Clean Coalition

How Solar Microgrids and Community Microgrids are already delivering resilience to three California communities

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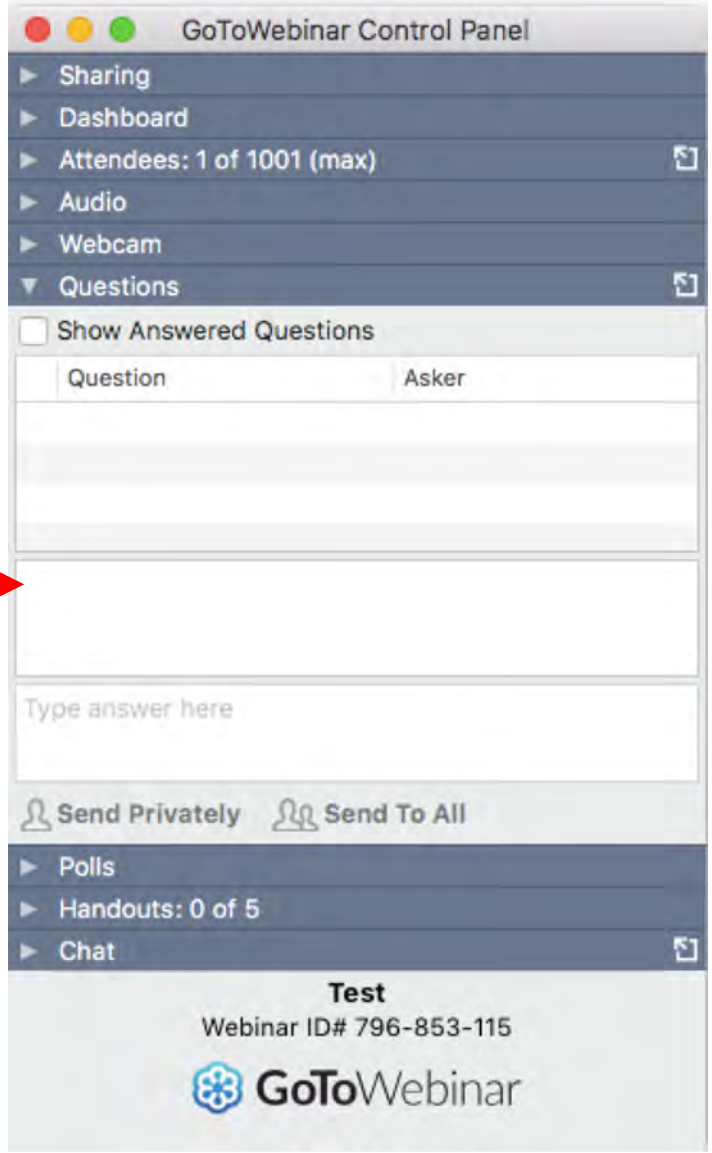
  - View varies by operating system and browser.
- Questions will be answered during the Q&A portion of the webinar.
- For other questions, contact Rosana Francescato: rosana@clean-coalition.org



Mission

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

100% renewable energy end-game

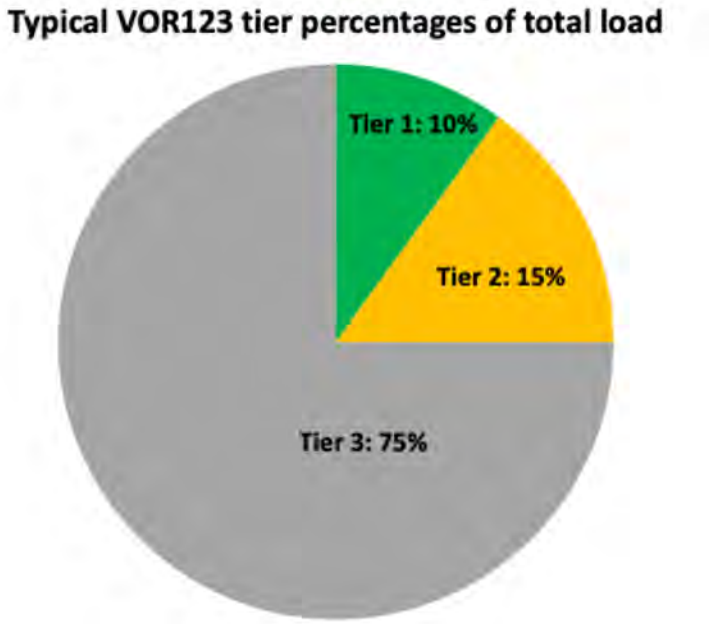
- 25% local, interconnected within the distribution grid and facilitating resilience without dependence on the transmission grid.
- 75% remote, dependent on the transmission grid for serving loads.

