Poudre Valley REA Microgrid at Red Feather Lakes, Colorado

Project Overview

Red Feather Lakes is an isolated community in a rugged area of the Rocky Mountains northwest of Fort Collins, Colorado. The community is served by Poudre Valley Rural Electric Association (PVREA), a rural cooperative, from a 69 kilovolt (kV) radial feeder. The area is subject to short-duration outages caused by vehicular accidents and weather events damaging this single and extremely vulnerable single distribution power line. Wildfires and major snow storms can bring extended outages to the area. (Just last year, the two largest wildfires in Colorado history threatened local water supplies in the Fort Collins area.)

The microgrid will be utilized to support essential services for the greater Red Feather Lakes community, which includes several hundred homes and seasonal cabins within a few miles of the unincorporated village center. During islanded operation the microgrid will rely upon Encorp's Egility controls platform to power essential services that provide not only water, but broadband, meeting space, telecommunications, fuel, food, general supplies, shelter and emergency services. In addition to community resiliency, the microgrid was designed to assess the following to standardize the microgrid development process to reduce customized engineering costs:

- Battery performance, particularly the efficacy of the remote control of the microgrid;
- Effectiveness of the microgrid in keeping critical facilities up and running during outages;
- Utilizing the microgrid for load management services such as demand response based upon distribution, transmission, and generation needs;
- Optimizing resiliency through enhanced energy efficiency and load management applications.

The microgrid is expected to be up and running this summer, just in time for the summer wildfire season, when islanding functionality will be of immense value to the rural cooperative utility and its customers.

The Problem

In 2018, a community group in Red Feather Lakes won a grant from a family foundation to install a solar photovoltaic (PV) system at the community library, a building that also serves as the Red Feather Lakes multi-purpose community center. The group of co-op members behind the solar initiative invited Poudre Valley Rural Electric Administration (PVREA) staff to discuss ways the community might work with the co-op to maximize the value of the solar installation. When the single power line snaking up the mountains experienced an outage, the co-op dispatched crews from its headquarters 60 miles away, and outages of several hours were not uncommon. The community hoped a microgrid might provide relief. The cooperative saw an opportunity to apply lessons learned from an initial microgrid installation at the PVREA headquarters to meet the community's need for resiliency.

The Solution

A variety of scenarios for the microgrid were proposed and evaluated. In 2019, while it was still anticipated that the project would use a battery tied to the library solar system, Poudre Valley REA set into motion the process to procure a microgrid controller. A request for information (RFI) was issued and within a few months the cooperative selected a controller from Encorp, a company headquartered in nearby Fort Collins which had deployed numerous microgrids around the world.

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The Solution (cont.)

Soon after, changed circumstances led to a decision that a larger battery system should be utilized and that Poudre Valley REA would be the owner and operator. A new location was selected for the battery system: the Red Feather Lakes fire station, which is center of the community's emergency services. It offered other advantages, including:

- Use of a legacy diesel-fueled generator, already at the site and used for back-up power generation
- The site was the only one with three-phase electric service in the community, a level of service required for the microgrid configuration being considered
- Sufficient space to site a battery energy storage system

The opportunity to join a federal Rural Energy Storage Deployment Program offered by the National Rural Electric Cooperative Association (NRECA) in 2020 allowed the project to move forward. The funding made acquiring the battery feasible. It also provided access to technical services from Sandia National Laboratories, a pioneer on new microgrid concepts, which collected data and ran models to identify the optimal battery size and the proper integration of resources within the microgrid.

NRECA, which has been exploring how rural coops can upgrade their networks and resiliency with new battery storage devices and microgrids, helped develop the solicitation parameters. Poudre Valley REA eventually purchased a Tesla battery energy system through Namaste Solar, another local Colorado company. Namaste Solar was contracted to deliver and install the battery system.

The solar PV system, when producing, will meet existing demand within the microgrid up to 35 kW when in island mode, with the batteries picking up additional load from the peak microgrid demand up to 90 kW. The battery is expected to provide 3.2 hours of buffer. In total, the microgrid should provide up to 12 hours of resiliency during a grid outage. This should provide ample coverage during a "standard" outage in Red Feather Lakes of one to two hours from a downed tree or a vehicle taking out a co-op utility pole. The microgrid will be controlled by Poudre Valley REA through its SCADA system at the co-op headquarters in Fort Collins.

Key Project DER Features

The microgrid incorporates assets provided by the community (solar PV and propane generator) and technologies financed by PVREA with the help of the NRECA:

- 35 kW solar PV system
- Generac propane generator (130 kW with 1,000 gallons storage)
- 140 kW/ 446 kWh Tesla lithium ion battery
- Encorp Egility control platform
- Reclosers, switches, transformers and distribution line upgrades

Encorp Egility control platform graphical user interface screen