Clean Coalition

Community Microgrids

Renewables-driven resilience for an inherently vulnerable grid

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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:

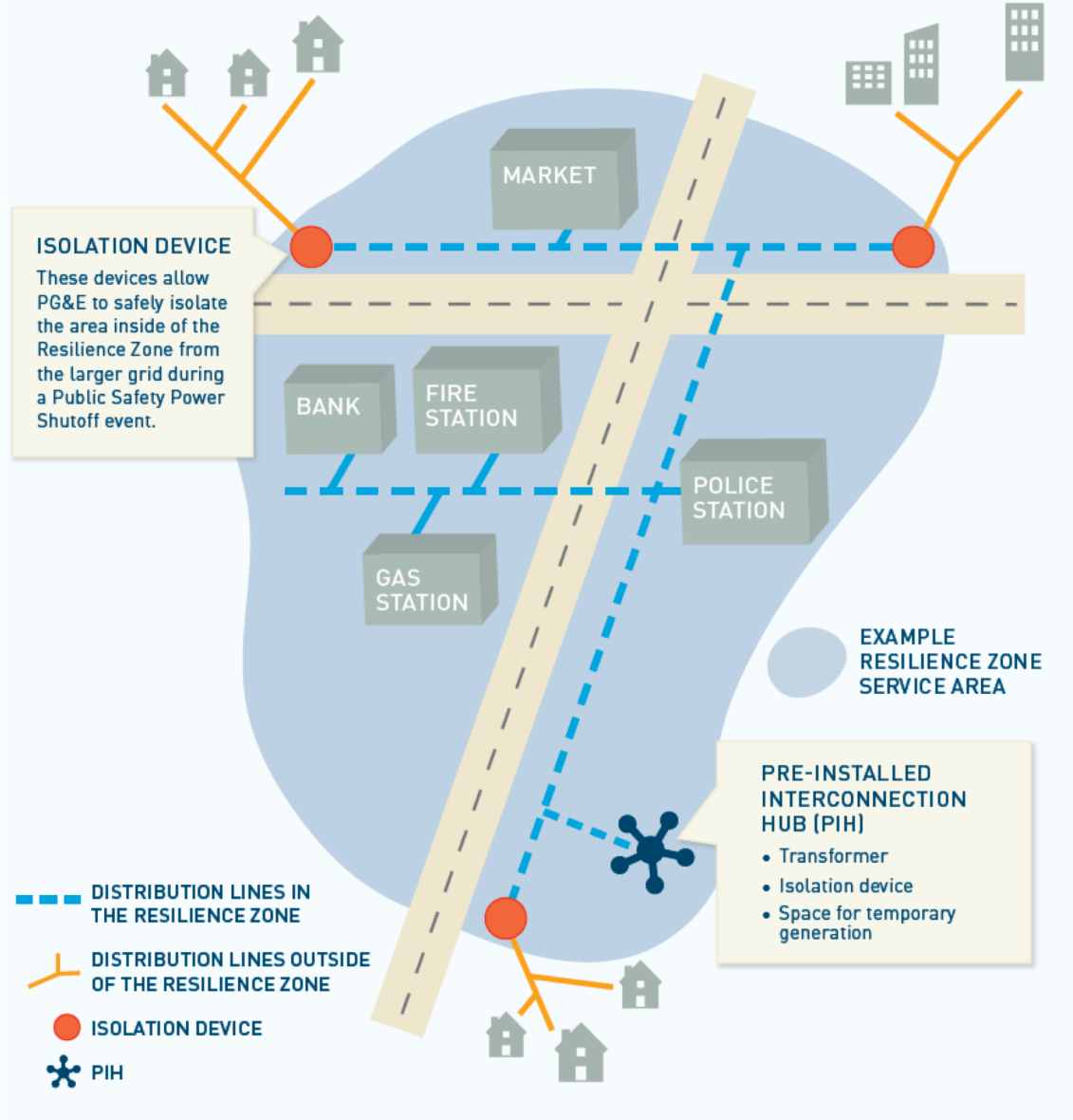
- A targeted and coordinated distribution grid area served by one or more substations – ultimately including a transmission-distribution substation that sets the stage for Distribution System Operator (DSO) performance.
- High penetrations of local renewables and other distributed energy resources (DER) 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.

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.