Value-of-resilience (VOR)

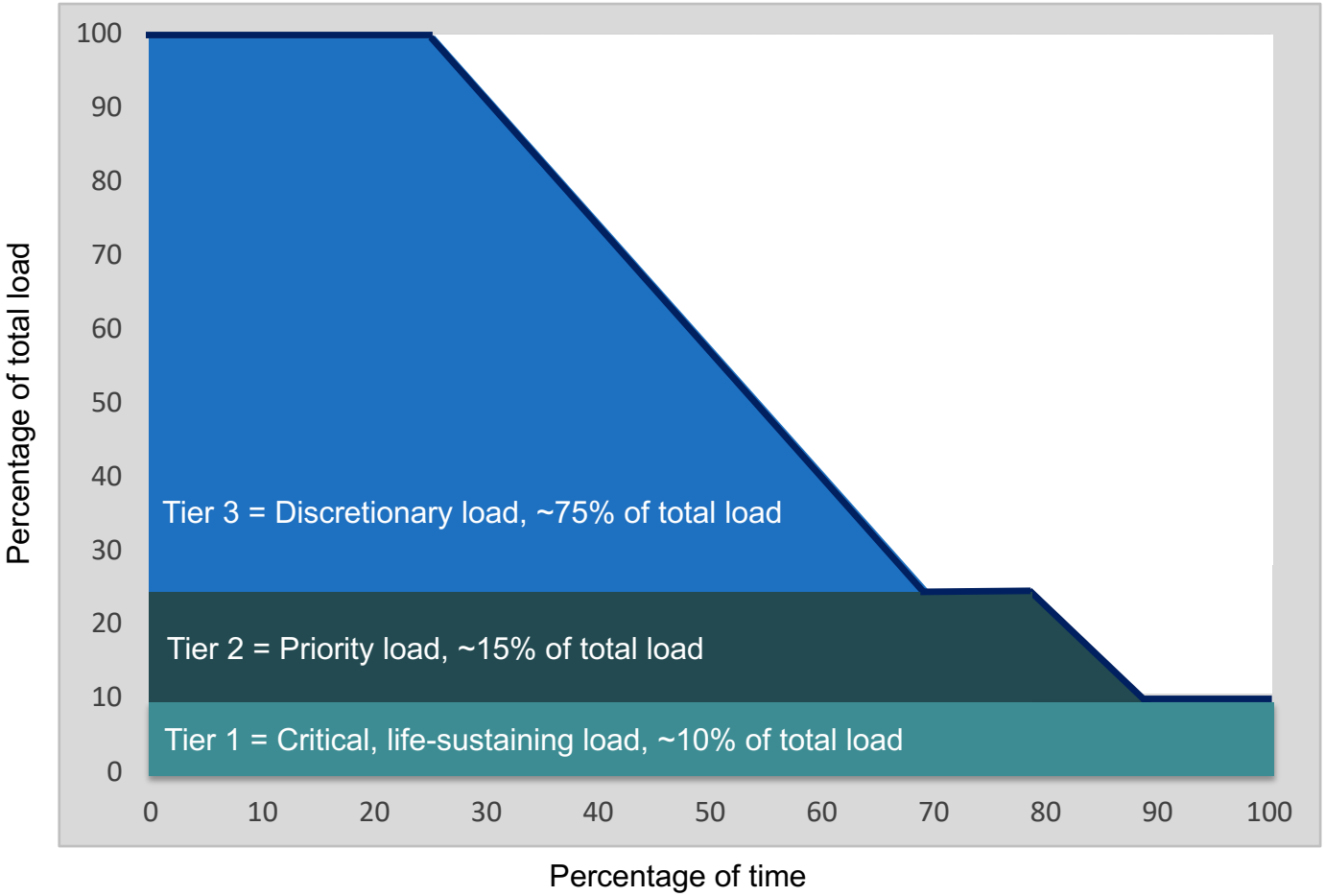
- Everyone understands there is significant value to resilience provided by indefinite renewables-driven backup power, especially for the most critical electricity loads.
  - But nobody has quantified the value of this unparalleled resilience.
  - Hence, there is a substantial economic gap for renewables-driven microgrids.
- The Clean Coalition developed a straightforward value-of-resilience methodology, VOR123, which makes it possible to quantify the value of renewables-driven resilience **at any facility type, in any location**.
- VOR123 will help everyone understand that premiums are appropriate for indefinite renewables-driven backup power to critical loads, almost constant backup power to priority loads, and backup power to all loads a lot of the time.
- **The key to VOR123 is tiering loads** — because different loads have different values.

VOR123 depends on tiering electricity loads

- The Clean Coalition's VOR123 approach standardizes resilience values for three tiers of loads, regardless of facility type or location:
  - **Tier 1, usually about 10% of the total load, are mission-critical, life-sustaining loads** that warrant 100% resilience.
  - **Tier 2, or priority loads, usually about 15% of the total load**, should be maintained as long as doing so does not threaten the ability to maintain Tier 1 loads.
  - **Tier 3 are discretionary loads** that make up the remaining loads, usually about 75% of the total load. Maintained when doing so does not threaten Tier 1 & 2 resilience.



