

GRID MODERNIZATION CASE STUDY: Rural Coop Virtual Power Plant Project (VPP)

In 2020, Holy Cross Energy, a rural electric cooperative in Western Colorado, partnered with an affordable housing project in the town of Basalt, Colorado to outfit four homes with utility-controllable, distributed energy resources (rooftop solar, battery storage, electric heat pumps, and heat pump water heaters) to be operated as a virtual power plant (VPP).

Community Goals

Basalt, CO wanted to deliver energy affordability and reliability solutions to residents of an affordable housing community while also reducing their carbon footprint. Holy Cross Energy wanted to understand how to integrate and operate new, customer-owned connected technologies versus traditional, coop-owned resources while increasing system resiliency.

Challenges to Achieving Goals

Basalt, Co is located in a mountainous area serviced by power lines across long distances and wildfires increasingly occur in surrounding areas. Holy Cross Energy risks starting wildfires around Basalt if they provide electricity service during windy or dry periods. The cooperative wanted to solve this problem by encouraging rooftop solar but, as adoption increased, Holy Cross faced costly upgrades to its distribution system to accommodate the excess generation that the existing system was not designed to handle.

Connection to Grid Modernization

Virtual power plants, aggregations of distributed energy resources, provide coops and utilities with demand flexibility solutions. The local electricity can deploy these resources to respond to situations on the grid to maximize the system's efficiency, avoid expensive infrastructure upgrade, and compensate customers for the services their resources provide. For example, with a storage VPP, the coop can deploy batteries at homes with rooftop solar to capture energy generated during the day when demand is low and dispatch it in the evening when demand is high. This helps customers get more use out of their solar panels while also saving the cooperative from having to upgrade its grid infrastructure. It also helps the cooperative avoid costly demand charges from its wholesale electricity providers keeping rates affordable while providing customers a power solution during high fire risk periods.

Technical Solution

Holy Cross Energy decided to run a VPP pilot at four homes in the Basalt Vista Affordable Housing project to study how it can utilize innovative technology to orchestrate distributed resources in ways that can provide value to customers and the grid as well as help the community meet its goals. This study led Holy Cross Energy to expand its virtual power plant to 174 homes and grow its installed distributed storage capacity to over 3 MWs in 2024.

