developing new tariff structures, and grappling with the effects of more intermittent renewable energy on the grid. Meanwhile, climate change has increased the frequency and severity of natural disasters, highlighting the importance of keeping critical facilities operating to provide emergency services in times of dire need.

The Redwood Coast Airport Renewable Energy Microgrid Project will demonstrate a replicable business case for deploying microgrids in California that address the needs of these emerging trends.

Project Innovation + Advantages

This project will demonstrate the first multi-customer, front-of-the-meter microgrid with generation owned by a local CCA (Redwood Coast Energy Authority) and the microgrid circuit owned by an IOU (Pacific Gas & Electric). It will provide low carbon resiliency to a commercial airport and U.S. Coast Guard Air Station, which are among the most critical facilities in the host community. The microgrid will include a megawatt scale PV array directly DC-coupled to a lithium-ion battery system. This will allow the CCA to participate in the CAISO wholesale electricity market. During "blue sky" conditions, the CCA-owned generation system will store solar energy during the day and discharge it during the evening peak when power is needed and wholesale prices are high. When islanded, the generation system will energize the microgrid, enabling extended operation on 100% renewable energy. The IOU will own, operate, and maintain the microgrid circuit, including protection and control devices, as well as control the microgrid during islanded operation.

Coast Guard Air Station Humboldt Bay

Anticipated Benefits for California

Demonstrating a replicable business case
The focus of this project is to deploy standardized, commercially available microgrid technology in an innovative configuration that offers measurable benefits to stakeholders, can be easily replicated, and can be economically viable. CCAs have the ability to finance renewable energy generation and it is typically part of their mission to do so. CCAs also must provide storage that is ≥1% of their maximum load. The microgrid will provide important resiliency benefits and the incremental cost of siting these generation/storage systems near critical facilities and upgrading the distribution system for microgrid readiness can be small. The Airport Microgrid project will demonstrate the economic viability of this business case, showing how barriers to widespread deployment of multi-customer microgrids can be eliminated.

Standards, tariffs & agreements that facilitate replication

Pacific Gas & Electric (PG&E) will develop engineering standards, testing protocols, and equipment specifications for multi-customer, front-of-the-meter microgrids within their distribution system. As the CCA administrator, the Redwood Coast Energy Authority (RCEA) will collaborate with PG&E to create experimental tariffs and agreements that allow for the creation and operation of this innovative microgrid project. These tariffs and agreements will become important examples to other IOUs and CCAs, and help to facilitate replication of this business model.

Increased reliability and resilience

In the event of a prolonged emergency, the large PV array and storage battery will be able to supply nearly continuous power to the airport and the adjoining U.S. Coast Guard station. Due to Humboldt County's remote, isolated location these critical facilities will provide the means to transport critical supplies into and around the region in a large-scale emergency.

Environmental and economic benefits

Over 3100 MWh/yr of renewable electricity will be generated. This will result in CO_2 emission reductions of over 880 MT/yr. Coupled with energy storage, this system will generate an annual economic benefit of approximately $356,000. During the construction phase an estimated 37 full time jobs will be created, with $1.5M in earnings and $3.4M in economic output. (*Note: these values are based on preliminary project estimates.*)

Community choice

RCEA's CCA program will make significant progress in its mandate to deliver locally produced renewable electricity to its ratepayers while also meeting its energy storage mandate.

Technological advancements

Innovative direct DC–coupling of the PV and battery systems will result in a more efficient system and will lower project costs by reducing the number of inverters and reducing telemetry requirements for interconnection.

Major Project Elements

- 2 MW$_{DC}$ solar photovoltaic array, DC-coupled to energy storage
- 2 MW$_{AC}$, 8 MWh battery energy storage
- 250 kW$_{AC}$ PV system that will offset airport electricity consumption through net metering
- Microgrid control system with distribution control center interface
- Two reclosers with advanced controllers
- Demand response capable electric vehicle charging
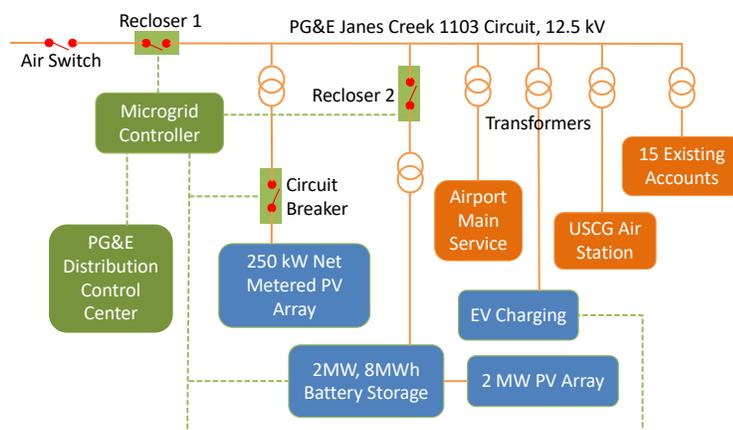
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Total Project Cost: $11,323,000
CEC EPIC Funding: $5,000,000
Project Location: California Redwood Coast – Humboldt County Airport, McKinleyville, CA
Contract Term: August 2018 to March 2023

Key Partners

California Energy Commission; Schatz Energy Research Center at Humboldt State University; Redwood Coast Energy Authority; Pacific Gas & Electric Company; County of Humboldt; Schweitzer Engineering Laboratories, Inc.; TRC Companies, Inc.; The Energy Authority, Inc.