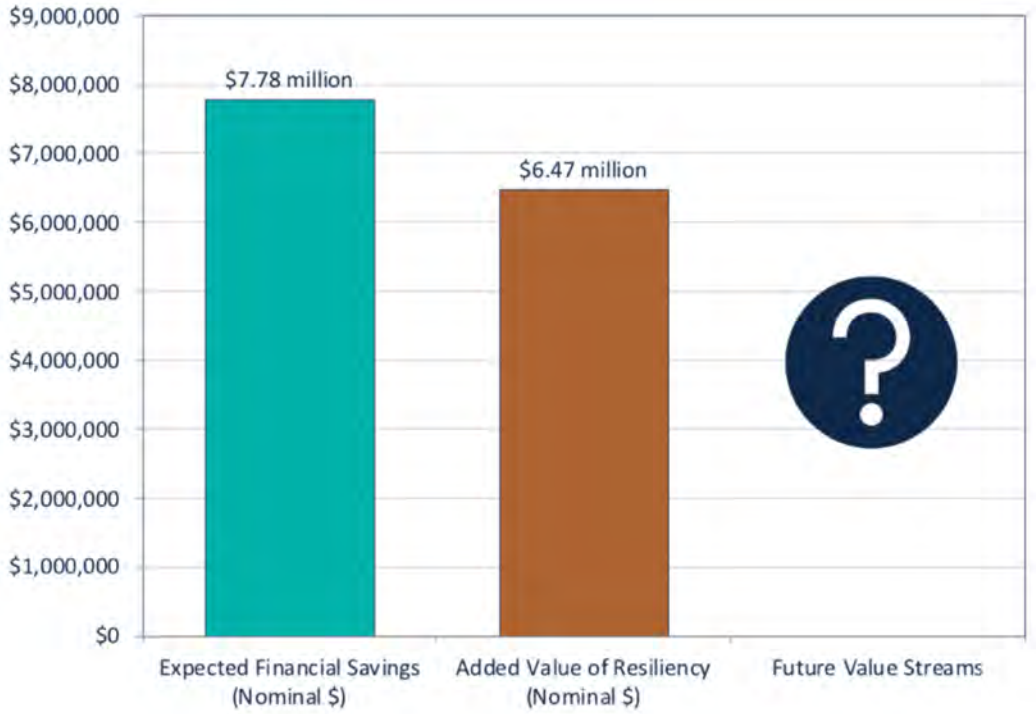
Typical load tier resilience from a Solar Microgrid



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.

VOR123 methodology yields a 25% typical adder

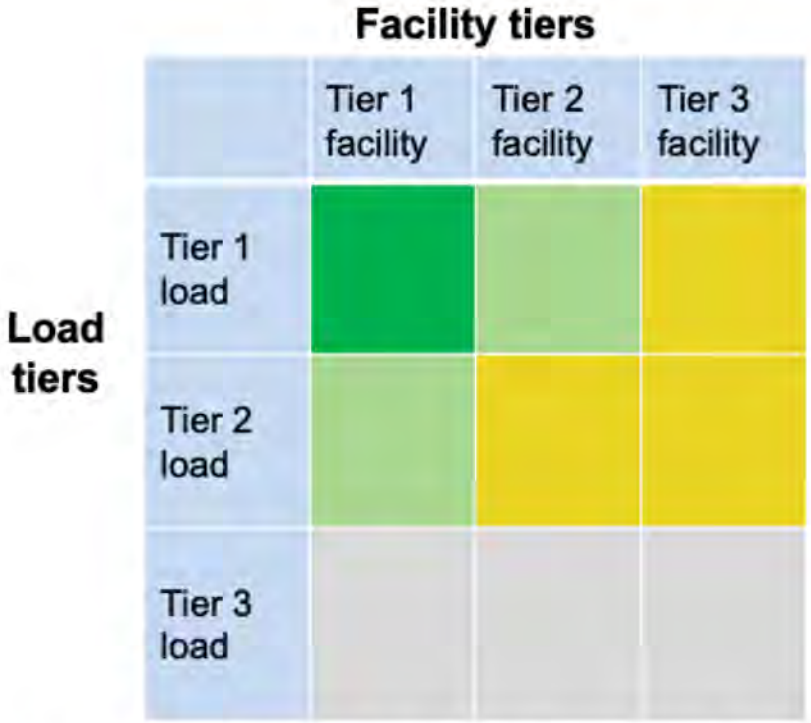
- Based on this tiering system, the Clean Coalition arrived at **25% as the typical VOR123 adder** that a site should be willing to pay for resilience.
- The Clean Coalition has validated the 25% adder using four approaches (see https://clean-coalition.org/disaster-resilience/#adder): Cost-of-service, Department of Energy multiplier, market-based, and avoided diesel generator cost.
- We also applied VOR123 to the Solar Microgrids for the Santa Barbara Unified School District (SBUSD), which is getting significant resilience benefits for free:



Bill savings and resilience value accruing to the SBUSD from six Solar Microgrid sites plus eight additional solar-only sites.

VOR123 for a Community Microgrid

- The VOR123 principles for an individual facility can also be applied to a larger grid area.
- Top emphasis is to provision 100% resilience for Tier 1 loads at Tier 1 facilities, followed by Tier 1 loads at other facilities and Tier 2 loads at Critical Community Facilities (CCFs).



