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Advanced renewable energy microgrids serving Tribal community needs

Microgrid Options for Resilience in the Hoopa Valley Indian Reservation, Upriver Yurok Reservation, and Karuk Communities of Orleans and Somes Bar

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Outline of Presentation

- Summary of Key Points
- Part 1: Electric system reliability and capacity: where things stand today
- Part 2: How microgrids increase resilience and support clean energy transitions

Summary of Key Points

- The Hoopa Valley Indian Reservation, Upriver portion of the Yurok Reservation, and the Karuk communities of Orleans and Somes Bar are all served by a **single electrical circuit,** which is referred to as the “Hoopa 1101” circuit by the utility (PG&E).
- Electricity **reliability** on the circuit is very poor (frequent and long outages).
- **Microgrids** can play an important role in helping to address the situation.
- The Schatz Center is supporting solution-oriented efforts by all three Tribes.




Summary of Key Points

- A **coordinated approach involving nested microgrids** will offer the best solution for improving the reliability and expanding the capacity of the circuit while also streamlining the interconnection processes.
- Successful development of a such a system would have **relevance for many communities throughout California**.

Part 1: Electric system reliability and capacity: where things stand today

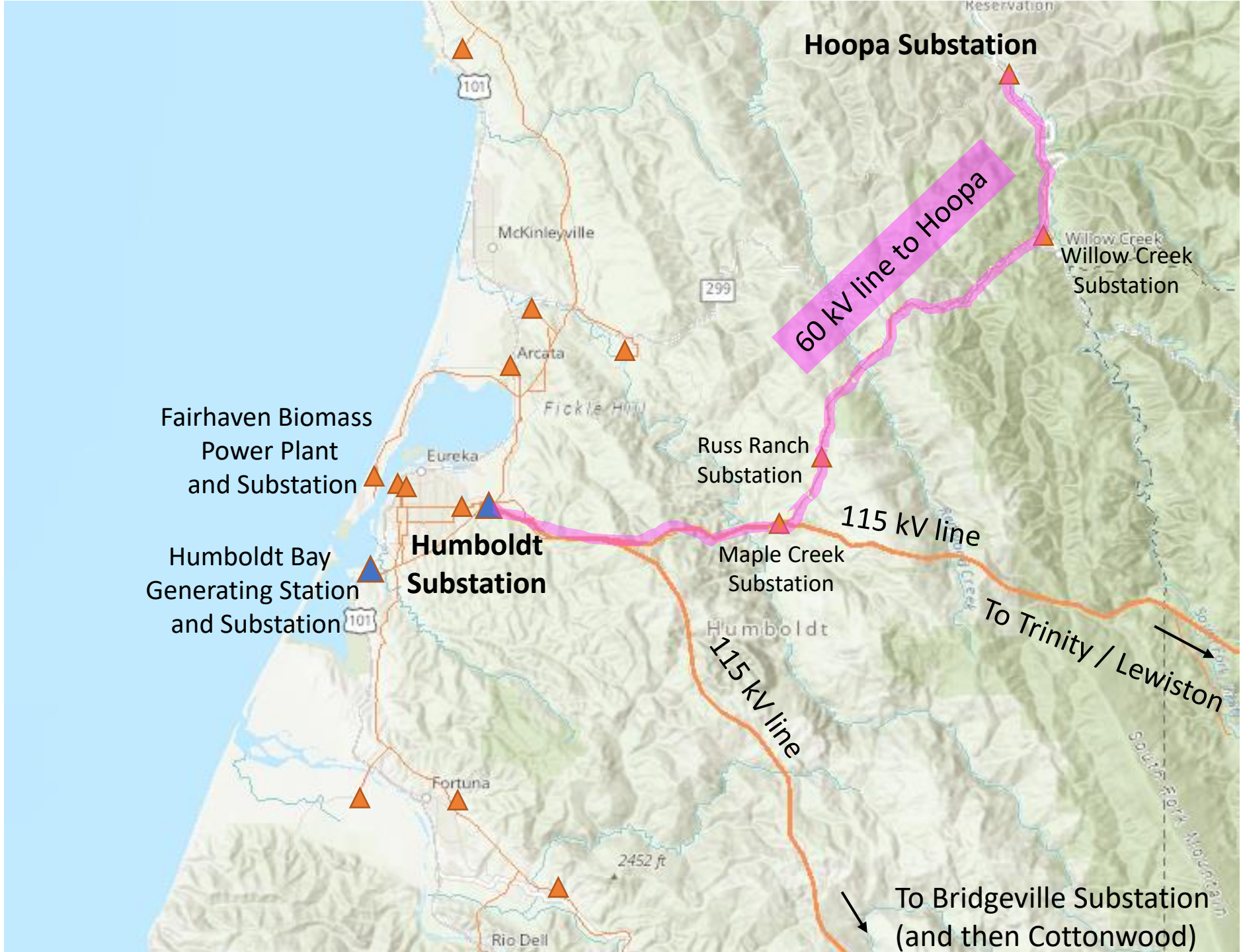
Electricity Service on the Hoopa 1101 Distribution Circuit

The Hoopa Substation ”Hoopa 1101 circuit” serves the Hoopa Valley Tribe, the Yurok Tribe, the Karuk Tribe, and all of the residents of the respective areas.

