Blue Lake Rancheria Microgrid: Energy Infrastructure

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Center for Community Investment June 2021





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hen Blue Lake Rancheria, a 50-member tribal reservation in Northern California, built their solar microgrid, their goal was to provide climate-resilient infrastructure for the tribal community. The reservation, which includes Wiyot, Yurok, and Hupa people, sits on 100 acres of land in a rural area with high risk of earthquakes, flooding, and forest fires. In 2008, when the tribe began strategic climate action planning, they made reduced energy consumption a key component of their climate plan. A tsunami that hit the community in 2011 led to an additional focus on disaster preparedness. Since then, the Rancheria has hosted Federal Emergency Management Agency classes and trained over 1,000 local residents. Their efforts earned them the nickname Emergency Management Institute of the West, and in 2017 FEMA recognized their community preparedness efforts.

As the community began working on energy independence, they applied for a grant from the California Energy Commission to develop their own solar photovoltaic array microgrid. Tribe members saw the grid as a way of ensuring community independence, lowering emissions, and reducing the costs of supplying power. The Rancheria received a grant for the grid in 2015, and the project was fully commissioned by 2017.

It turned out that the benefits of the Rancheria microgrid extended beyond the reservation. In 2019, the tribe realized it was able to sustain essential services for the 136,000 residents in Humboldt County during power outages. In recent years, public service power shutoffs have become a more common practice in California as Pacific Gas and Electric (PG&E) and Southern California Edison, the state's two utility companies, shut off power on hot and windy days to avoid liability for fires started by their equipment. Often with little notice, these preventable outages leave communities without power, causing medical equipment failures, heat risks for the vulnerable, and disruptions to daily life. Humboldt County has the most energy cut-offs in the state.

Fortunately, the microgrid enabled the tribe to strategize on how to deploy its power. When PG&E imposed a utility shutoff in October 2019, the microgrid was able to provide power and general services to about 10,000 people per day. They kept the casino running, provided fuel for their fish hatchery and the municipal water system, offered local residents access to charging stations and internet, and housed critically ill patients in their hotel. In subsequent power outages, the microgrid built by this community of 50 has provided essential services to residents throughout the county.

In addition to community and climate benefits, the development of the microgrid project produced \$9.5 million in economic benefits, according to the California Energy Commission. Those benefits included decreased utility costs, increased utility stability, contracts with local businesses, and new jobs for both the development of the grid and ongoing maintenance.

A residential solar array at the Blue Lake Rancheria, installed by volunteers and GRID Alternatives Cover Photo: bluelakerancheria-nsn.gov



Arerial view of Blue Lake Rancheria, a federally recognized Native American tribe in northwestern California Photo Credit: bluelakerancheria-nsn.gov

Additionally, the community had seen how investments in sustainable infrastructure had direct economic benefits, a benefit that is clearer in smaller communities. In 2009, the tribe built their new casino with a focus on energy sustainability and had been experimenting with a biomass fuel system that sequesters carbon.

Financing

The microgrid cost \$6.7 million, \$5 million of which came from a California Energy Commission grant through their Electric Program Investment Charge (EPIC) program. Most of the remaining funds came from revenue generated by the tribal casino. Since the development of the microgrid, the community has saved \$200,000 per year on utility costs.

What made this work?

Microgrids are used by many large universities, business centers, and jails as a mechanism for ensuring their operations will not need to shut down during power outages. For any isolated community in a rural and disaster-prone area, energy independence is an important component of community security. The tribe's ongoing interest in climate resilience and independence and strong sense that larger institutions and systems of governance cannot be relied on undoubtedly played a role in their move toward a microgrid.

Additionally, the community had seen how investments in sustainable infrastructure have direct economic benefits, which are especially visible in smaller communities. In 2009, the tribe built their new casino with a focus on energy sustainability, and they had been experimenting with a biomass fuel system that sequesters carbon. The small size of the community and the immediate benefits of these investments deepened support for new innovations.

One of the challenges for the Rancheria was that investors were not sure how to predict the ongoing maintenance costs of the grid or the value of its energy savings because the technology is fairly recent. Community microgrids are expensive and rely on data management and battery technology that is rapidly changing. The platform used to run the microgrid at Blue Lake had never been used at a community scale before. However, as traditional power grids have become increasingly expensive and hazardous, there is a growing interest in microgrids, which is likely to result in data that will make the process more accessible.