= 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

Resilient Energy Subscription (RES)

- Community Microgrid costs-of-service (COS) can be rate-based for Tier 1 loads, and potentially Tier 2 loads, at Critical Community Facilities and other facilities deemed to be Tier 1 facilities.
  - Potentially also at Tier 2 facilities that provide important community benefits.
- All other facilities can subscribe for resilience from the Community Microgrids via the Resilient Energy Subscription (RES) market mechanism in return for guaranteed allocations of daily energy during islanded operations.
- The RES fee is a $/kWh fee separate from any existing rate tariffs, paid for by a facility to reserve a guaranteed allotment of daily energy during grid outages.
  - In California, RES fees are expected to add ~1% to a facility's electricity bill for every 1% of normal load that is reserved for guaranteed daily energy delivery.
  - Example: If a bank determines that it wants to reserve 10% of its normal load, about the average Tier 1 load, then the bank will pay RES fees of about a 10% increase to its electricity bill.
  - The bank's RES fees will cover the COS, including CapEx, OpEx, and return-on-investment (ROI), for the Community Microgrid owner-operator to increase the capacity of the Community Microgrid to cover the bank's RES.
- For more on applying VOR123 to a Community Microgrid, see https://clean-coalition.org/news/a-revolutionary-way-to-easily-value-resilience-for-any-facility/
  - More to come on RES on the Clean Coalition's blog: https://clean-coalition.org/news/category/news/blog/

Presenters

Rachel Permut, Director, Solution Innovation at ENGIE North America Inc., brings 20 years of energy strategy experience tackling a cross-section of business, technical and policy challenges. She is responsible for Solutions Innovation for Energy Solutions across ENGIE North America, working cross-functionally with sales, engineering, operations, legal and finance.

Neal Bartek, Project Director, Microgrids at ENGIE North America Inc., is responsible for the development and implementation of best practices to ensure that ENGIE is able to competitively design, procure, construct and operate energy solutions that meet the requirements of their customers. He works with project teams to review both the technical and financial components of proposed microgrids to provide recommendations to optimize solutions.

Margaret Miller, Director of Government and Regulatory Affairs at ENGIE North America Inc., is responsible for advising the company on regulatory and policy matters in organized and bilateral electricity markets across the Western United States. Prior to joining ENGIE, Margaret held various positions focused on regulatory affairs and market design.

Clean Coalition

ENGIE

WEBINAR

ENERGY RESILIENCY

FOR YOUR COMMUNITY

Bringing Resiliency to California Communities

July 28, 2021

Presenters

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Purpose of Webinar

With the increase in power outages and Public Safety Power Shutoffs (PSPS) across California, communities are facing enormous pressure to adapt and find new ways to ensure that critical operations are not impacted by grid outages.

Today's webinar seeks to simplify the landscape of resilient backup power options and highlight how five communities in Northern, Central and Southern California seamlessly transitioned to more resilient forms of backup power with ENGIE.

Today's Agenda

1. Approaching a microgrid project
2. Featured case studies
3. Latest policy updates
4. Q&A

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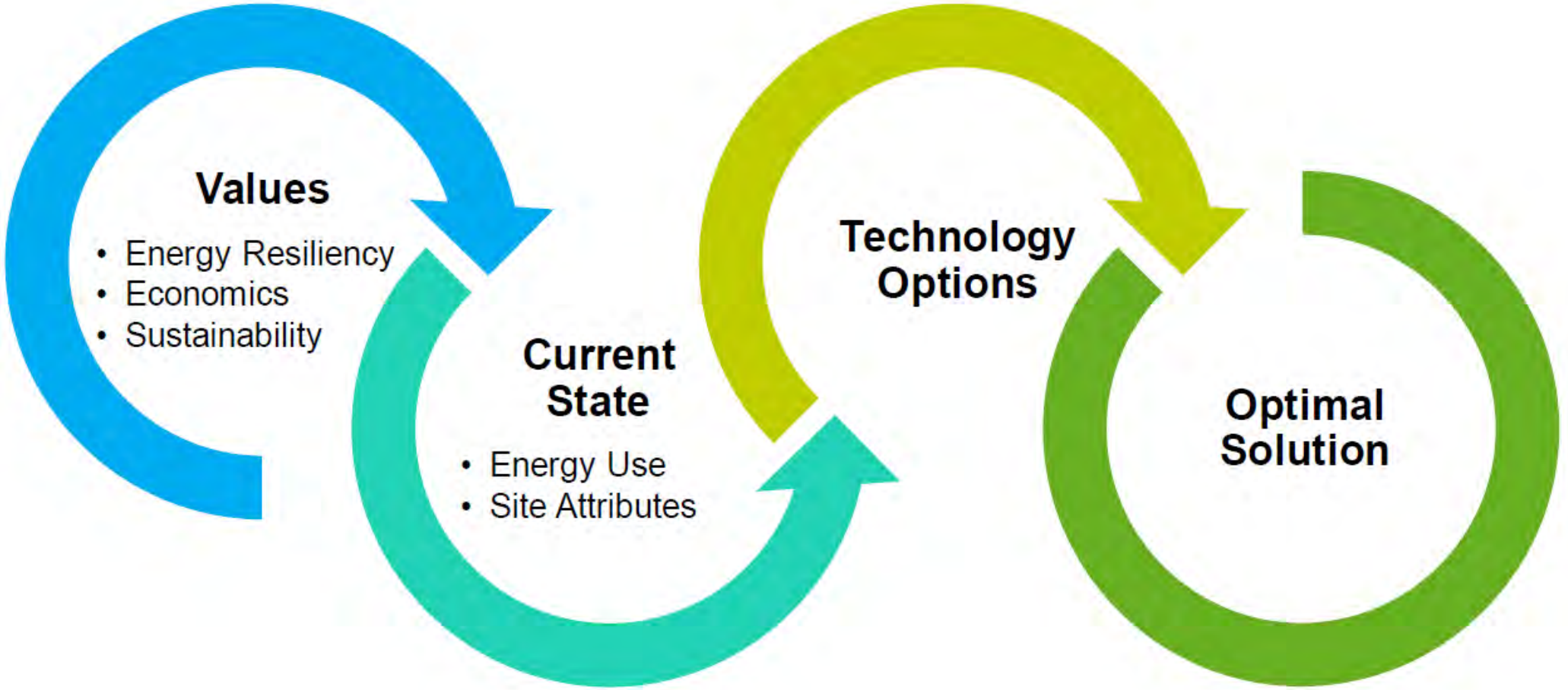
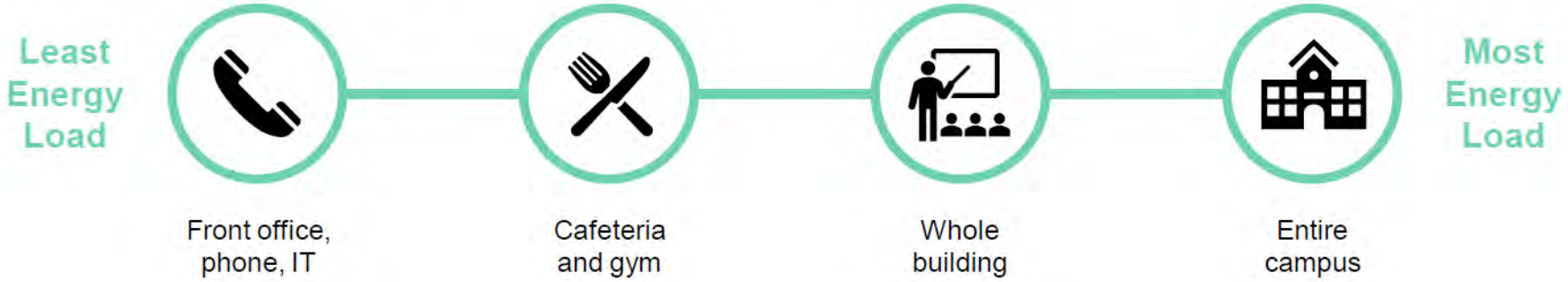
Approaching a microgrid project

