Clean Coalition

# Community Microgrids & Solar Microgrids

## Economic, environmental & resilience benefits

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## Mission

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

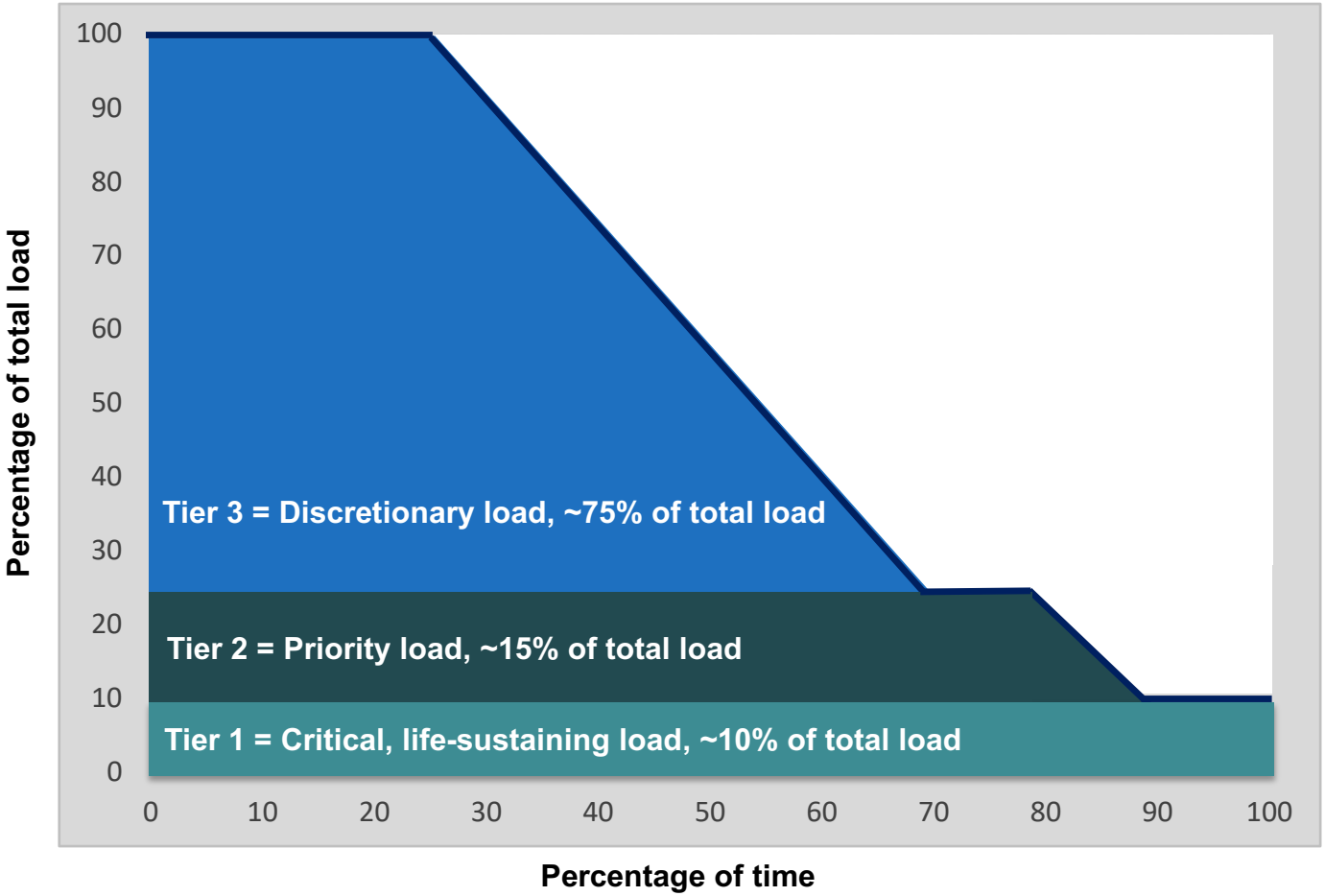
## 100% renewable energy end-game

- 25% local, interconnected within the distribution grid and facilitating resilience without dependence on the transmission grid.
- 75% remote, dependent on the transmission grid for serving loads.

# Value-of-resilience (VOR) depends on tier of load

- Everyone understands there is significant value to resilience provided by indefinite renewables-driven backup power, especially for the most critical loads
  - But, nobody has quantified this value of unparalleled resilience.
  - Hence, there is a substantial economic gap for renewables-driven microgrids.
- The Clean Coalition aims to establish a standardized value-of-resilience (VOR) for critical, priority, and discretionary loads that will help everyone understand that premiums are appropriate for indefinite renewables-driven backup power to critical loads and almost constant backup power to priority loads, which yields a configuration that delivers backup power to all loads a lot of the time
- The Clean Coalition's VOR approach aims to standardize resilience values for three tiers of loads:
  - Tier 1 are mission-critical & life-sustaining loads and warrant 100% resilience. Tier 1 loads usually represent about 10% of the total load.
  - Tier 2 are priority loads that should be maintained as long as long as doing so does not threaten the ability to maintain Tier 1 loads. Tier 2 loads usually represent about 15% of the total load.
  - Tier 3 are discretionary loads make up the remaining loads, usually about 75% of the total load. Maintained when doing so does not threaten Tier 1 & 2 resilience.

# Typical load tier resilience from Solar Microgrids




Percentage of time online for Tier 1, 2, and 3 loads for a Solar Microgrid designed for the University of California Santa Barbara (UCSB) with enough solar to achieve net zero and 200 kWh of energy storage per 100 kW solar.

