

# 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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# Blue Lake Rancheria, California

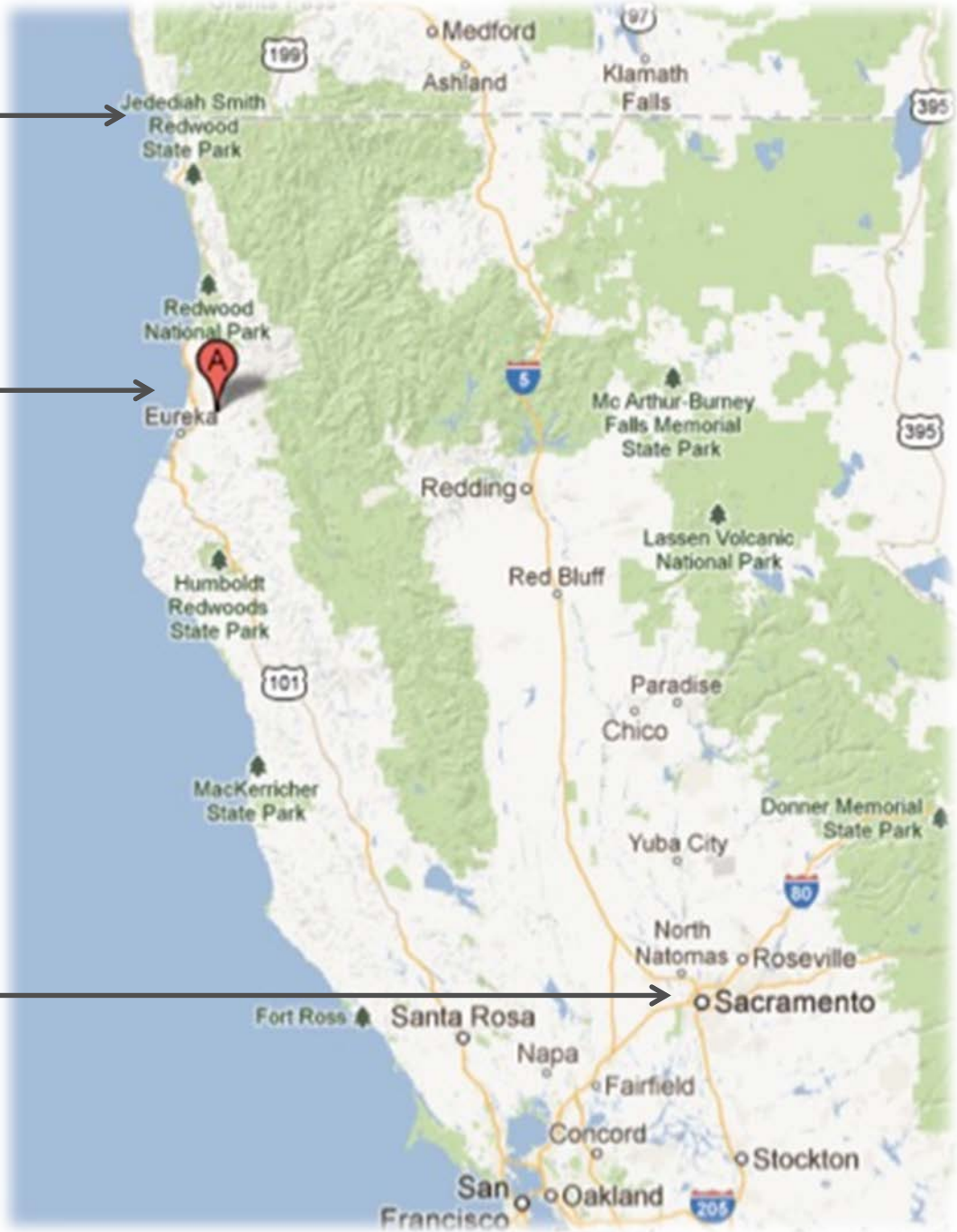
- ❖ Federally Recognized (1908) Tribal Government
  - ~100 Acres of Trust Land Spanning the Mad River
  - 15 Departments | Utility | OES | Wildland Fire | Police
  - Economic Enterprises | 400+ Employees
- ❖ Illustrative Local, Regional, State, National Resilience Work
  - U.S. DOE ICEIWG | U.S. BOEM 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