Process for Determining the Optimal Solution



Factors in Sizing Energy Resiliency

1. **How much load do you need backed up?**



2. **For how long?**

3. **What is it worth to you?**

What are the customer's economic requirements?

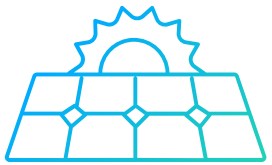
- Must deliver a positive financial return
- Least Cost Compromise Solution
- Reliability at Any Cost

Project Economics Driven by Size & Complexity

Type of Complexity		Cost Driver
Larger Loads	→	May need to upgrade Transformers or Switchgear
Load Shed	→	HVAC/Lighting Controls
Load Segmented	→	Critical Load Panel/Wiring
Multiple Technologies	→	Controls Integration and Commissioning
Whole Campus	→	Distance to Point of Master Meter

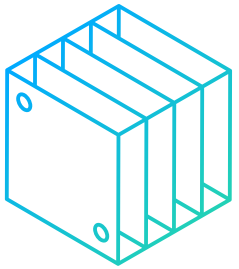
Sustainability of Project Varies with Technology

Solar PV

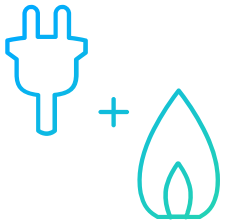


Battery Energy Storage

Fuel Cell



Combined Heat & Power



Natural Gas Generator

Diesel Generator

Customer Facility Considerations

Current State

- Historical Load
- Utility Rates
- Emergency Response Plans
- Existing Distributed Energy Resources (DERs) On-site
- Historical Outages
- Defined Critical Loads

