Clean Coalition

Renewables-driven Resilience

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Mission

To accelerate the transition to renewable energy and a modern grid through technical, policy, and project development expertise.

Renewable Energy End-Game

100% renewable energy; 25% local, interconnected within the distribution grid and ensuring resilience without dependence on the transmission grid; and 75% remote, fully dependent on the transmission grid for serving loads.

Community Microgrids are the grid of the future

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A Community Microgrid is a new approach for designing and operating the electric grid, stacked with local renewables and staged for resilience.

Key features:

- A targeted and coordinated distribution grid area served by one or more substations – ultimately including a transmission-distribution substation that sets the stage for Distribution System Operator (DSO) performance.
- Ability to utilize existing distribution grid infrastructure to serve the Community Microgrid during broader grid outages.
- High penetrations of local renewables and other distributed energy resources (DER) such as energy storage and demand response.
- Staged capability for indefinite renewables-driven backup power for critical community facilities across the grid area – achieved by 25% local renewables mix.
- A solution that can be readily extended throughout a utility service territory – and replicated into any utility service territory around the world.

Percentage of time online for Tier 1, 2, and 3 loads for net zero solar + 2 hours storage microgrids at UCSB

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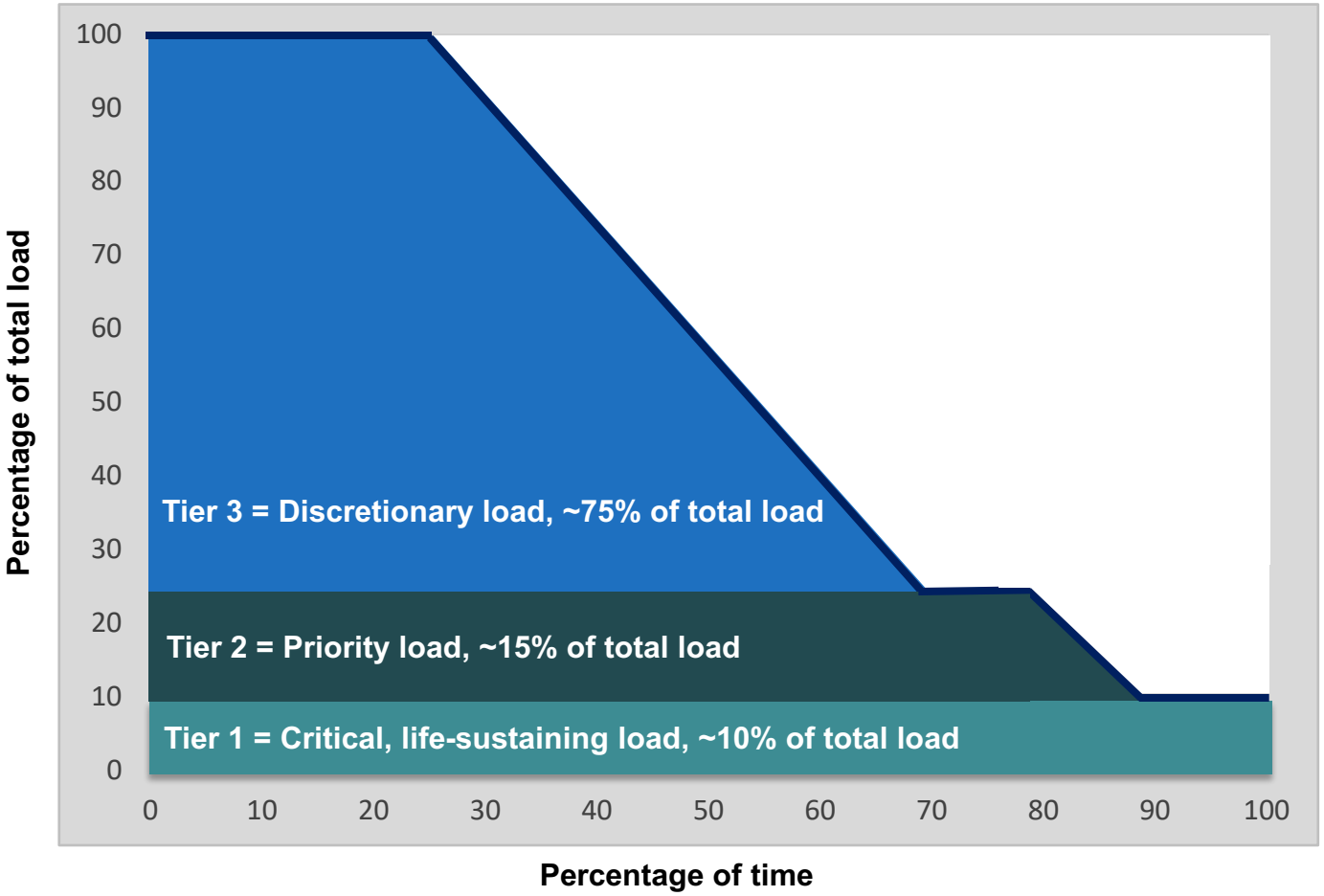
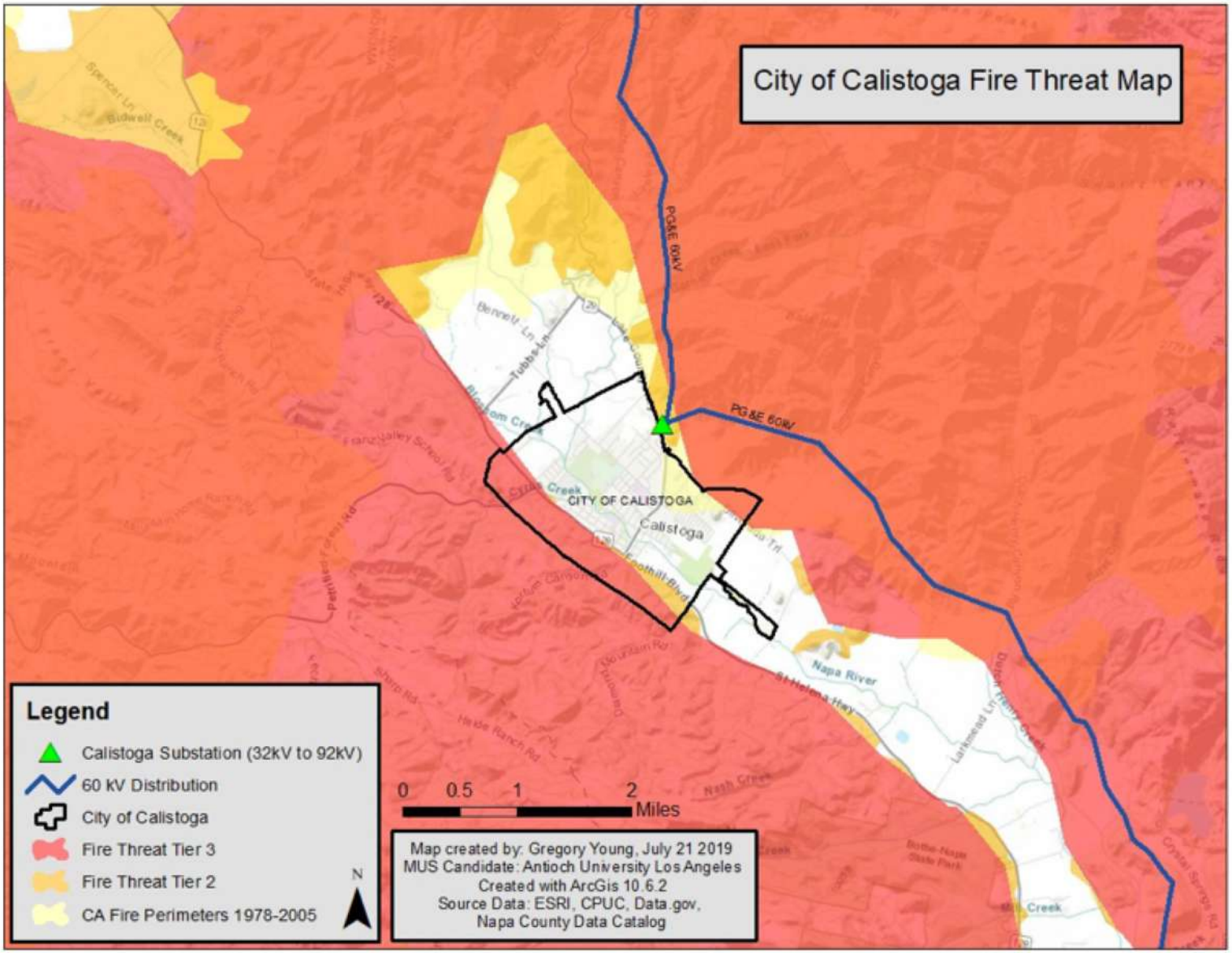
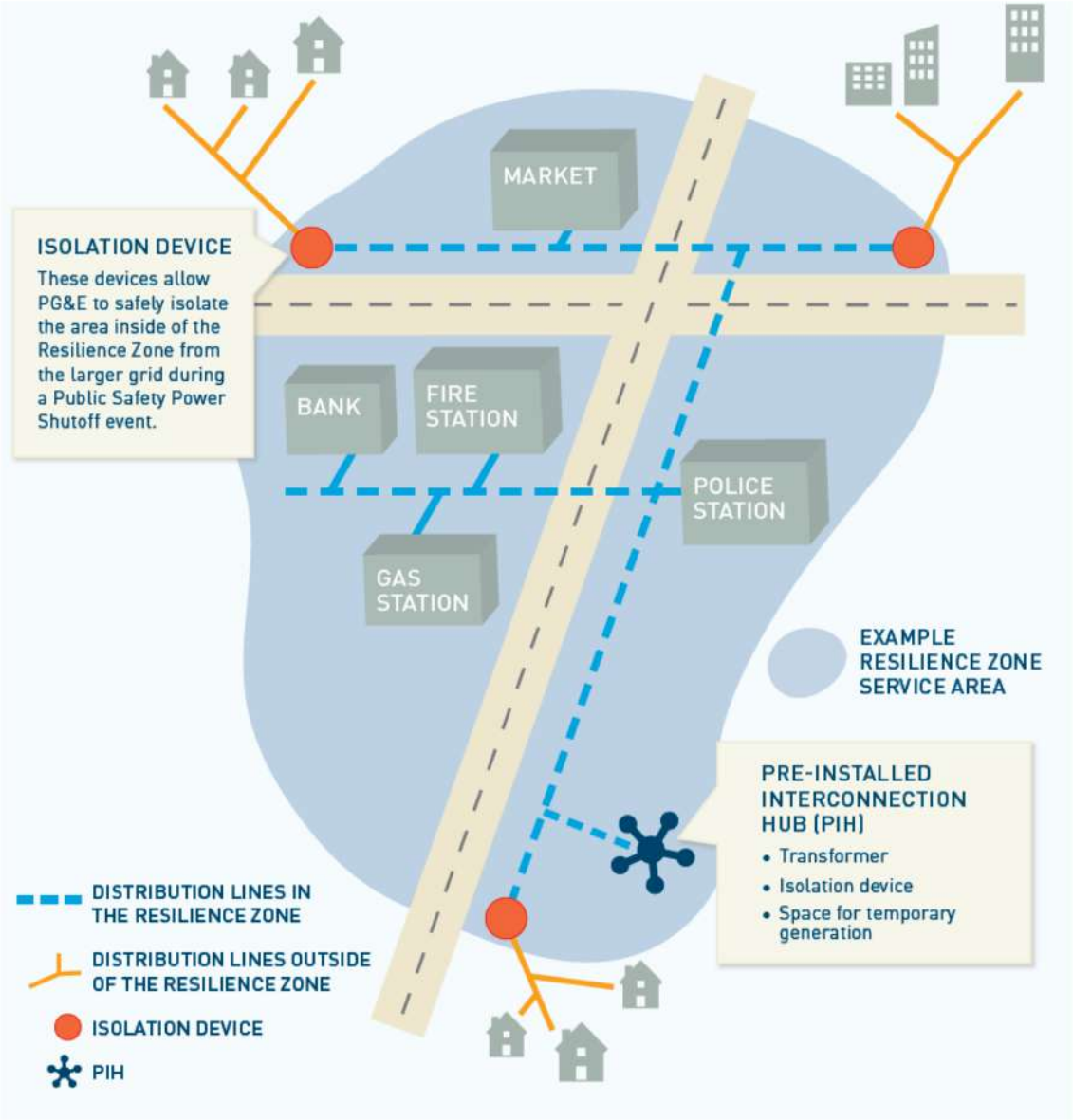