Outages are frequent due to inclement weather, storms, landslides, fires, wildland fires, PSPS events, EPSS wildfire prevention settings, and other causes. The circuit **outage rate is many times the average** for PG&E territory*, and it is now among the least reliable circuits on the system overall.

* Based on data from 2014 – 2018 showing 4x the average and more recent increased outages due to EPSS and PSPS events on top of the underlying deficiencies

The Hoopa Substation receives power through a 60 kV transmission line that originates at the Humboldt Substation in Eureka



115 kV transmission line

60 kV transmission line

Substation (115 kV capacity)

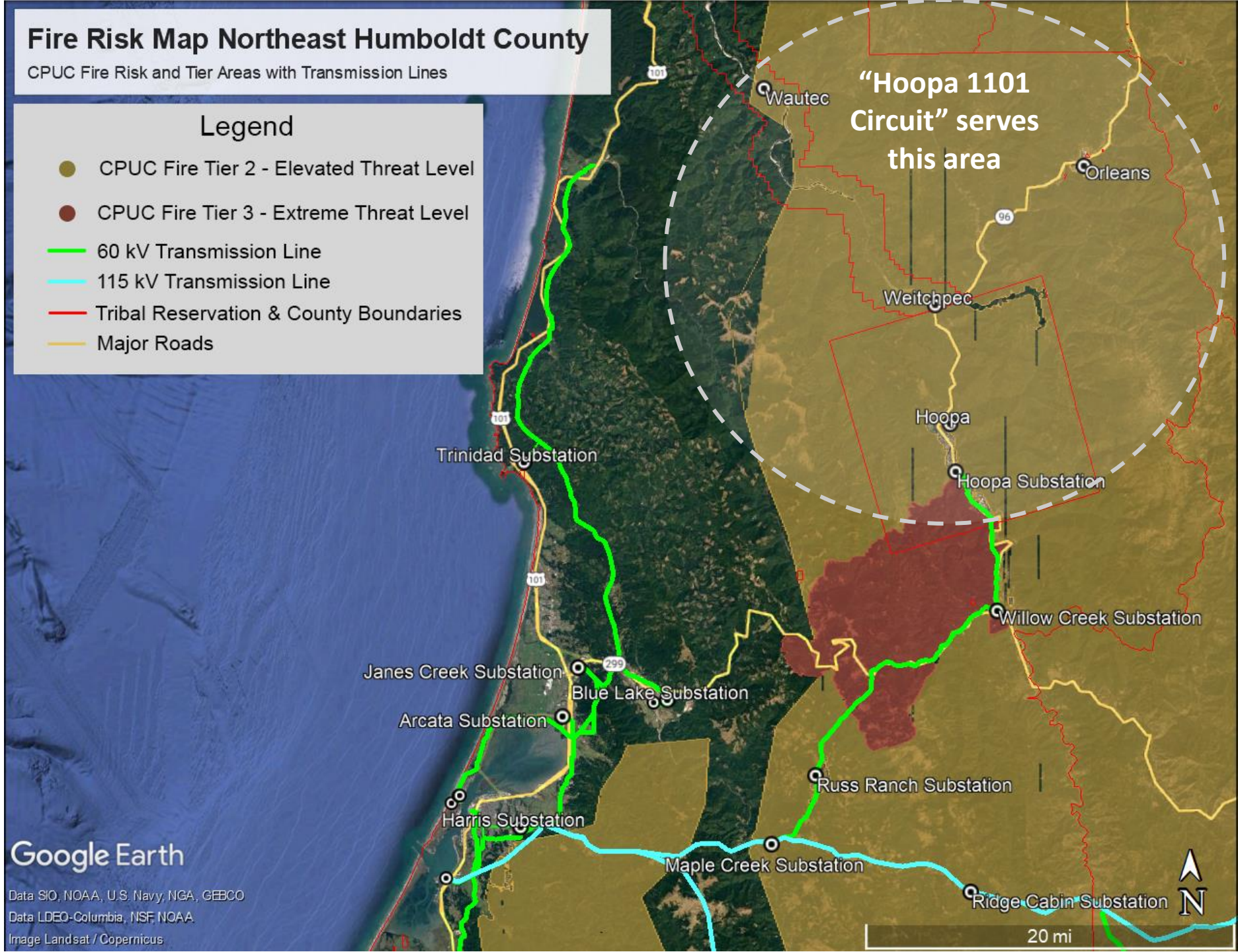
Substation (60 kV capacity)