# Diesel generators are designed for limited resilience

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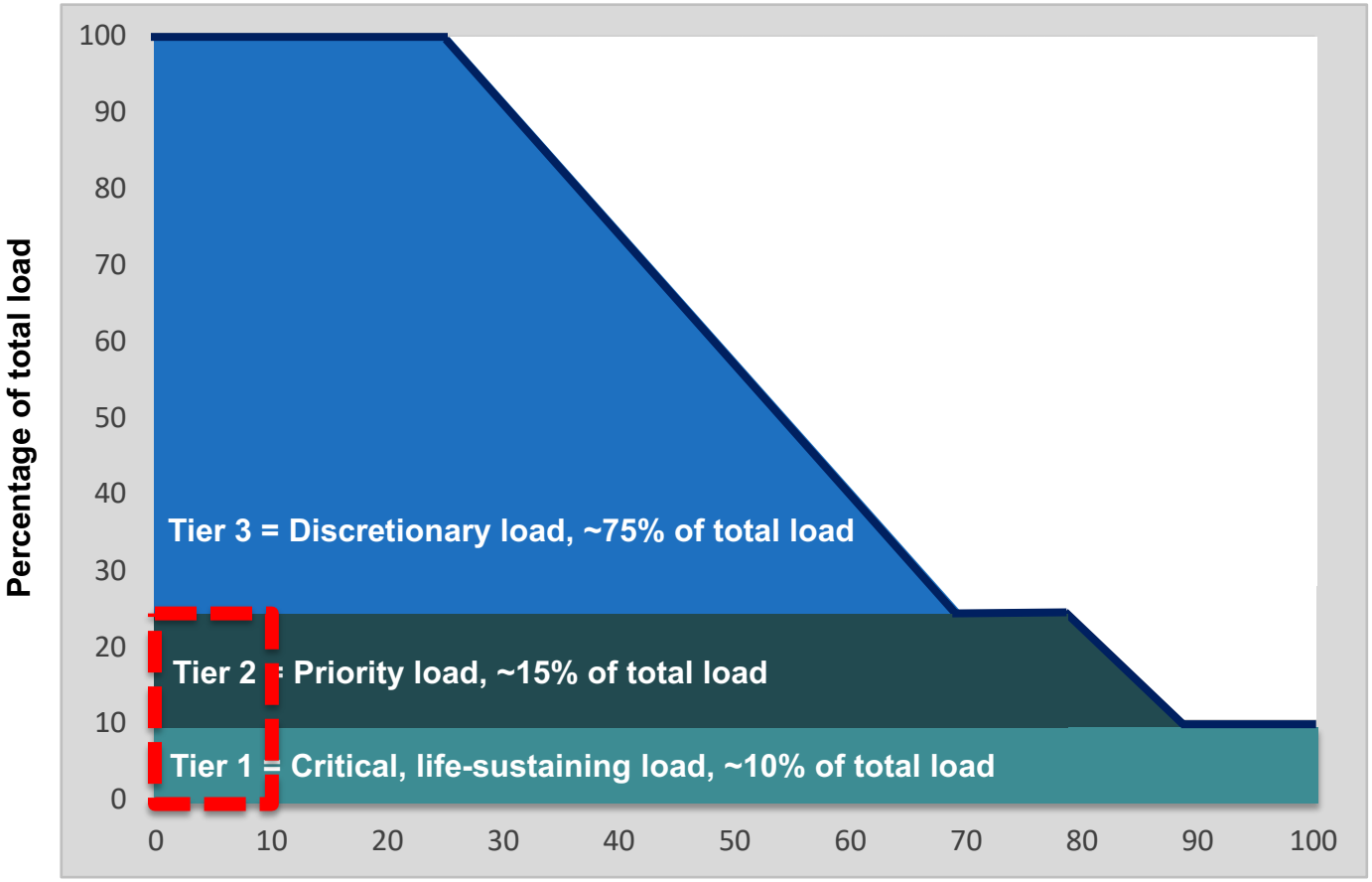


A typical diesel generator is configured to maintain 25% of the normal load for two days. If diesel fuel cannot be resupplied within two days, goodbye. This is hardly a solution for increasingly necessary long-term resilience. In California, Solar Microgrids provide a vastly superior trifecta of economic, environmental, and resilience benefits.

Goleta Load Pocket (GLP)

Community Microgrid

case study

# Goleta Load Pocket (GLP) and attaining resilience

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## 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.

