Fact Sheet

July 2019

Cooperatives and Energy Storage

Key Findings

- Electric energy storage technologies such as batteries enable us to capture electric energy for later use. Electric cooperatives are using these technologies to reduce the demand for power during peak periods, provide backup power, maintain frequency, power microgrids, integrate renewable resources and defer transmission investments or upgrades.
- Lithium-ion batteries remain the nearly universal choice for cooperative deployments of battery energy storage systems (BESS) for stationary applications in 2019.
- Kauai Island Utility Cooperative (KIUC) tops the list of cooperatives deploying storage with two solar-plus-storage systems in operation and a third under construction for a total of 220 MW hours.

Energy storage reaching a tipping point

Batteries and other technologies that allow electric utilities to store energy are becoming increasingly viable thanks to technological advances, expanding battery sizes, new use cases and declining costs. From Kotzebue, Alaska, to Ocracoke, North Carolina, electric cooperatives are field-testing an array of energy storage options. Co-ops believe energy storage has enormous potential, especially for utilities where the cost of power is high, such as those located on islands and other remote, inaccessible places.

Member expectations are driving co-op energy storage development

In addition to deploying advanced, large-capacity batteries, co-ops are testing new applications of proven technologies that can store energy in other ways, such as aggregated control of residential appliances and electric vehicles, pumped hydro, thermal energy and "buildings as batteries."

Electric co-ops are responding to evolving expectations from their consumer-members who have indicated they want sustainable, affordable and reliable power with flexible rate options. That's why co-ops are:

- Deploying energy storage in tandem with intermittent resources such as wind and solar.
- Using batteries to provide back-up power during outages, increase resiliency and improve power quality.
- Leveraging energy storage as a way to reduce demand for expensive peak power and defer costly investments in transmission and transformer upgrades.
- Offering members new services including innovative rates and residential batteries.

Policy priorities

As the electric utility sector transitions from pilot projects to large-scale energy storage deployments, the research priorities are also shifting. Electric cooperatives advocate for investments in applied research on the

full range of storage technologies, not just lithium-ion batteries. Co-ops are calling for increased field deployment of energy storage options that can solve challenges specific to the needs of rural electric systems.

Cooperative advances in energy storage

The rapid increase in cooperative solar capacity offers a useful template for energy storage. Co-ops are sharing information and lessons learned across the network. Given co-ops' strong ties to their members, their flexible business model and innovative spirit, co-ops are in a strong position to lead on energy storage.

Integrating renewable resources: Kauai Island Utility Cooperative

Less than 10 years ago, KIUC in Hawaii relied almost entirely on diesel fuel to power local communities, resulting in extremely high electric bills. Today, the co-op is able to leverage solar and other renewable energy resources to supply over half of the co-op's power needs. To maximize the potential of these renewable resources, the co-op developed stand-alone batteries and solar arrays coupled with batteries. By the end of 2019, these solar-charged batteries will supply a majority of the nighttime power needs on the island.

Commercial partnerships: South River EMC, North Carolina Electric Cooperatives and Butler Farms

Adapting solutions that meet specific member needs is a hallmark of the electric cooperative movement. Co-ops in North Carolina recently demonstrated one such solution through an innovative partnership with Butler Farms, a sustainability-focused hog farm. In 2018, South River EMC, the local distribution co-op, and North Carolina's Electric Cooperatives, the state's generation and transmission cooperative, helped Butler Farms establish an on-site microgrid incorporating the batteries and controller with the farms existing solar and diesel generator. During normal conditions, the microgrid connects to South River EMC's distribution system to supplement and diversify traditional power sources. In the case of a power outage, the microgrid can provide locally generated power using a system of batteries that store energy produced from solar panels and a biogas digester.

Residential energy storage partnerships: Dairyland Power Cooperative, Jo-Carroll Energy, Richland Electric, Oakdale Electric and MiEnergy Cooperative

Four distribution cooperatives in Iowa, Illinois, Wisconsin and Minnesota are engaged in a pilot program to test the capabilities of residential energy storage. They are combining several residential storage systems to manage electricity use during times of peak demand. Throughout the process, the co-ops monitor and evaluate the progress alongside the real-world performance of the system and the economic impacts. The co-ops will analyze, quantify and share the results later this year.

Overview of cooperative battery storage

In 2018, NRECA issued *Battery Energy Storage Technology Overview and Co-op Case Studies,* a report on co-op battery storage projects, focusing on lithium-ion and flow batteries, the technologies that have emerged as the leading short and long-term choices for stationary battery energy storage systems (BESS). The research, conducted jointly with the National Rural Utilities Cooperative Finance Corporation, CoBank and the National Rural Telecommunications Cooperative, provides details on the deployments and outcomes.

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