Source: California State GeoSpatial

60 kV transmission line on the way to the to the Hoopa Valley Substation

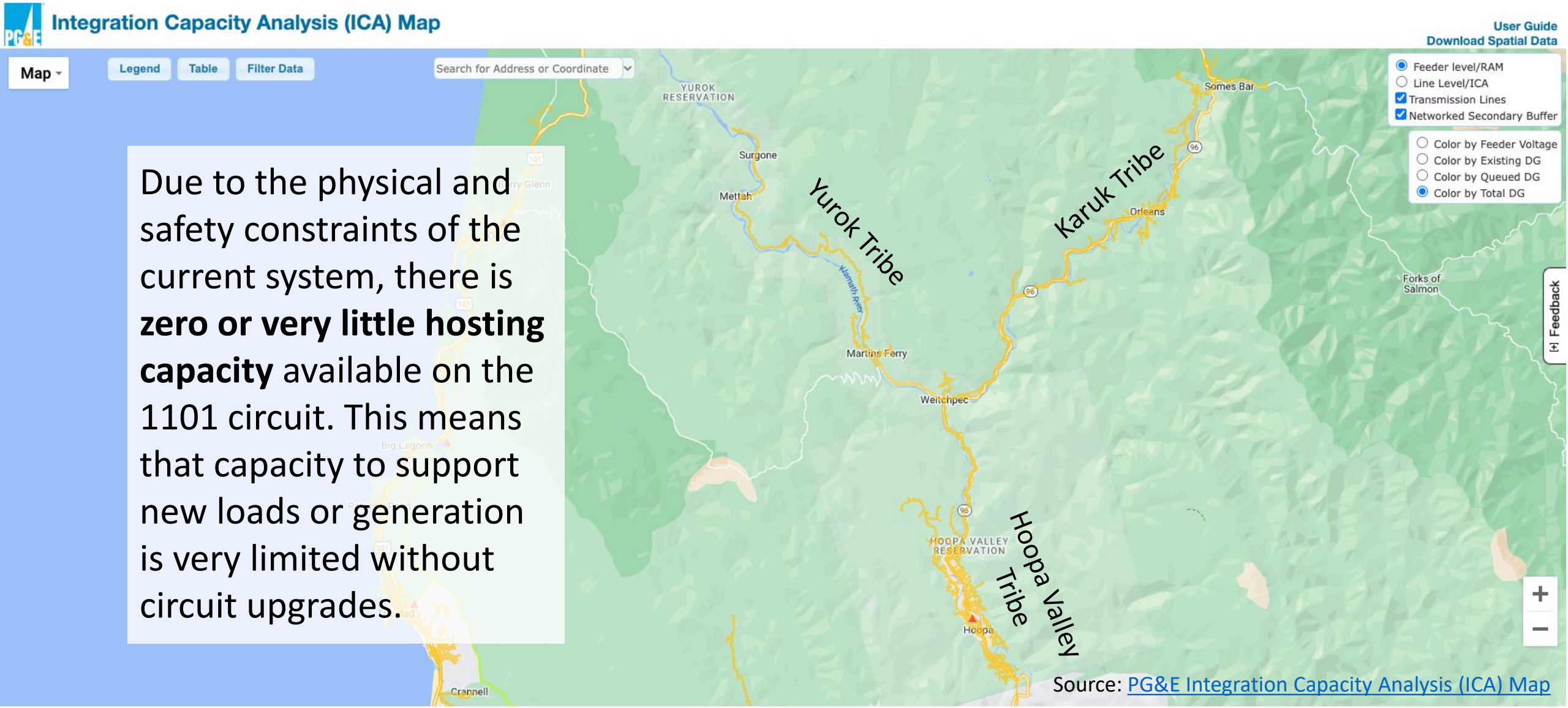
(photos taken from Snow Camp Road near the Russ Ranch Substation on Sept 4, 2022)

The 60 kV line that serves the Willow Creek and Hoopa Substations passes through areas with **elevated and extreme fire risk**, at Tier 2 and Tier 3 according to the CPUC's threat level system.



Source Data: [CPUC FireMap]

Hoopa 1101 Distribution Circuit Map



Due to the physical and safety constraints of the current system, there is **zero or very little hosting capacity** available on the 1101 circuit. This means that capacity to support new loads or generation is very limited without circuit upgrades.

Source: PG&E Integration Capacity Analysis (ICA) Map

Distribution Lines (12 kV) on the Yurok Reservation

Distribution lines on the 1101 circuit travel long distances over rugged terrain to reach end users.

