Microgrid Case Study
Decarbonized Lifeline Sector and Economy-enabling Resilience at Blue Lake Rancheria

U.S. Department of Energy, Office of Indian Energy 2018 Tribal Webinar Series
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❖ Federally Recognized (1908) Tribal Government
  • ~100 Acres of Trust Land Spanning the Mad River
  • 15 Departments | Utility | OES | Wildland Fire | Police
  • Economic Enterprises | 400+ Employees

❖ Illustrative Local, Regional, State, National Resilience Work
  • U.S. DOE ICEIWG | U.S. BOEM CA Task Force
  • CA ICARP TAC | AB 617 Community Air Protection Program CG
  • Regional Flood & Dam Break Planning Committee
  • Long-Term Water Resource Planning Advisory Committee

❖ Resilience Recognition
  • 2018 "Project of the Year, DER Integration" PowerGrid Int’l
  • 2017 “Whole Community Preparedness” FEMA
  • 2015-16 “Climate Action Champion” White House and DOE
  • 2014 “Integration Award” PG&E
Need for Resilience

Climate change and other local impacts create threats to life, safety, ecosystems, and infrastructure.

- Landslides
- Wildfires
- Drought
- Extreme Storms
- Floods
- Sea Level Rise
- Earthquake
- Tsunami

Oct. 2017 Wildfire
1/4 mile from BLR
Credit: CalFire
2017
Highway 299 Landslide
Credit: CalTrans

2017
Highway 101 Landslide
Credit: CalTrans
We live in earthquake/tsunami country.

Source: http://www2.humboldt.edu/shakyground/info/why_care/you_live_in_earthquake_country1/
Tenuous Energy Supplies

 Rural, geographically isolated area

 Energy peninsula
  • 115 kV transmission loop
  • Runs through wildfire country
  • Import restricted to ~70 MW

 One 10” natural gas line

 Diesel fuel expensive; supply constrictions

 Disasters and disruptions

 Out-of-area impacts
  • E.g., barge/shipping vulnerabilities
Microgrid Overview

- Purchased distribution infrastructure from PG&E @12.5kV
- Power generation
  - 500kW / 950kWh / 2-hour battery storage system
  - 420kW (AC) solar PV
  - Legacy gensets
- Seamless islanding
- Auto load-shed
- Loads
  - Ave. ~450kW
  - Peak ~950kW
  - 6-building campus
    - Gov’t offices
    - Casino/hotel/dining/event center
    - EV charging and biodiesel plant
    - Critical Infrastructure
Site Plan

Casino and Restaurants

PV Array

Hotel

Battery

1MW Genset

Event Venue

Gov't Office

EV Charging

80kW Genset

Water System

IT/Communications

North

South

www.bluelakerancheria-nsn.gov
Microgrid = Resilience

- Powers critical infrastructure
  - Enhances continuity of operations (gov’t; economy)
  - Supports “lifeline sectors”
    - Energy, water, food, communications/IT, transportation
- Provides emergency power
  - American Red Cross shelter
- Lower and levelize costs
- Seamless islanding to/from regional grid
- Strengthens grid
  - Counters volatility, increases demand response
    - New wildfire mitigation: portions of the grid de-energized
  - Improves cyber security
- Solar + storage
  - Secure, low O&M, 365-day perpetual fuel, zero carbon
- New and continued clean energy jobs
- Augments region; encourages replication
Microgrid Partnership

California Energy Commission + EPIC
Microgrid = Decarbonization

- Reduces CO2 by ~195 tons/year
- Enables rapid deployment of solar/wind + storage, at community and facility scales

- The solar industry broke even on GHGs in 2018. (source: Atlantic)
- Every additional solar panel helps reverse climate change
Expansion & Replication

If at first you do succeed ... try something harder.
Expansion & Replication

☑ New “Solar+” Microgrid
☑ At fuel station/convenience store
☑ Solar PV - 60kW
☑ Battery storage
  • 106kw/169kwh
☑ Advanced building controls
  • Improved efficiency
  • Enables demand response
☑ Replicable, low-carbon ‘resilience package’
  • Supply ‘lifeline sectors’ in BAU and emergencies
  • Energy, water, food, IT/communication, transportation
  • Fuels: EV, gas, propane
  • Important in rural areas | BLR serves as alternate EOC
  • Generators, refrigeration
We view fuel stations/convenience stores as critical infrastructure

Need for low-carbon resilience in rural areas

Fuel stations can run on solar + battery storage

- Save diesel for more urgent needs
- Bay County, FL: 30-minute drive to find open stations (NPR)
- Wilmington, NC: no stations had fuel and power (GasBuddy)
Expansion & Replication

-current community microgrid expansion
  • Adding 1MWh battery storage (total ~2MWh)
  • Adding ~500kW of solar (total ~1MW)

Adding electric vehicles and charging

Developing smart water grid – powered by our low-carbon microgrid

Public reporting makes follow-on projects easier and more cost-effective
Tribal Government Leadership

- Developed goals and strategies
  - Specific goals
  - Long term strategies
- Invested government and economic enterprise revenues
  - Must have matching and leveraged funds
  - Demonstration projects needed typical overrun contingencies
  - Learned about financing mechanisms
    - Used technical assistance (DOE OIE, HUD)
    - E.g., tax credit investing
- Tracked and reinvested ‘found’ revenues
  - E.g., energy efficiency and other savings
  - Drove down costs and GHGs even further
- Gave the effort a solid runway
  - 5 years
  - Dedicated point person
  - Tribal Council advocate and liaison
Microgrid Development Strategies

**Planning**
- Institutionalized our transition to zero carbon
- Technical assistance
  - EDA – CEDS
  - DOE Office of Indian Energy – Strategic Energy Plan template
  - BIA – Climate action plan, codes and policy development, feasibility studies, engineering and plans

**Funding**
- Utility incentives
  - Began with free and low cost energy efficiency measures
- Federal funds – blend of energy, emergency, community (housing, food, water), and planning sources
- State funds – CA Energy Commission SGIP, EPIC, other
  - Partnerships and willingness to take risk of demonstration projects

**Policy**
- Net metering; energy efficiency
- Energy/transportation nexus programs and incentives
  - Transitions to EVs
Further Considerations

✧ Power everything with electricity from zero-carbon sources
  • Energy, transportation, manufacturing
  • Build solar/wind + storage now and as fast as possible
    • Utilities: get ready to catch it

✧ Internalize health and environmental costs
  • Improve enforcement
  • Stop relaxing regulations – industry needs predictability, trajectory, momentum

✧ Question and prove carbon lifecycle analysis of everything
  • E.g., vehicle fuels, biomass energy
  • Methods to do this are already created

✧ Carbon sequestration
  • Keep all trees and plant more

✧ Carbon pricing, tax, markets
  • Widespread support; Republican idea initially
  • Bipartisan success story

✧ Transition to decarbonized society within 12 years
  • This is our ‘moon shot’ and tribes are leading the way
  • IPCC reporting
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