City of Calistoga area & fire threat map



PG&E Resilience Zones = Community Microgrids



- PG&E is planning for a Resilience Zone powered by 7 MW of diesel generators.
- These diesel generators could be replaced by local solar and storage.

Source: PG&E, Jul2019

Goleta Load Pocket (GLP)

The GLP is the perfect opportunity for a comprehensive Community Microgrid

- GLP spans 70 miles of California coastline, from Point Conception to Lake Casitas, encompassing the cities of Goleta, Santa Barbara (including Montecito), and Carpinteria.
- GLP is highly transmission-vulnerable and disaster-prone (fire, landslide, earthquake).
- **200 megawatts (MW) of solar and 400 megawatt-hours (MWh) of energy storage** will provide 100% protection to GLP against a complete transmission outage ("N-2 event").
  - 200 MW of solar is equivalent to about 5 times the amount of solar currently deployed in the GLP and represents about 25% of the energy mix.
  - Multi-GWs of solar siting opportunity exists on commercial-scale built-environments like parking lots, parking structures, and rooftops; and 200 MW represents about 7% of the technical siting potential.
  - Other resources like energy efficiency, demand response, and offshore wind can significantly reduce solar+storage requirements.

Dispatchable Energy Capacity Services (DECS)

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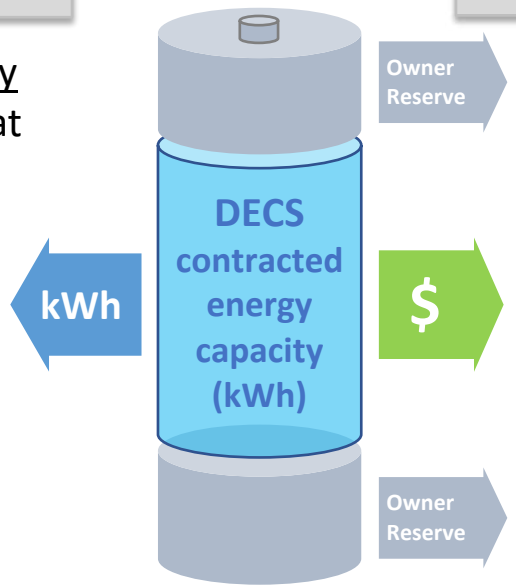
Load Serving Entity (LSE)

- LSE contracts for dispatchable daily cycling of energy capacity (kWh), at a fixed $/kWh fee, used or not.
- LSE optimizes fully flexible energy capacity, dispatching for any purpose, which could be based on time of day, day of week, season, event, and/or other optimizations over the DECS contract period.
- Initial DECS contracts are priced at Cost of Service (COS) while subsequent DECS contract pricing is adjusted for market response.



Storage Asset Owner

- Owner retains discretion over any capacity not under DECS contract.
- Owner earns guaranteed $/kWh payments for the DECS-contracted energy capacity.
- Owner retains discretion over any capacity not under DECS contract.

Three COS components:

1. Net Cost of Energy (NCOE).
2. Capital expenditure ("capex").
3. Operating expenditure ("opex").

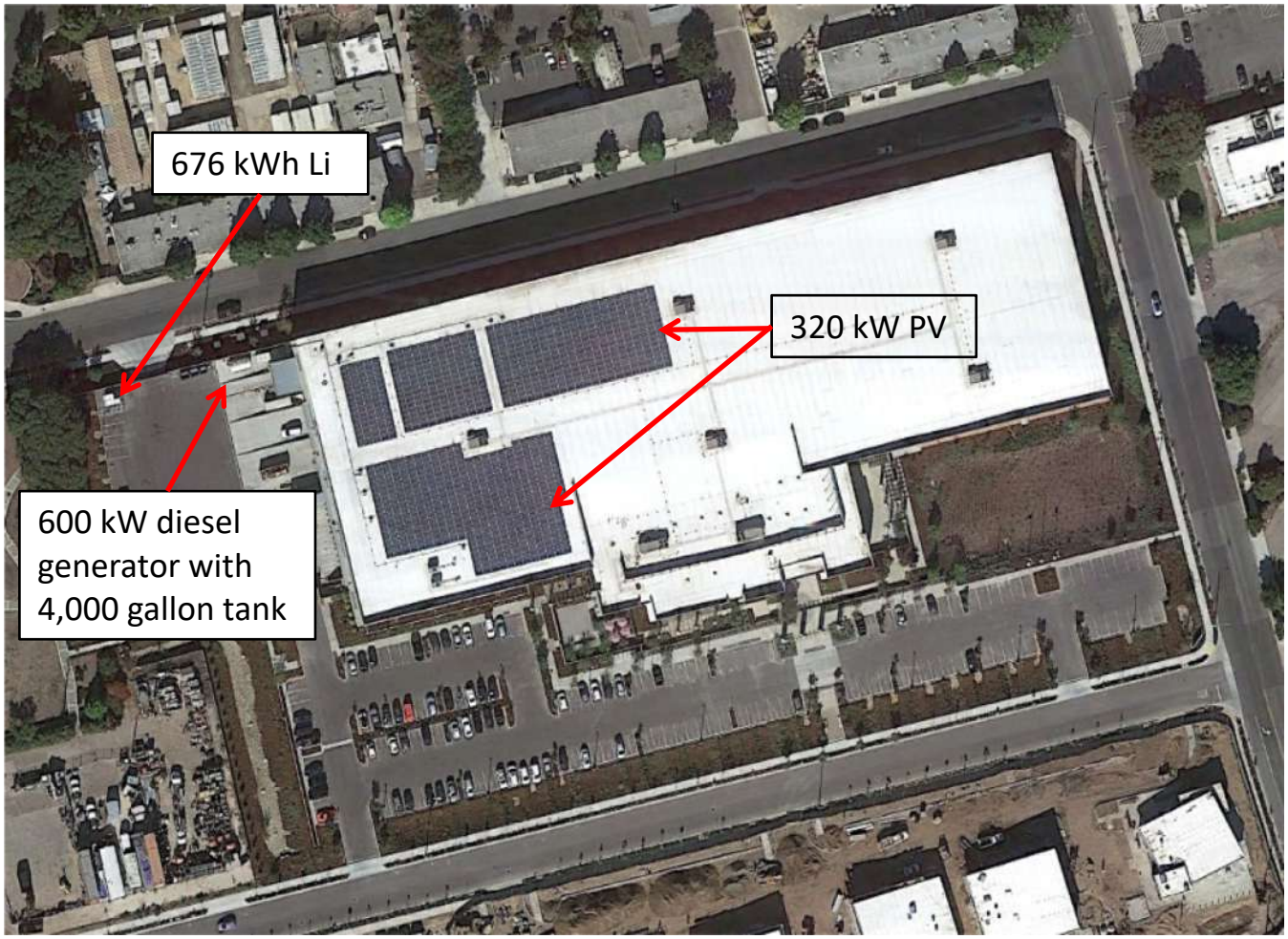
DECS offers a single bankable revenue stream for energy storage owners and a fully flexible & dispatchable energy source for LSEs available daily.

Direct Relief Microgrid is a perfect case study

- Location: Santa Barbara, CA.
- Owner: Direct Relief (one of the largest disaster recover/supply non-profits in the world).
- Brand new 155,000-square-foot pharmaceutical warehouse.
- Ships direct to disasters zones, internationally. Cold storage cannot be without power.
- Needed a microgrid for indefinite renewables-driven backup power.
- Has a microgrid with net zero solar plus about 2 hours of storage.
- Has a diesel generator backup to the backup that is almost never used beyond the maintenance routine required every couple weeks.

Direct Relief Microgrid limited to onsite resilience

- Resiliency is #1 concern:
  - 320 kW PV
  - 676 kWh Storage
  - 600 kW generator
  - 4000 gal. of fuel
- PV annual generation designed to cover annual consumption.
- Storage designed to time-shift the generation to more valuable times, and provide Resiliency.
- Genset provides “back-up to the back-up”.
- Direct Relief Microgrid requirement is that the critical loads are operational indefinitely, even through local disasters that causes long-term interruptions to normal electricity service.



Direct Relief is ready to do way more!

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Microgrid only serves Direct Relief needs:

- 70% of roof and 100% of massive parking area solar potential is unused.
- Additional storage not able to be considered due to policy prohibitions around exporting energy from a battery to the grid – even though the energy is 100% stored solar.

Ready to do way more::

- 1,133 kW in total solar siting potential, 427 kW more rooftop and 386 kW in parking lots.
- Existing switch gear is already sized for the expansion and is just awaiting the policy innovation!