Part 2: How microgrids can increase electricity resilience and generation capacity

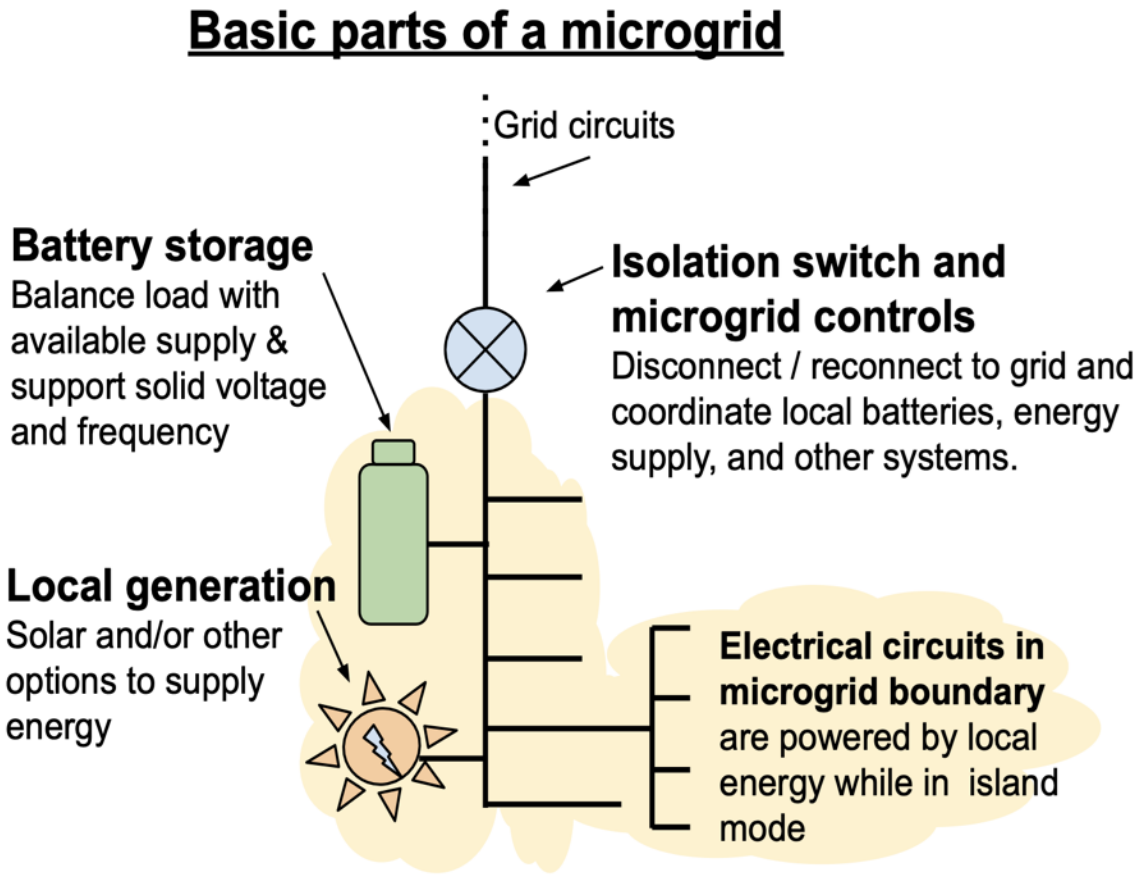
Tribally Led Clean Energy Microgrids

- Microgrid systems can be deployed to improve electricity reliability and increase hosting capacity on the Hoopa 1101 circuit, benefitting all three Tribal communities or jurisdictions.
- The Blue Lake Rancheria Tribe has established a model for Tribally led, community-scale microgrids to support priorities for resilience and clean energy development.
- With support from the Schatz Center, and informed by technology proven at the Blue Lake Rancheria and the more recent Redwood Coast Airport Microgrid, the Hoopa Valley Tribe, Yurok Tribe, and Karuk Tribe are working to develop solutions for their communities.