Calistoga Community Microgrid



Source: PG&E, Jul2019

Wholesale Distributed Generation (WDG) defined

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Project Size

50+ MW

500 kW

5 kW

Wholesale DG

Serves Local Loads

Central Generation

Serves Remote Loads

Retail DG

Serves Onsite Loads

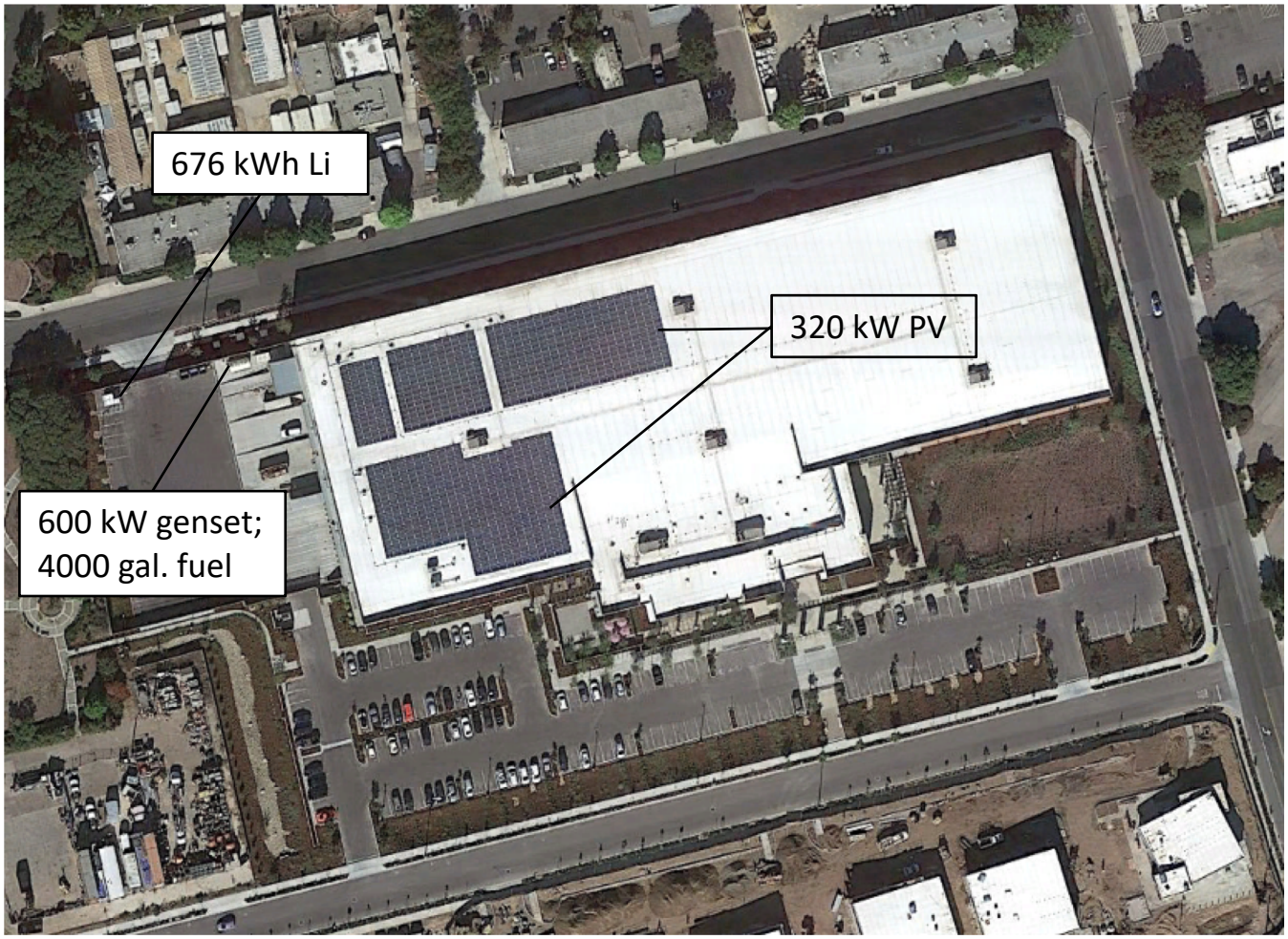
Behind the Meter

Distribution Grid

Transmission Grid

Direct Relief Microgrid – onsite resilience only

- Resiliency is top concern:
  - 320 kW solar
  - 676 kWh storage
  - 600 kW diesel genset
  - 4,000 gal of diesel fuel
- Solar net zeros the site with annual solar generation equaling the site's total annual electricity consumption.
- Storage designed to provide daily solar optimization by maximizing solar energy through time-shifting and minimizing demand charges -- and to ensure indefinite solar-driven backup power.
- Diesel genset provides back-up to the back-up but only typically runs for required bi-weekly maintenance.