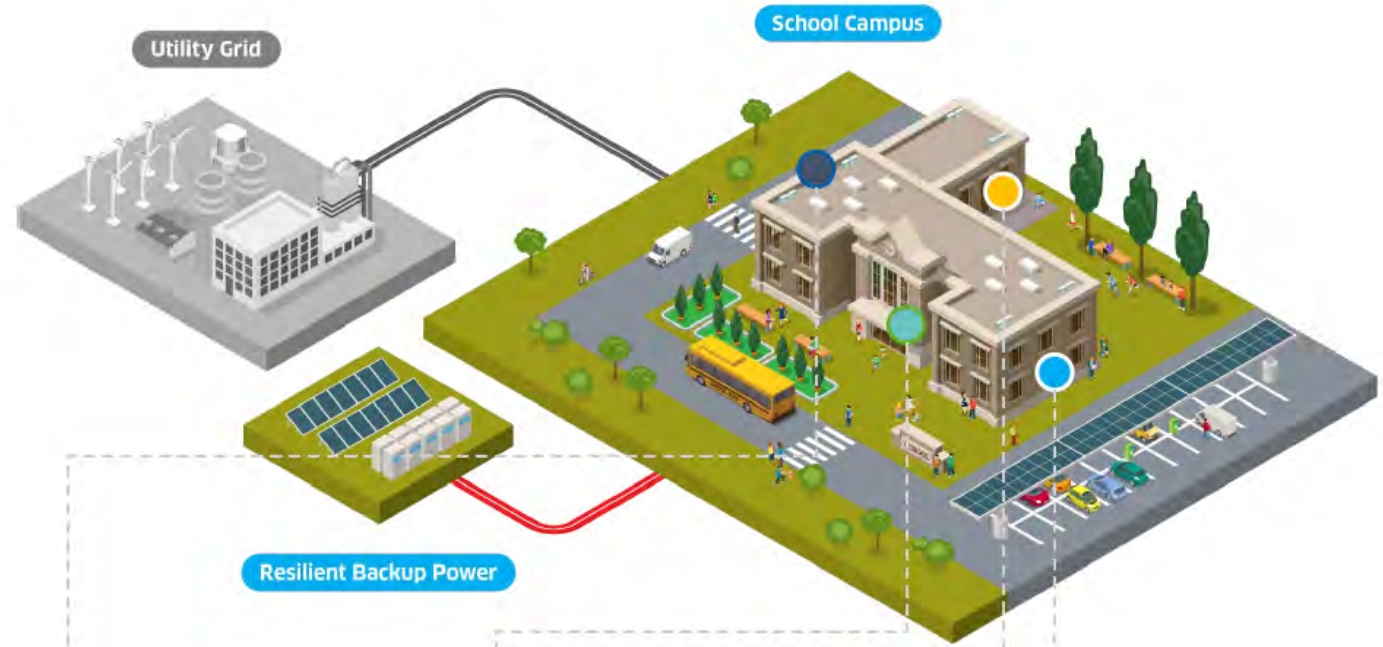
Considerations

- Space
- Local Permitting Requirements
- Interconnection
- Incentives
  - Solar Investment Tax Credit (ITC)
  - Self-Generation Incentive Program (SGIP)
  - Other

Technology Options

- Facility Efficiency
  - Lighting
  - HVAC Retrofits
  - Energy Load Management (EMS)
- Microgrid Controls
- On-site Generation
  - Solar PV
  - Batter Energy Storage
  - Diesel / Natural Gas / Biofuel Generator
  - Hydrogen Fuel Cells
  - Wind

Renewable Energy Microgrid



Lighting/HVAC operational

Communications/IT connected

Emergency shelter open

Food service available

Resiliency Services: Caring for your microgrid

Routine Services

- Quarterly and Annual Preventative Maintenance

→ **Be confident that you're ready for an outage.**

→ **Know how much run-time you can expect in July or in December.**

Event Related Services

- Post-event review of system performance w/ stakeholders
- Implement lessons learned