Microgrid components and capabilities

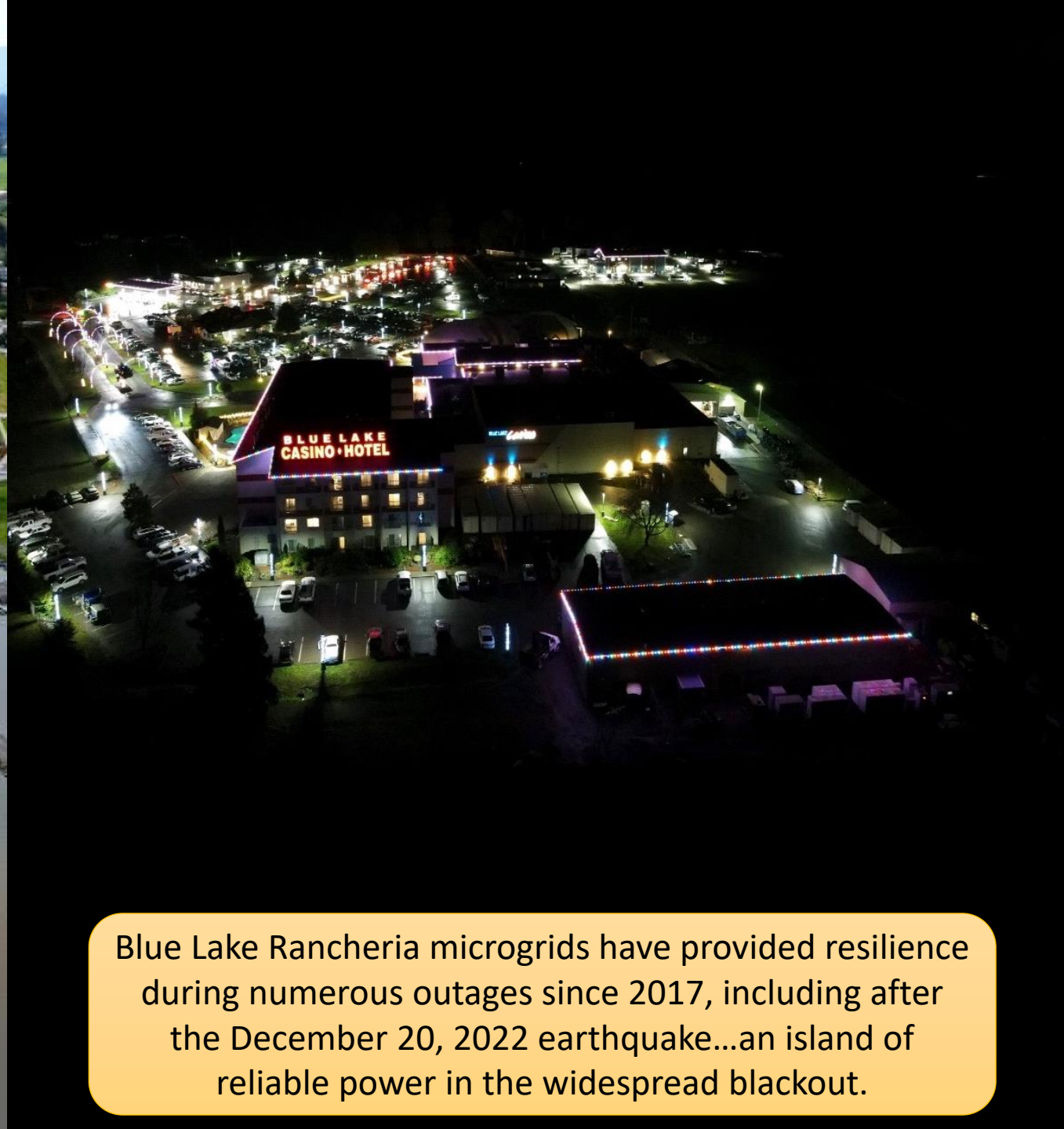
Microgrids integrate generation, storage, and electrical switchgear to create a set of circuits that can run independently from the regional grid when needed.

Two main applications:
Behind-the-meter microgrids for individual buildings and campuses
Front-of-the-meter community microgrids for a community or a cluster of facilities



What can microgrids do?

- *When the regional grid is online*, provide a range of **grid services** that can generate revenue and/or reduce utility bills;
- *When the regional grid is down*, provide resilient, seamless **backup power** with local generation resources;
- Increase **hosting capacity** for renewable energy and new loads without requiring costly upgrades to T&D system



Blue Lake Rancheria microgrids have provided resilience during numerous outages since 2017, including after the December 20, 2022 earthquake…an island of reliable power in the widespread blackout.

Nested Microgrids for Rural Resilience

Nested microgrids–multiple community microgrids providing overlapping resilience–are a next step for microgrid development. This is a possible solution for the 1101 circuit.

The Hoopa Valley Tribe, Yurok Tribe, and Karuk Tribe could use nested microgrid development for energy resiliency, energy sovereignty, tribal government collaboration and partnership, and economic development in a model that could also work for other Tribes and communities.