WDG and FIT drove huge solar use in Germany

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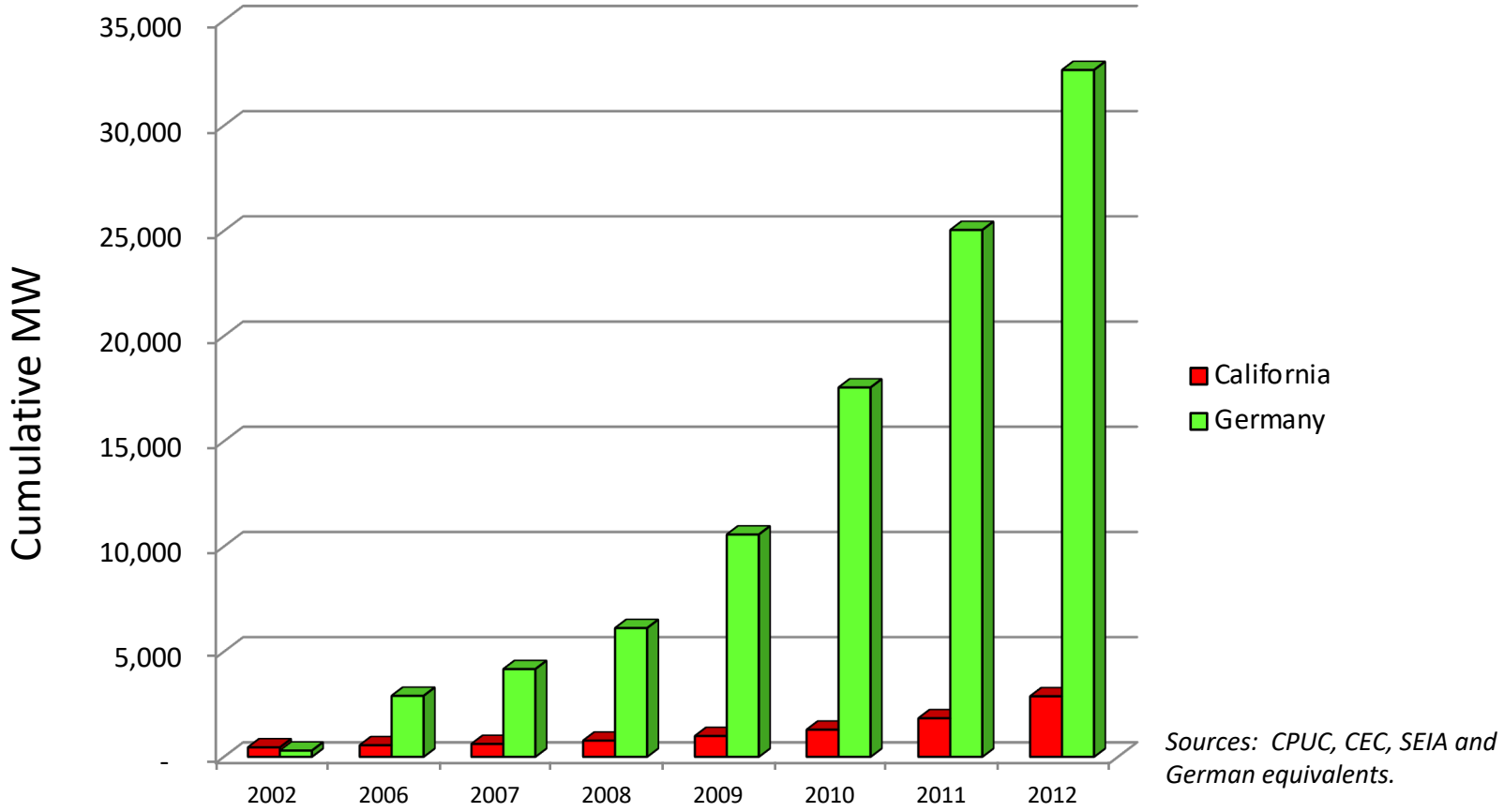
Solar Markets: Germany vs California (2002-2012)



Sources: CPUC, CEC, SEIA and German equivalents.

Germany deployed over 10 times more solar than California in the decade from 2002 — despite California having 70% better solar resource.