→ **Everyone knows that everyone knows…**

→ **Things change and we can all get better.**

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Case Studies

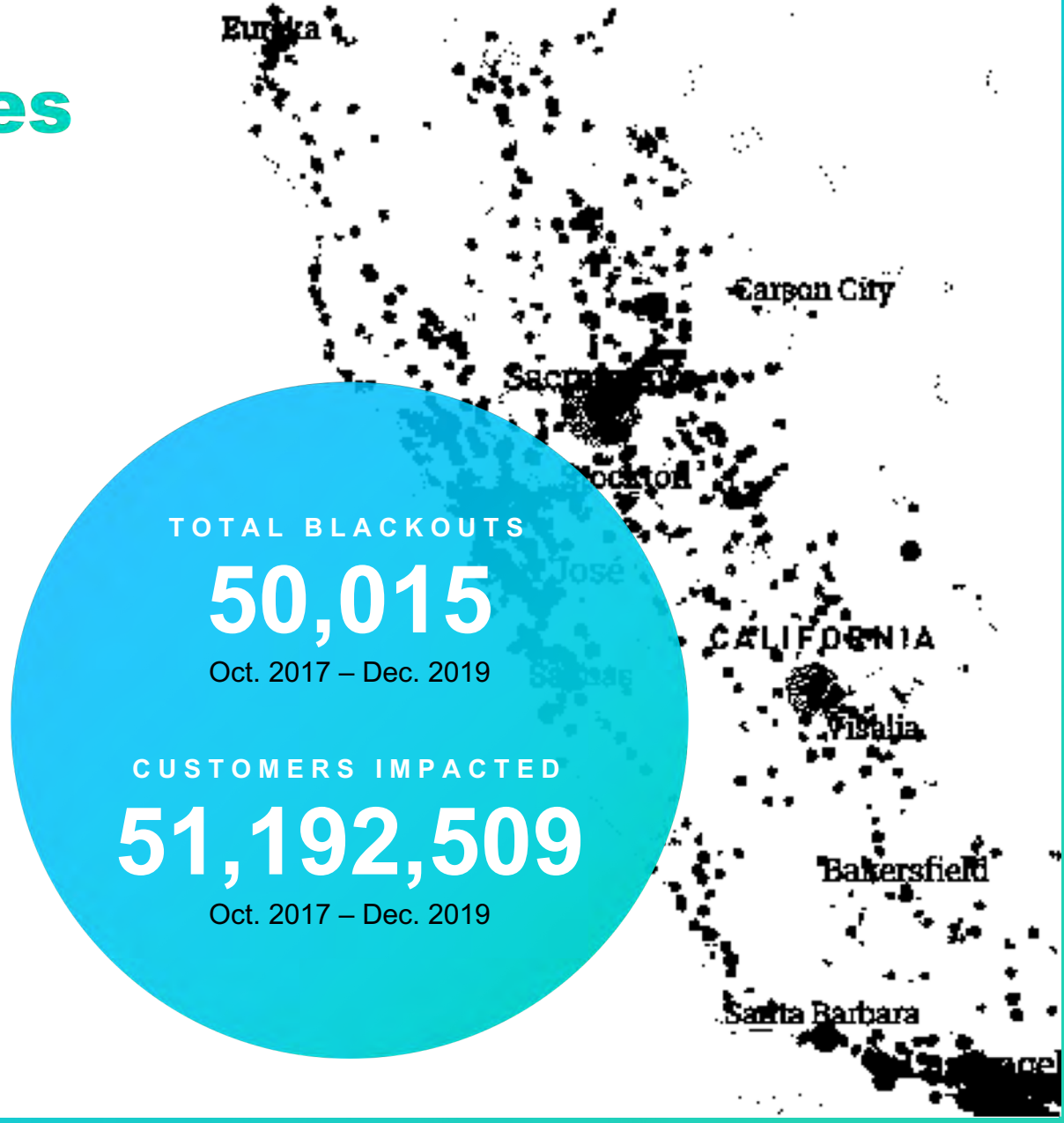
California Power Outages

Outages are on the rise

- From 2018 to 2019, blackout events increased 23%.
- For that same time period, the number of utility customers impacted by outages jumped by 50%.
- For the month of October 2019, black out events increased 80% from October 2018.

Public Safety Power Shutoffs (PSPS) are increasing

- 4,547 outage days from PSPS occurred between October 2017 and October 2019 and impacted 2.3M utility customers.
- Average PSPS duration is 46 hours or nearly two full days.



Source: Bloom Energy, https://www.bloomenergy.com/bloom-energy-outage-map/

Impacts on Students, Families, and Staff

Physical health
(e.g., increased respiratory illnesses)

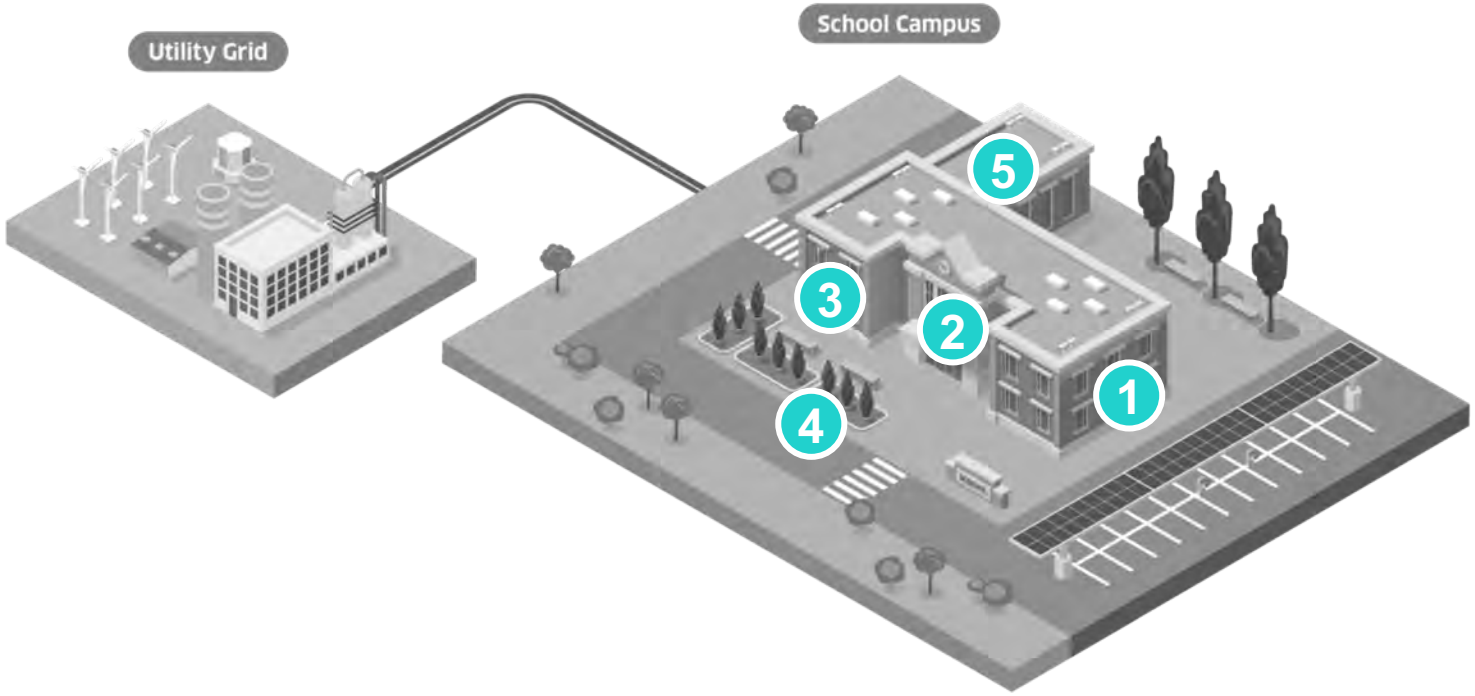
Mental & emotional health

Childcare

Security

Impacts on School Operations

1. Food service
2. Information technology
3. Communications systems
4. Buses
5. Emergency systems/shelters
6. Funding



Anza Electric Co-op Microgrid

Community Benefits

- Increases community access to clean, renewable energy.
- Provides increased electrical resilience to critical community functions by providing power to the downtown Anza, an area that includes key businesses such as gas stations and restaurants.
- Allows community to meet peak load demand during summer months. Saves money that would have been needed to upgrade utility transmission line.