Oregon / California  
Border

Blue Lake Rancheria

Sacramento



# 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  
¼ mile from BLR

Credit: CalFire



2017

## Highway 299 Landslide

Credit: CalTrans

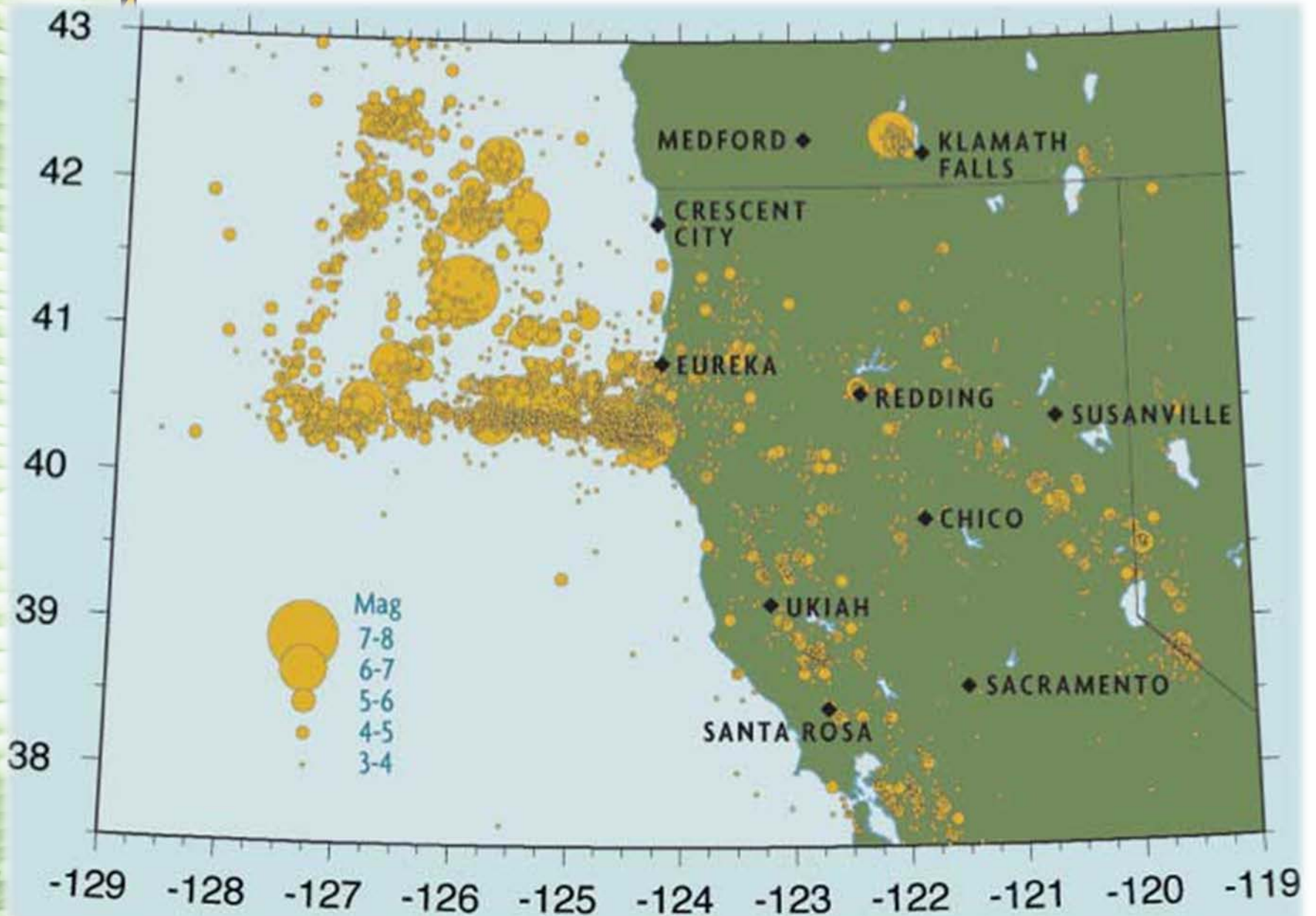


## 2017 Highway 101 Landslide

Credit: CalTrans



We live in earthquake/tsunami country.