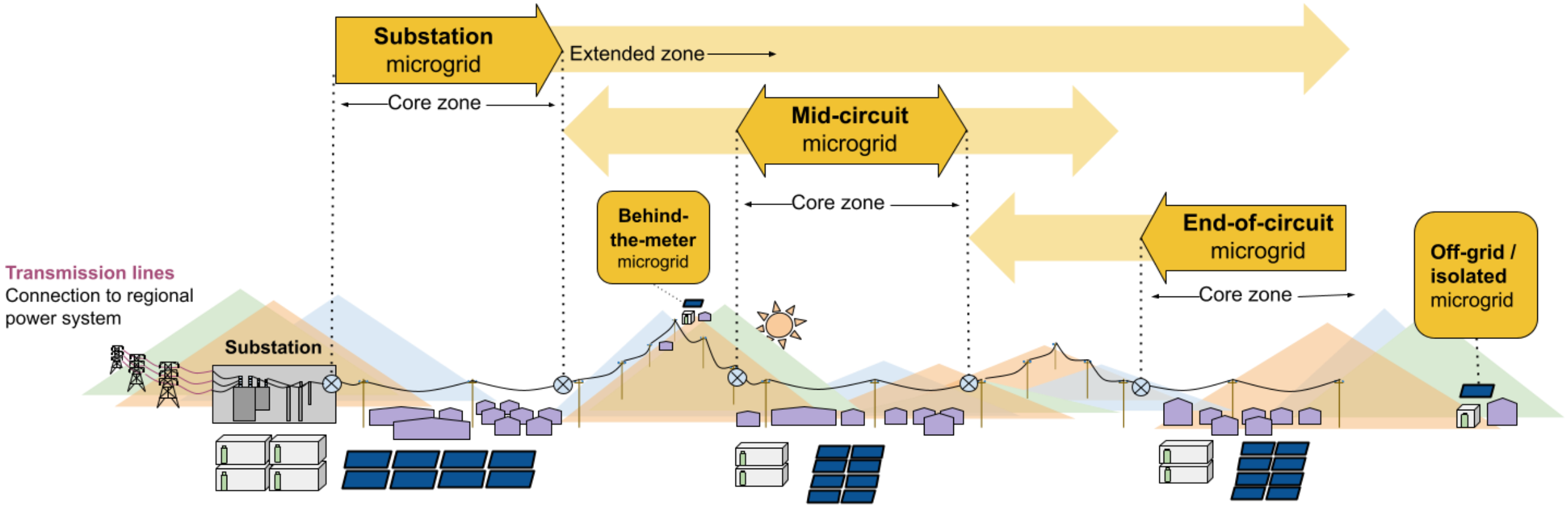


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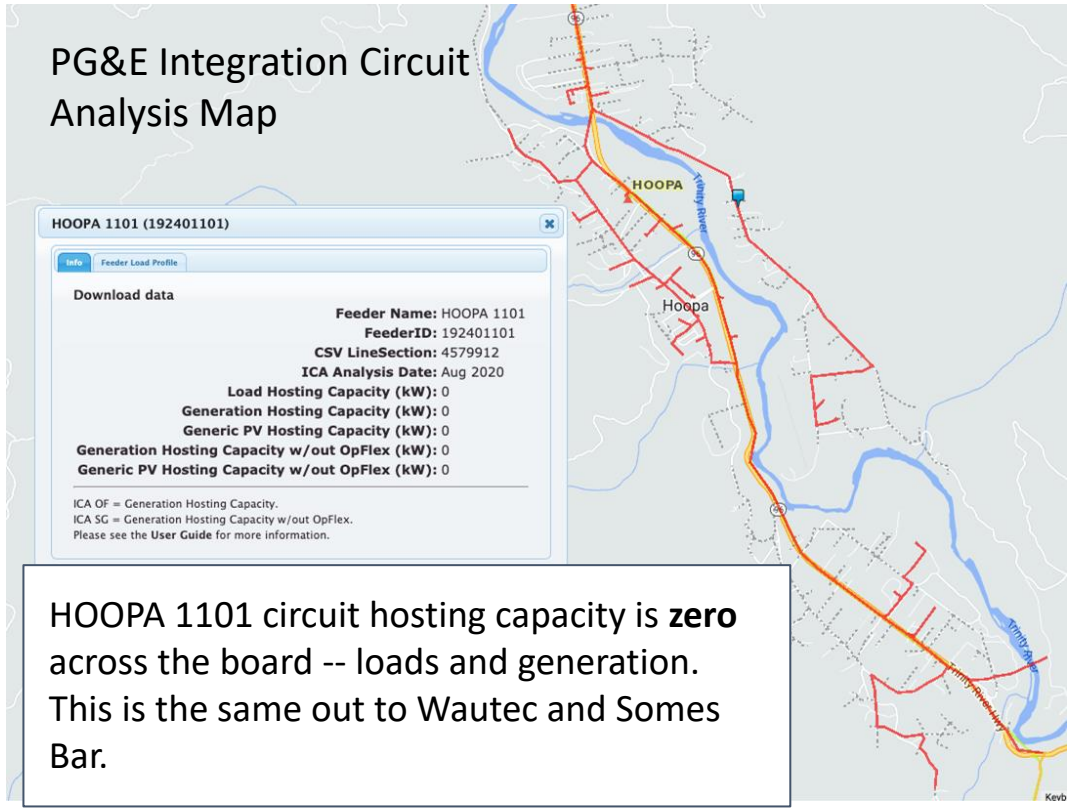
Photo credit: Maia Cheli

Annex Slides

Hoopa substation

(serving the Hoopa Valley, upriver Yurok Reservation, and out to Orleans and Somes Bar)