Other Communities

Until the development of the microgrid at Blue Lake Rancheria, most microgrids were used by organizations that did not want to risk power interruptions and did not need private investment to pay for their systems. The Santa Rita Jail began building a grid in 2001 during the energy crisis. The grid has enabled the jail to continue to operate during recent public safety power shutoffs. Similarly, the Inland Empire Utilities Agency installed a microgrid to ensure smooth operation of their regional wastewater system. The system was installed with a power purchase agreement that required no capital investment.

Some private institutions, such as vineyards in Napa and a boarding school in Southern California, have also installed microgrids, but they were paid for without private loans as the institutions were able to use private reserves. And while institutions, agencies, and businesses are investing in microgrids to maintain mission-critical operations, new luxury developments are also using them. A 600-home development outside Burns, Oregon, features solar off-grid microgrids that are touted as ecological and cost-saving amenities. These early adopters illustrate the broader applicability and benefits of investing in microgrids.

The California Energy Commission, which administers about \$130 million per year, supports research and development of new energy investments through the EPIC program. The success of the Blue Lake Rancheria solar microgrid, particularly in a region known for rain and fog, has provided proof of concept that is making microgrid financing accessible to more communities. EPIC has helped other Native communities in California move towards energy independence and supported the development of other microgrid systems in the area, including at the Redwood Coast Humboldt Airport. The Hoopa Valley tribe is currently exploring a microgrid solution to the specific needs of their tribal community. Unlike Blue Lake, Hoopa Valley does not have its own utility infrastructure, which is why the community is looking into creating a network of distributed energy resources (DER) that will be spread out across several small buildings and centrally managed. Last year EPIC awarded a grant to the Native American-owned microgrid firm Indian Energy to install new technology for a microgrid in San Diego. These projects are learning from each other and expanding the capacity of what microgrids can do.



The Blue Lake Rancheria microgrid integrates a solar array, battery storage, and control systems. Photo Credit: Blue Lake Rancheria

Lessons

- Local control of investments and operating infrastructure builds capacity for co-benefits.
 - While state subsidies helped make the Blue Lake microgrid possible, its design, ownership, and labor are all controlled at the local level. Local control of green investments allows for adaptations to address new climate risks while providing economic benefits.
 - Every community will have its own calculations about which high-cost investments are worthwhile. The specific energy needs and fire risks of Northern California mean that high-cost energy investments may be more attractive for communities that are not well served by (or pay a high cost to access) existing energy infrastructure. For each climate investment, the calculations and benefits will depend on local risks and context.

• Energy investments generally require a supportive regulatory environment as well as buy-in from utility companies.

Part of the success of the Blue Lake grid rests on its capacity to operate both connected to the PG&E grid and separate from it, which made PG&E an essential partner. Across the country, utility infrastructures are in need of upgrades. Pilot innovations can help utilities identify new models for energy investments.

Without outside investors for unproven climate innovations, communities need either public support or their own resources to fund new projects.

- Because the economic viability of a community grid was unknown, Blue Lake had to use its own resources and public grants to pay for their grid. For communities without resources, state funding becomes even more essential.
- Public funding should support learning so that new innovations can be replicated. EPIC's grants focus on research, technology demonstrations, and market facilitation to accelerate proven solutions.

About the Author

Saneta deVuono-powell is a co-founder and partner at Ground Works Consulting, where her focus is supporting equitable community development and climate justice. Saneta has over a decade of experience working on issues of racial justice, housing, and health and conducting community-based participatory research. She serves on the Oakland Rent Board, sits on the boards of the Texas Observer and The Safe Return Project, and is a contributing editor at Stranger's Guide. Saneta received her bachelor's degree from Sarah Lawrence College and both her law degree and her master's degree in city planning from UC Berkeley.

Acknowledgements

Saneta deVuono-powell would like to thank the generous and thoughtful folks at the Center for Community Investment, particularly Robin Hacke, Omar Carrillo Tinajero, and Rebecca Steinitz; Rupal Sangvhi, Naomi Cytron, Abby VanMuijen, and Miriam Zuk for their thought partnership and Honora Montero for her research and input on this wicked problem; Thomas Yee, Nora Bloch, Lizzy Mattuizzi, Kerry O'Neill, Anthony Corso, Phill Giffee, and Solange Gould for their interviews; and, finally, Allison Allbee and Joules for creating space. The Center for Community Investment would like to thank Chavon Blount of Irie Designs by Tere for designing this publication; Janelle Julien for managing its production and Zev Alexander for production support; the photographers and artists credited in these pages for their powerful images; Amy Cotter, Maureen Clarke, and Will Jason of the Lincoln Institute of Land Policy for their thoughtful reviews; and The Kresge Foundation and the Robert Wood Johnson Foundation, whose generosity made this piece possible.

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Center for Community Investment June 2021