Percentage of time online for Tier 1, 2, and 3 loads for net zero solar with 2 hours of storage in California

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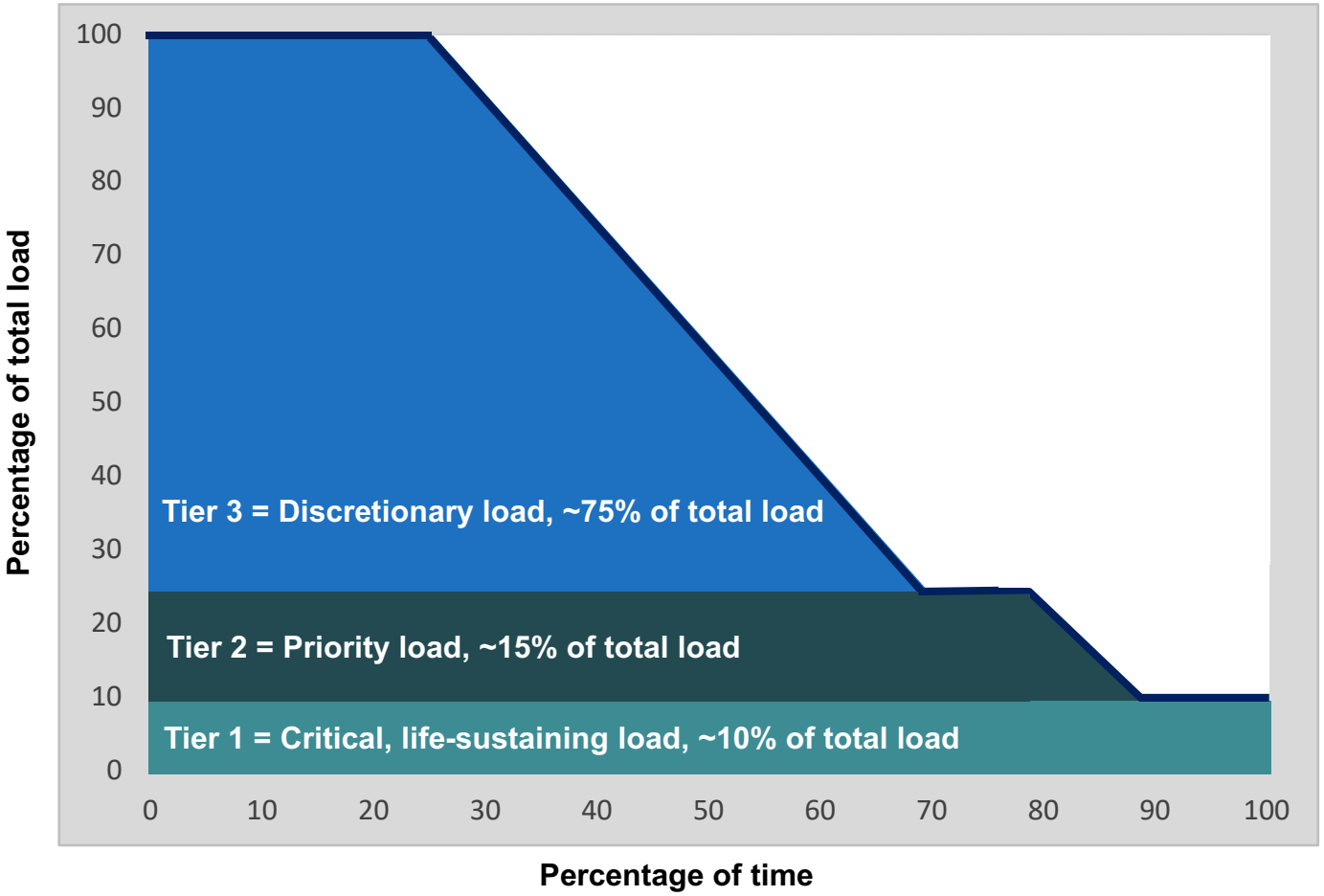

Dispatchable Energy Capacity Services (DECS)

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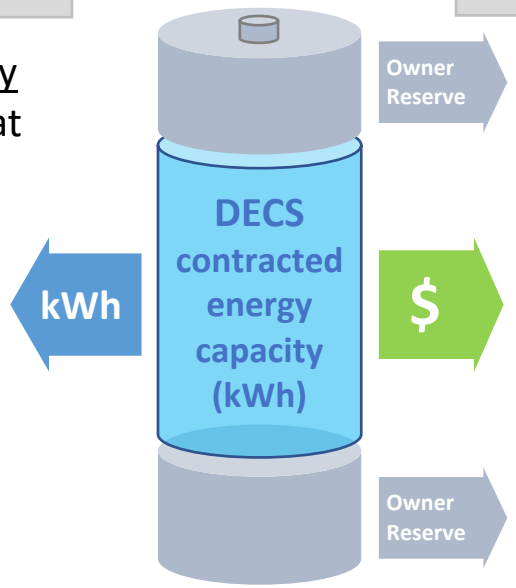
Load Serving Entity (LSE)

- 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.