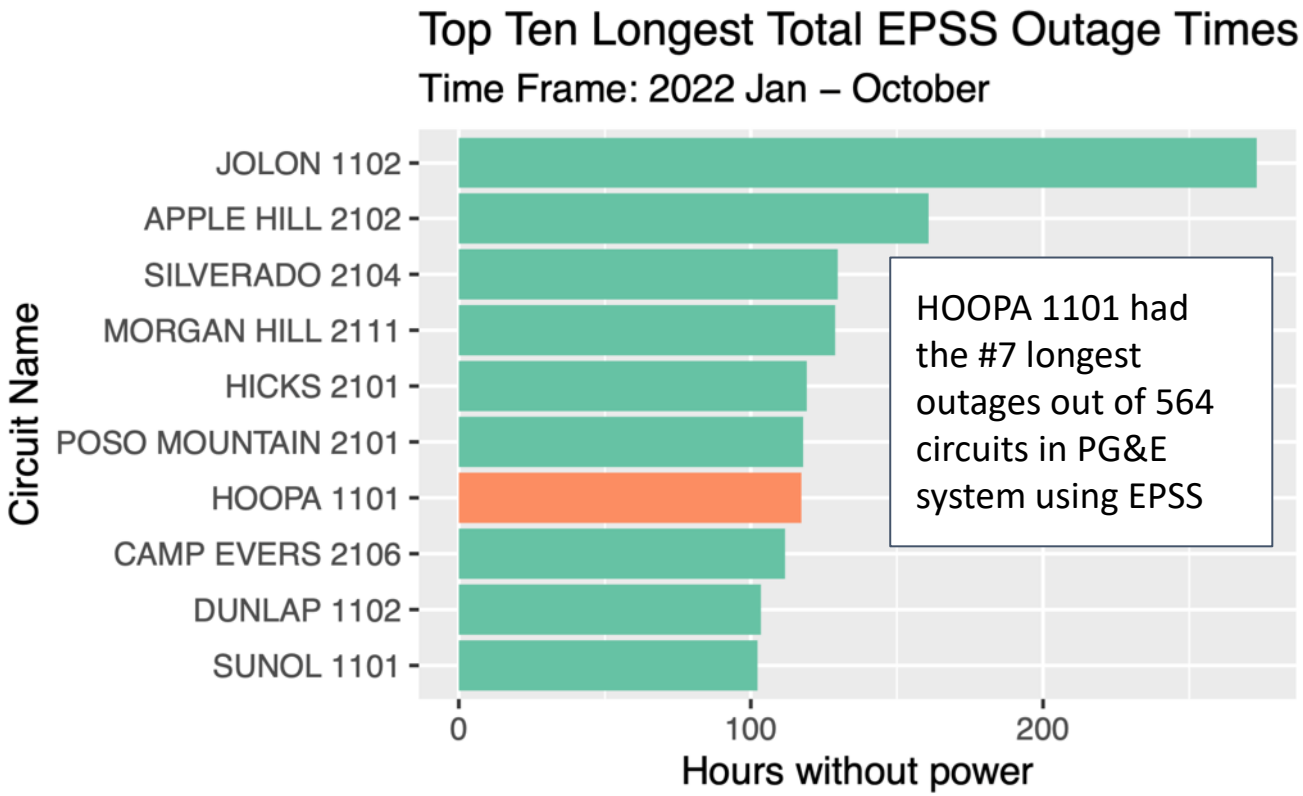


HOOPA 1101 circuit hosting capacity is **zero** across the board -- loads and generation. This is the same out to Wautec and Somes Bar.

Outages are frequent: PSPS, storms, landslides, and wildfire prevention settings**.** The EPSS system implemented by PG&E to reduce fire risk alone has led to **over 100 hours without power** in the last year. This is likely to continue.

There is often a **backup diesel generator** located at the substation to provide power during some regional outages.

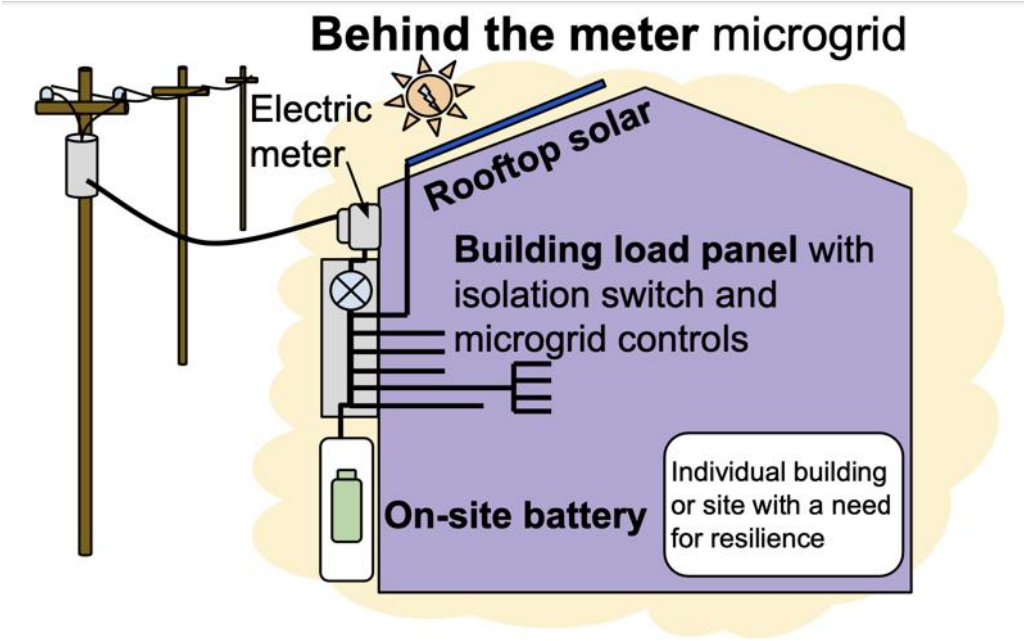
Due to the physical and safety constraints of the current system there is **no hosting capacity** available for any new loads or generation, impeding economic development and participation in renewable energy generation and decarbonization.