# Target 66kV feeder at the core of the GLP

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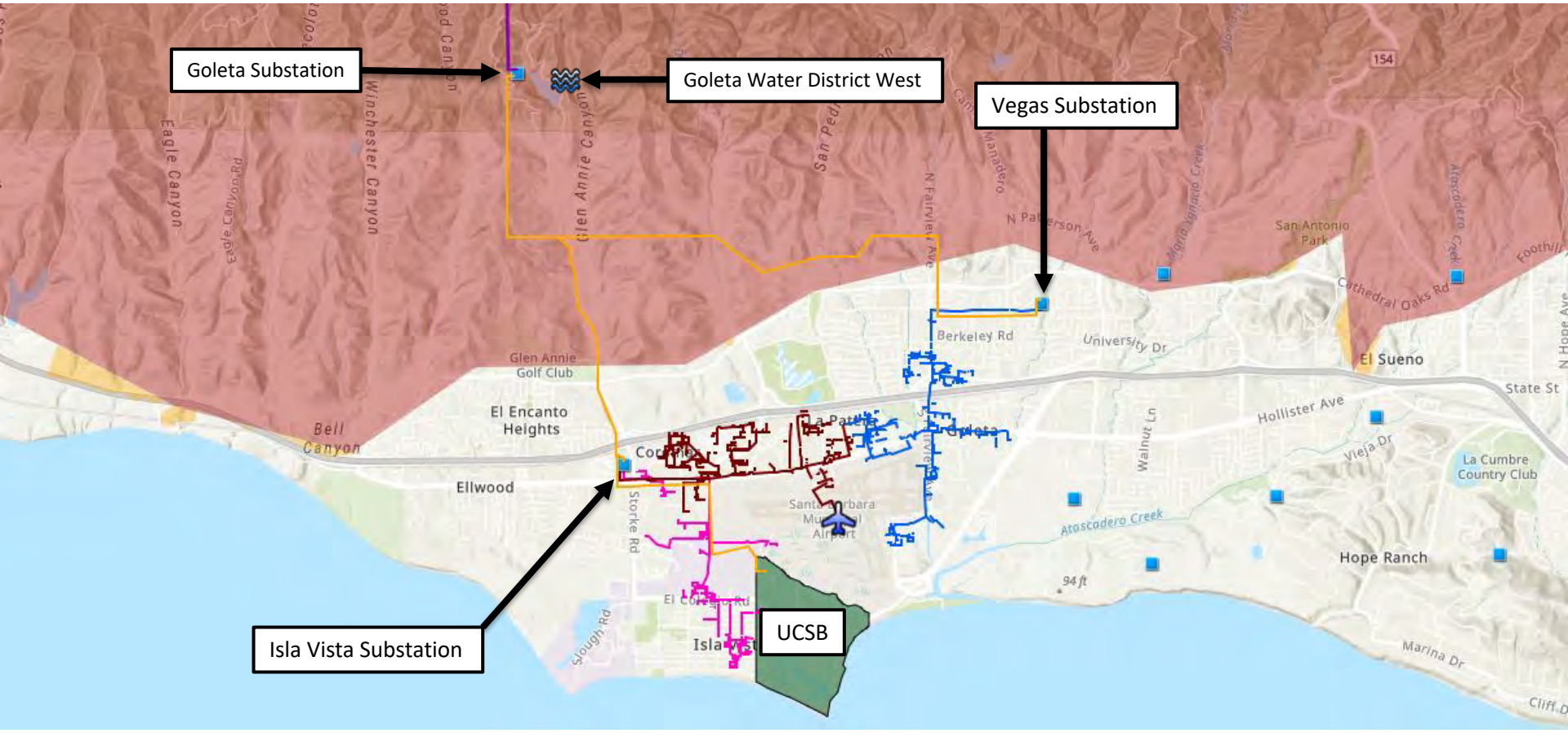
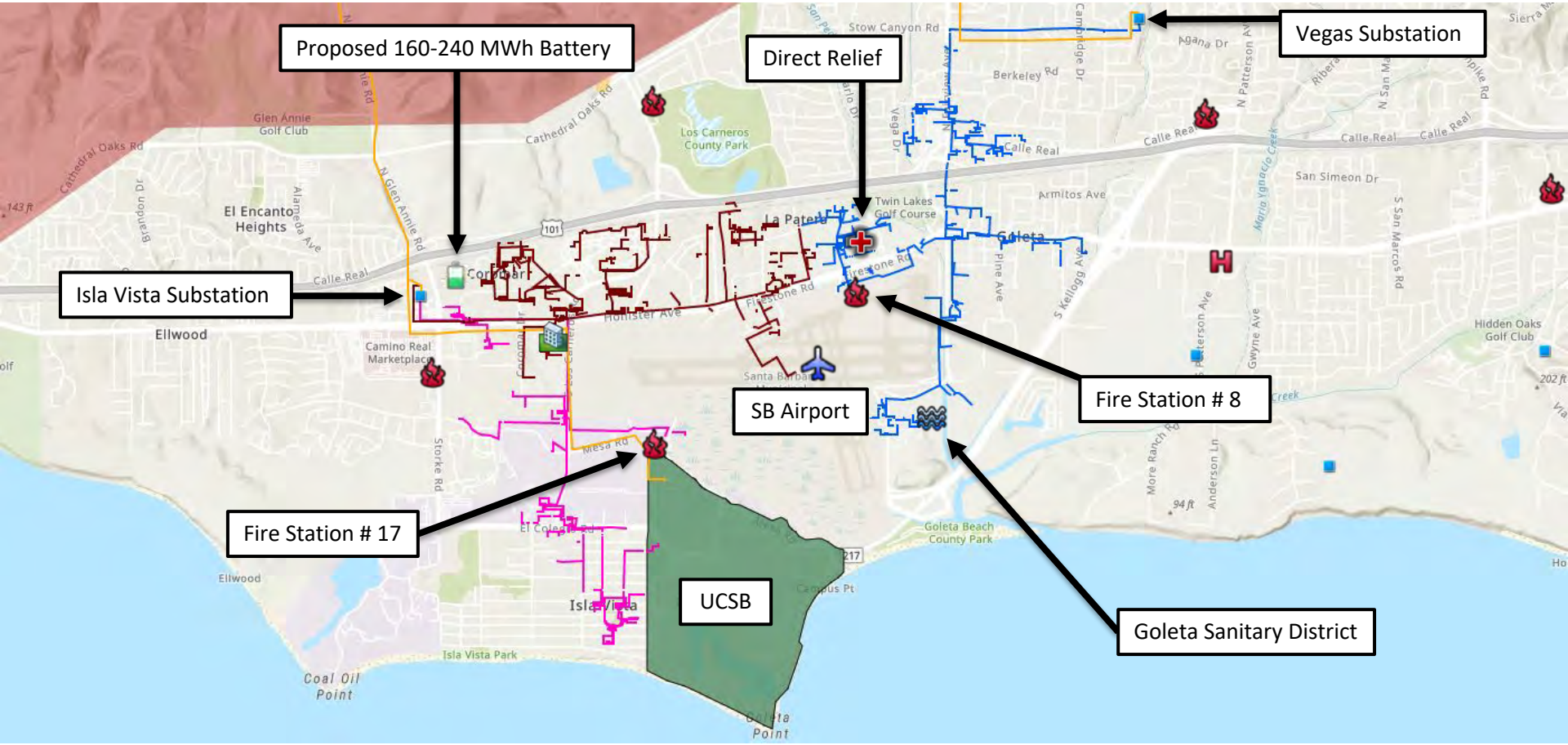



