Pacific Northwest
NATIONAL LABORATORY

Energy Storage Case Studies

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Energy Storage for Customer Affordability

United Power Cooperative: Firestone, Colorado

- United Power Cooperative in Firestone, Colorado developed a 4 MW/16 MWh BESS project structured to deliver peak demand savings to its members.
- The battery charges when wholesale electricity prices are low and discharges during high price periods, which reduces the co-op's exposure to market volatility.
- United Power anticipates savings of about $1 million annually.
- Co-op members can benefit from these savings by paying a fixed monthly fee in a subscription model that allocates battery capacity to participating customers.

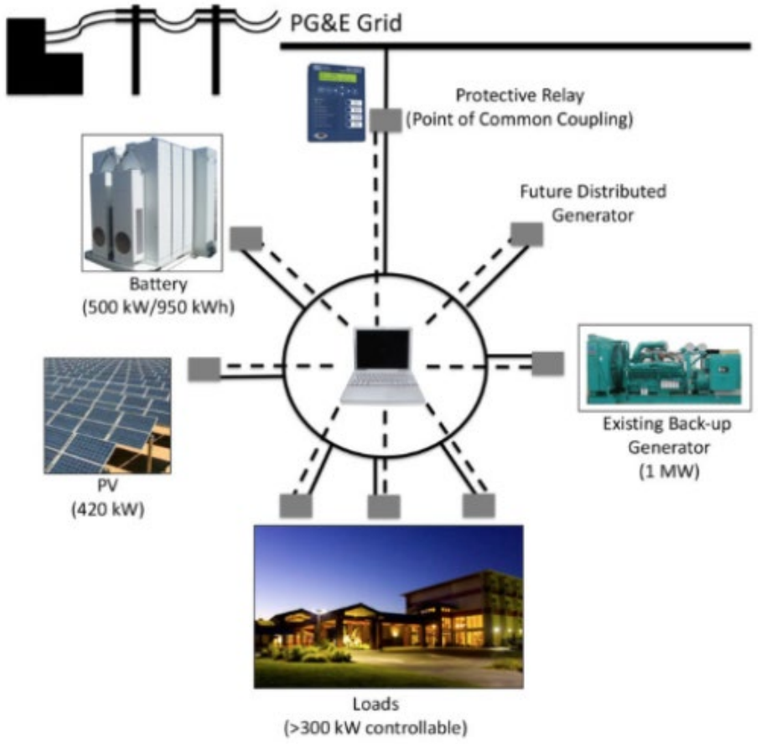
United Power Cooperative's Carbon Valley battery storage facility

(Source: https://www.unitedpower.com/energy-projects#heading-accordion-3665-1)

Energy Storage for Tribal Resilience

Blue Lake Rancheria Tribe Microgrid: Blue Lake, California

- In Humboldt County, California, the Blue Lake Rancheria Tribe operates a microgrid designed to maintain power to its campus during normal grid conditions and utility outages.
- The system combines 420 kW PV array with a 1,150/1,950 kWh BESS.
- The microgrid's value was demonstrated during a 2019 public safety power shutoff event when much of the surrounding area lost electricity.
  - The broader grid was deenergized, but the Tribe's campus served as a community resilience hub.
  - The microgrid provided critical services to about 10,000 people (~10 percent of Humboldt County's population at the time).



Major project elements of the Blue Lake Rancheria Tribe Microgrid.

Energy Storage for Cost-Effective Transmission Deferral

Arizona Public Service: Punkin Center, Arizona

- Punkin Center is an unincorporated community located in a rural and mountainous part of Arizona.
- Arizona Public Service, the utility serving the area, identified a need for additional capacity to meet forecasted demand growth.
- In 2018, the utility chose to deploy a 2 MW/8MWh battery to meet demand, which cost ratepayers 50% less than a rebuilt transmission line.
- The BESS is able to supply additional capacity by providing power during peak demand periods, deferring the need for a transmission upgrade.

Overhead view of the Punkin Center BESS facility

(Source: https://tristate.coop/sites/tristategt/files/PDF/TransmissionPlanningDocs/2020/20M-0008E_Appendix%20O_Supplemental%20Report_HDR%202020%20Energy%20Storage%20Report.pdf)

Energy Storage for Rural Energy Access

Navajo Tribal Utility Authority: Dilkon, Arizona

- The Navajo Nation spans rural and remote areas of Arizona, New Mexico, and Utah. More than 15,000 residents live without grid-connected electricity (as of 2022).
- Because the area is very large with a dispersed population, building traditional distribution infrastructure can be cost prohibitive.
  - The Tribe is exploring off-grid options to provide energy to more residents.
- A demonstration project built in 2022 paired 1.8kW of generation with a 3kW/13 kWh BESS that can operate independently of the grid.
  - The project models how distributed standalone systems that include BESS can address energy access gaps in very rural areas.

The Navajo Nation's BESS pilot project in Dilkon, Arizona.

(Source: https://www.sandia.gov/app/uploads/sites/82/2023/10/PR2023_104_Cowles_Gabriel_Demonstration-Projects.pdf)

Energy Storage for Affordable Peaker Plant Replacement

CAISO and PG&E: Oakland, CA

- In 2018, a decades-old peaker plant in Oakland was slated for planned retirement.
- California's grid operator (CAISO) and the area utility (PG&E) studied options to replace the plant's capacity to ensure electric reliability.
- The study found that deploying multiple energy storage projects alongside some transmission upgrades could save hundreds of millions of dollars compared to alternatives.

BESS partially replaced the capacity of an aging jet-fuel peaker plant

(Source: https://www.sfchronicle.com/business/article/Agency-s-effort-to-retire-Oakland-power-plant-13944285.php)

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Thank you