Behind-the-meter microgrids:

Resilience for individual buildings and campuses

- Energy generation and storage are all on the site of the building or campus.
- Isolation switch is behind the electric meter, allowing site to operate as island.
- Revenue sources: Electric bill savings, participation in demand response programs
- Customers become owners and operators of their site's resilient energy system.
- Appropriate for critical facilities in need of extra resilience or for isolated buildings outside town.

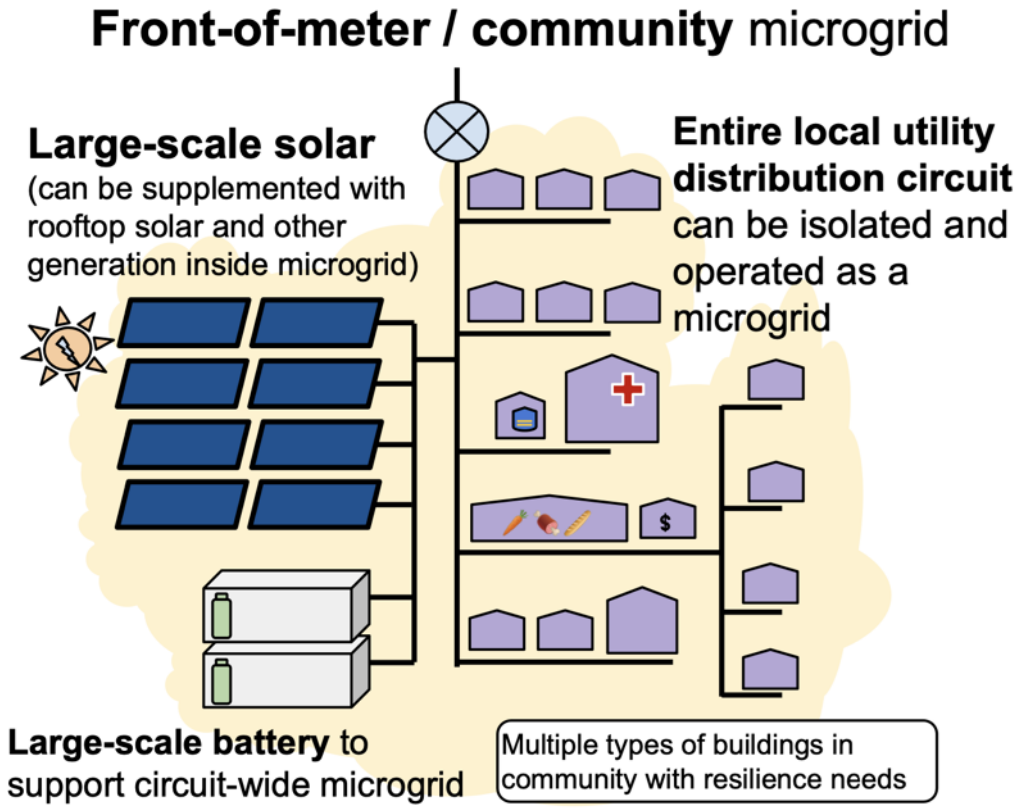


The main campus microgrid at the Blue Lake Rancheria is a BTM microgrid that provides clean and resilient electricity for government operations, business enterprises, and emergency response functions. Image source: Blue Lake Rancheria

Community microgrids:

"Front of meter" resilience for a cluster of sites

- Energy generation and storage are interconnected to the local distribution circuit.
- Isolation switches allow a section of the distribution circuit to operate in island mode
- Revenue sources: sales in energy markets (energy & grid support), avoided T&D capacity upgrades.
- Customers continue to be billed and pay as normal, but with more reliable power.
- Appropriate for clusters of buildings and facilities that share electric distribution infrastructure experiencing unreliable access to power.



The Redwood Coast Airport Microgrid provides resilient power to the airport and all of the neighboring customers sharing the same distribution circuit (18 in total). It is the first "front of meter" microgrid in PG&E territory and a template for the development of future FTM microgrids.