Legend

- 220 kV Transmission
- 66 kV Feeder #4311
- Substations
- 16kV Gladiola Feeder
- 16kV Gaucho Feeder
- 16kV Professor Feeder
- Tier 3 Fire Threat
- Tier 2 Fire Threat
- University of California Santa Barbara (UCSB)
- Santa Barbara Airport
- Sanitary or Water Districts

# Target 66kV feeder serves critical GLP loads



# Target 66kV feeder grid area block diagram

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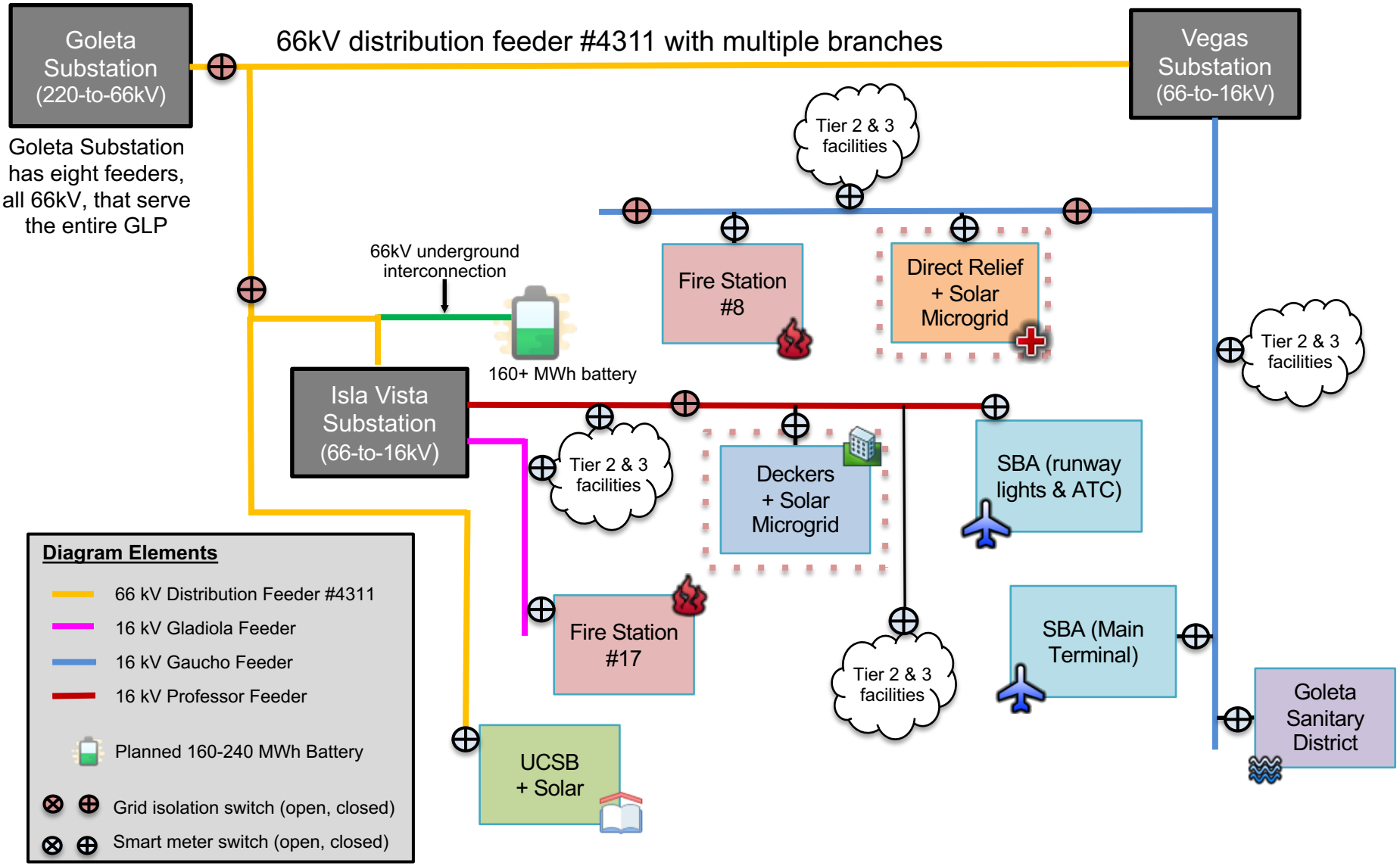

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# Santa Barbara Unified School District (SBUSD) case study