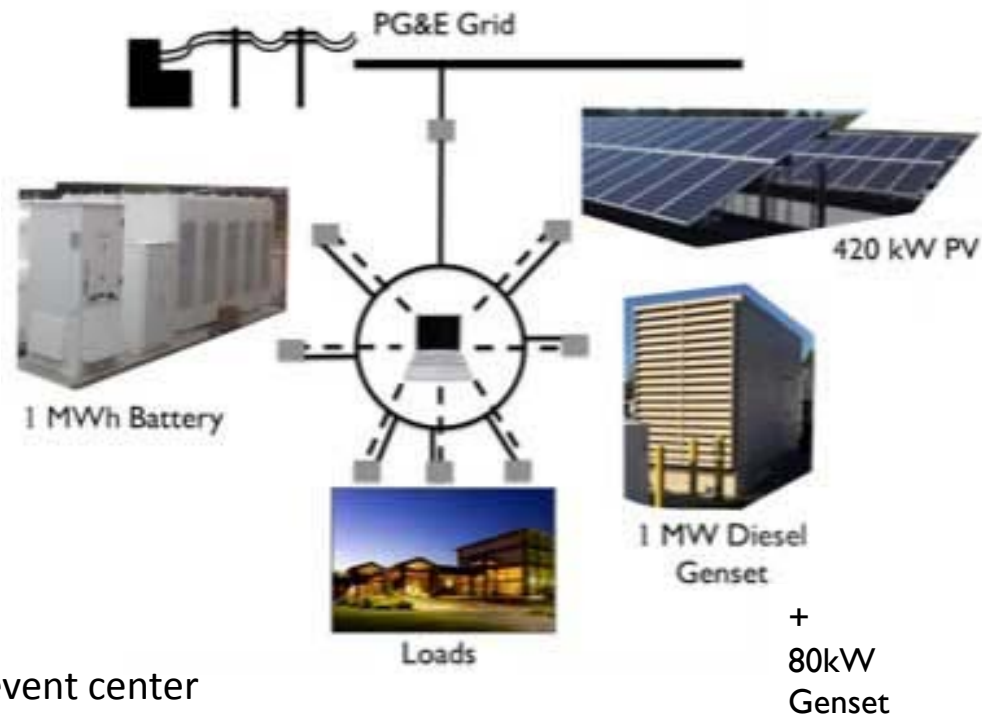
# Tenuous Energy Supplies

- ❖ 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



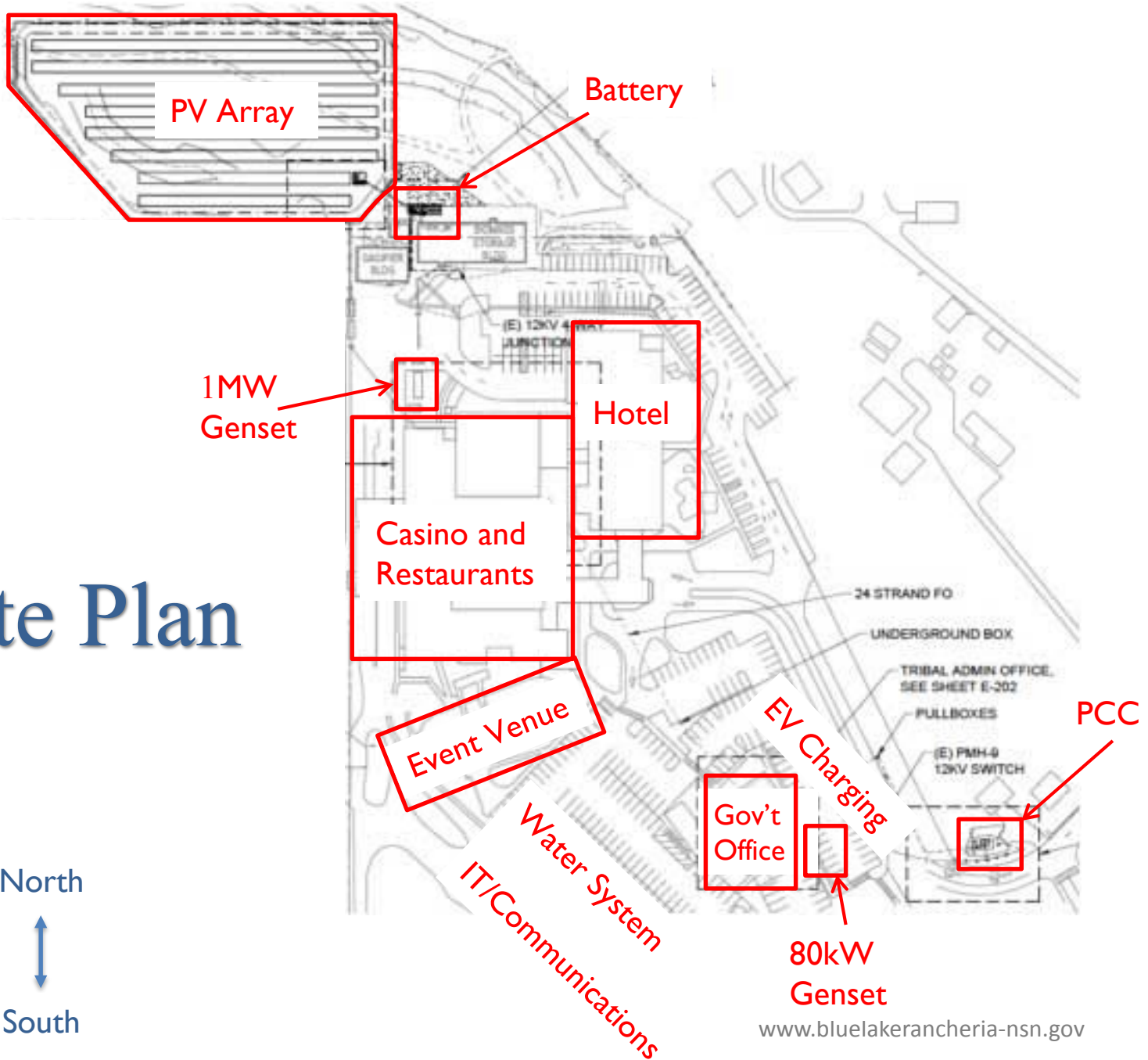
# Microgrid Overview

- ❖ 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



North  
↕  
South

# 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



*-Prime contractor  
-Engineering manager  
-Technology integrator*

Project partners



Blue Lake Rancheria



Robert Colburn Electric

**KERNEN CONSTRUCTION**  
Building & Engineering Contractors

Vendors to Blue Lake Rancheria



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# 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



# 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





Theindychannel.com



- ❖ 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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