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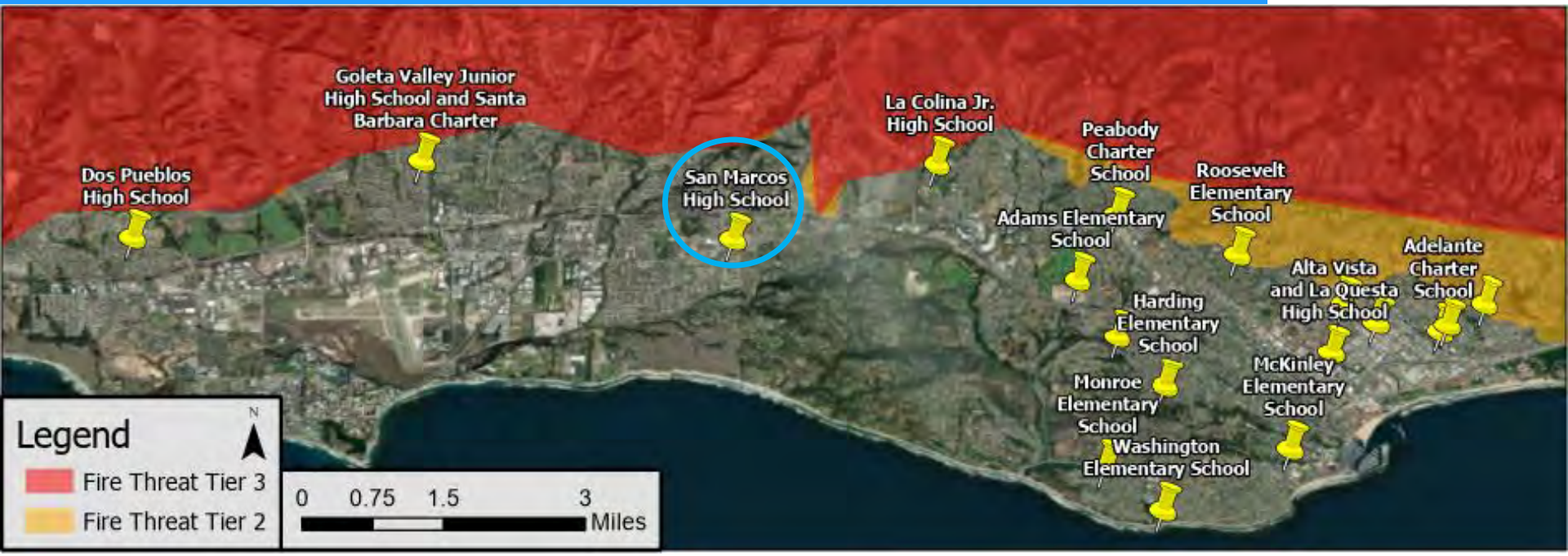


- The entire Santa Barbara region is surrounded by extreme fire risk (earthquake & landslide risk too) and is extremely vulnerable to electricity grid outages.
- The SBUSD is a major school district that increasingly recognizes the value-of-resilience (VOR) and has embraced the Clean Coalition's vision to implement Solar Microgrids at a number of its key schools and other critical facilities.
- SMHS is in the middle of the extensive SBUSD service area.

# Six SBUSD Solar Microgrid sites

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Dos Pueblos High School

San Marcos High School

La Cumbre Junior High School

District Food Warehouse & District Office

Santa Barbara High School

# Guaranteed SBUSD bill savings and free VOR

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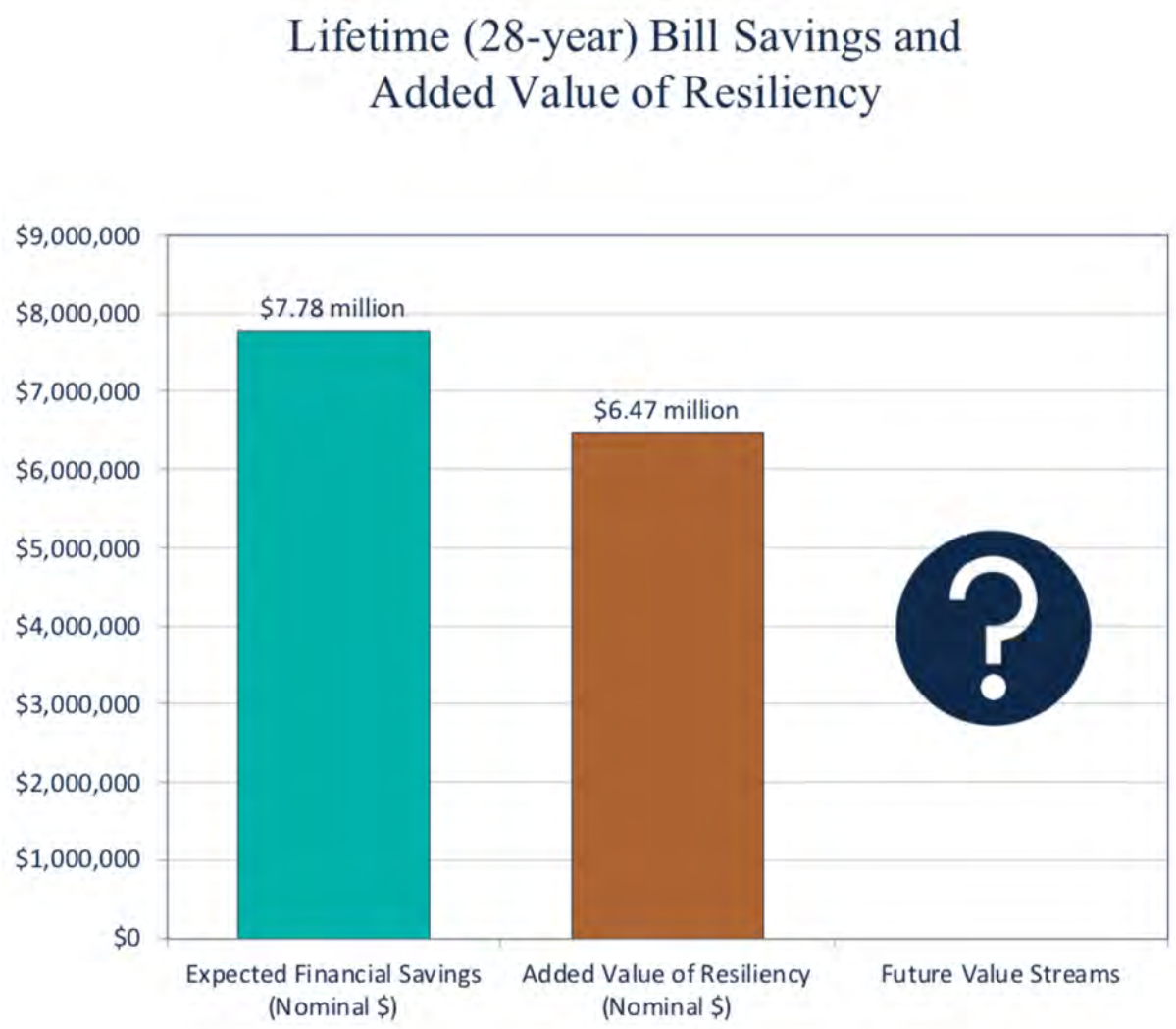

Valencia Gardens Energy Storage (VGES) case study

# Valencia Gardens Apartments in San Francisco

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# Lots of solar on the Valencia Gardens Apartments

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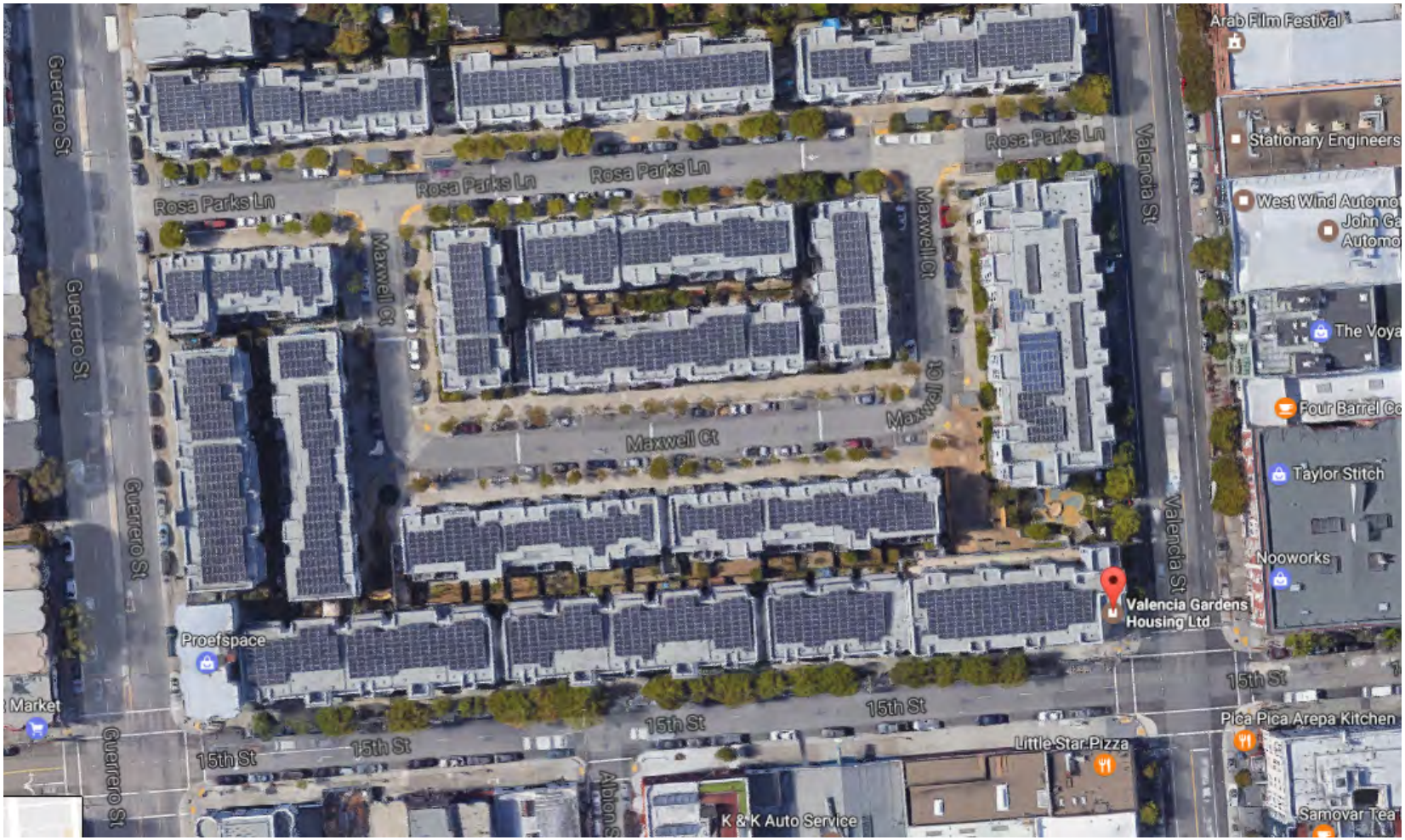
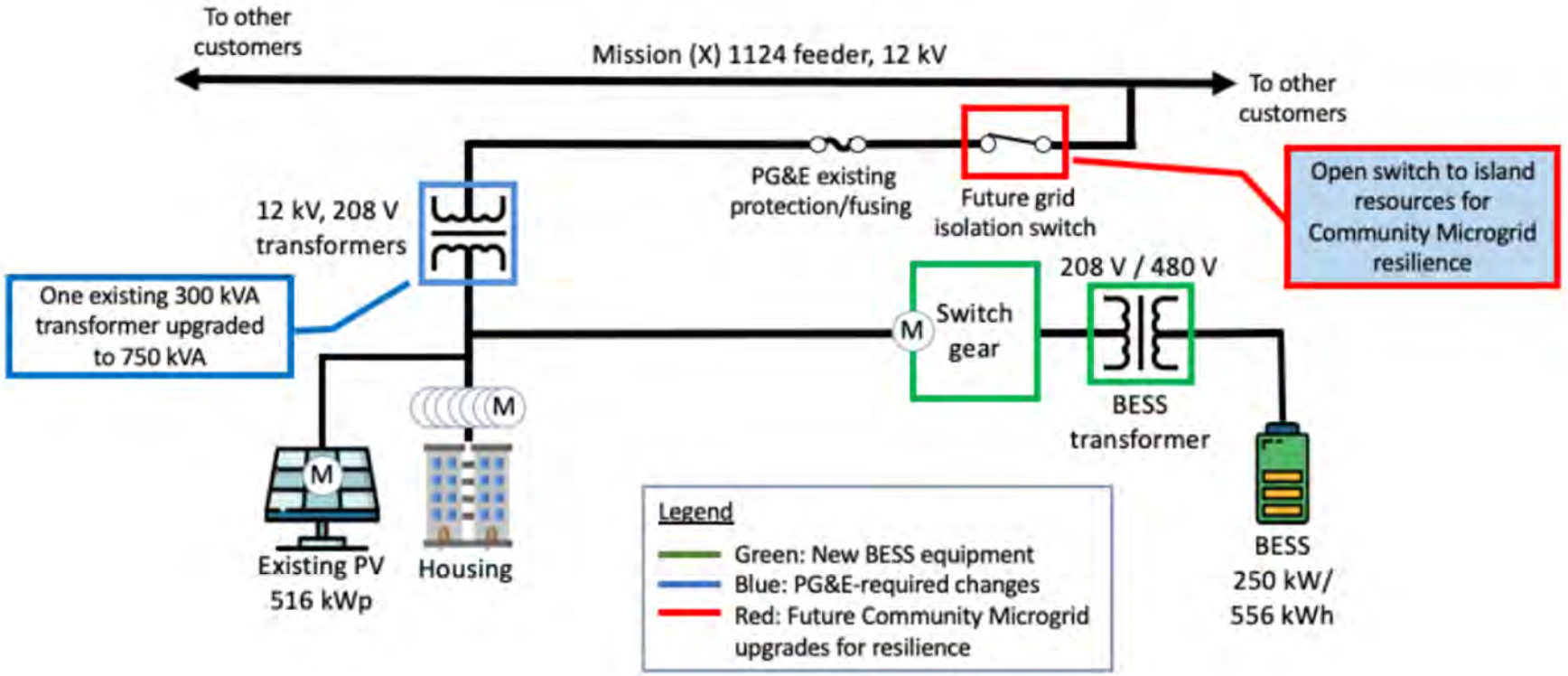


# Future VGES Community Microgrid opportunity



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# Planning for resilience begins with tiering

# Target 66kV feeder grid area block diagram

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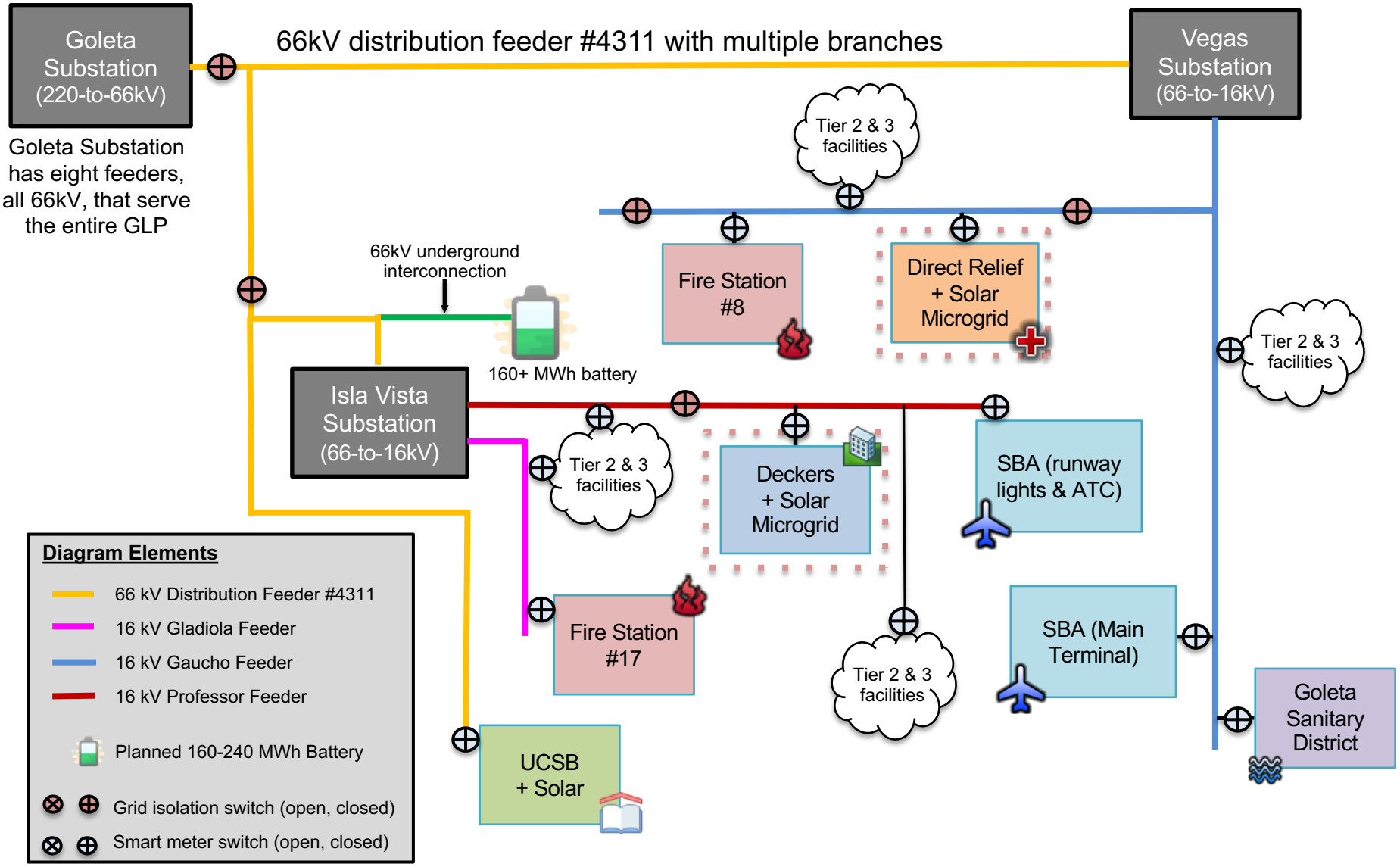
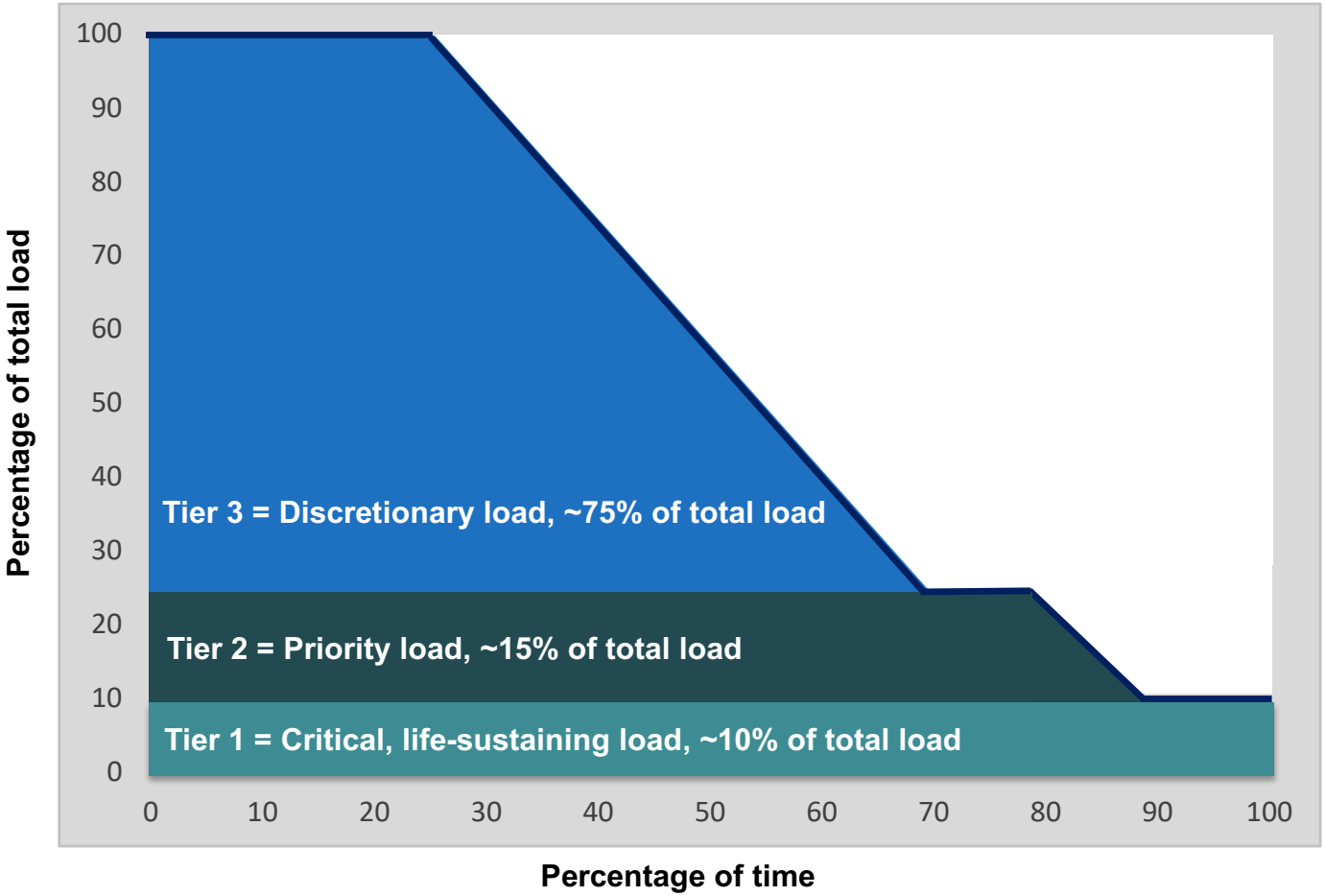


# Typical load tier resilience from Solar Microgrids




Percentage of time online for Tier 1, 2, and 3 loads for a Solar Microgrid designed for the University of California Santa Barbara (UCSB) with enough solar to achieve net zero and 200 kWh of energy storage per 100 kW solar.

# Facility & Load tiers of a Community Microgrid

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**Facility tiers**

| **Load tiers** | Tier 1 facility | Tier 2 facility | Tier 3 facility |
|---|---|---|---|
| Tier 1 load | | | |
| Tier 2 load | | | |
| Tier 3 load | | | |

= Critical for the entire community, such as Tier 1 loads at Tier 1 facilities like fire stations

= Priority for the entire community, such as Tier 2 loads at Tier 1 facilities and Tier 1 loads at Tier 2 facilities like multi-unit housing facilities that can provide safe and easy sheltering in place

= Priority for individual facilities but not the entire community

= Discretionary loads that are not impactful to the community, whether on or off