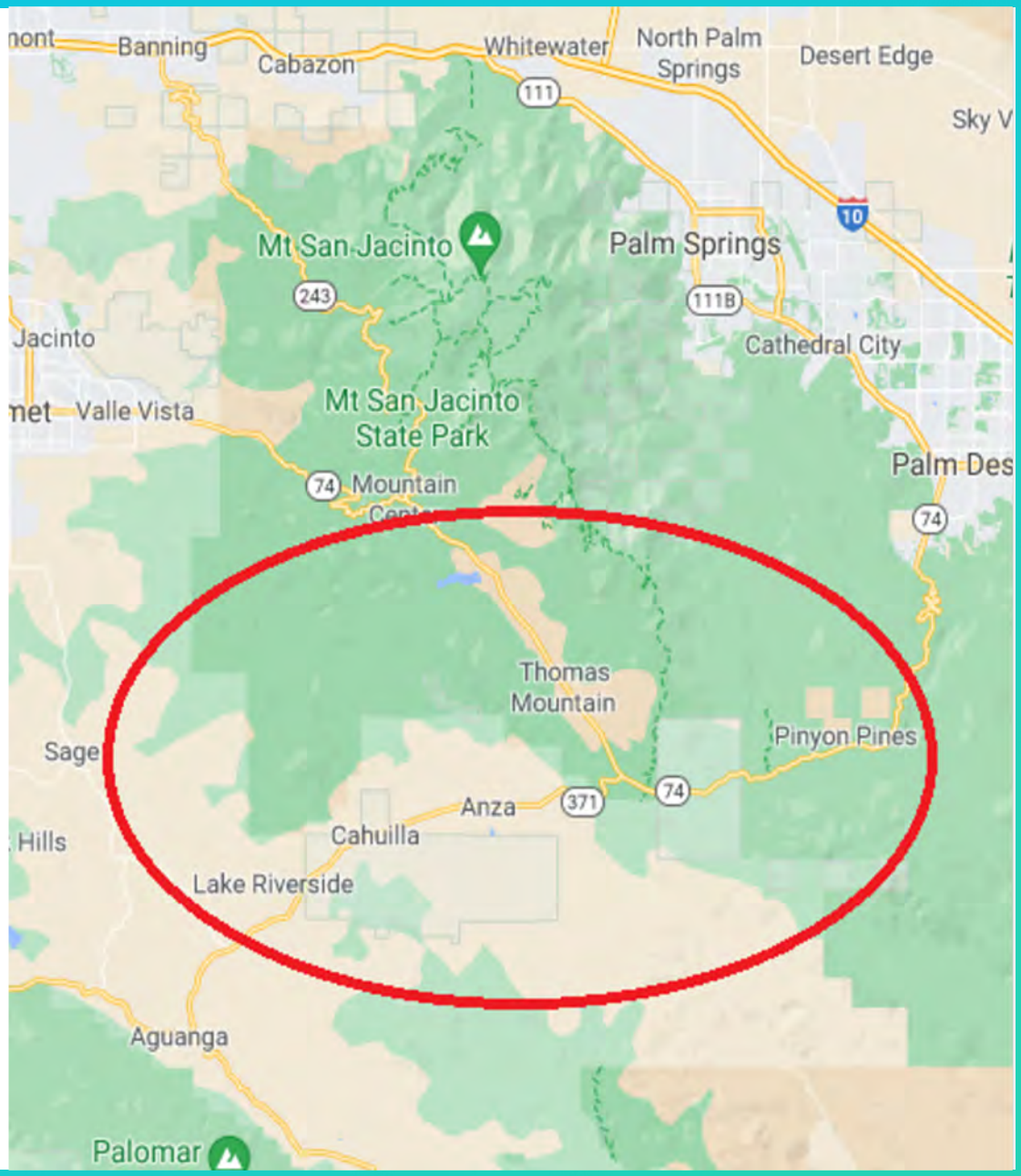
SITE DESIGN

- 5.4 MW microgrid
- 3.4 MW of solar
- 2 MW / 4 MWh BESS

Anza Electric Co-op Microgrid

Dynamic Site Testing

- Communications
- Manual/Automatic On-Grid functionality
- Manual Off-Grid Functions
- Automatic Off-Grid Functions
- Some tests had to be run during the day and again at night.
- Tests requiring outages had to be coordinated and communicated to the community and with operation centers in Arizona.



Adventist Health

Feather River Clinic Microgrid

Community Benefits

- Affordable, low-carbon energy resilience for healthcare facility.
- Increased electrical resilience to provide healthcare services during an extended utility power outage.
- Protects medication at clinic requiring refrigeration.
- On-site solar generates 695 MWh annually to offset more costly utility power purchases.

SITE DESIGN

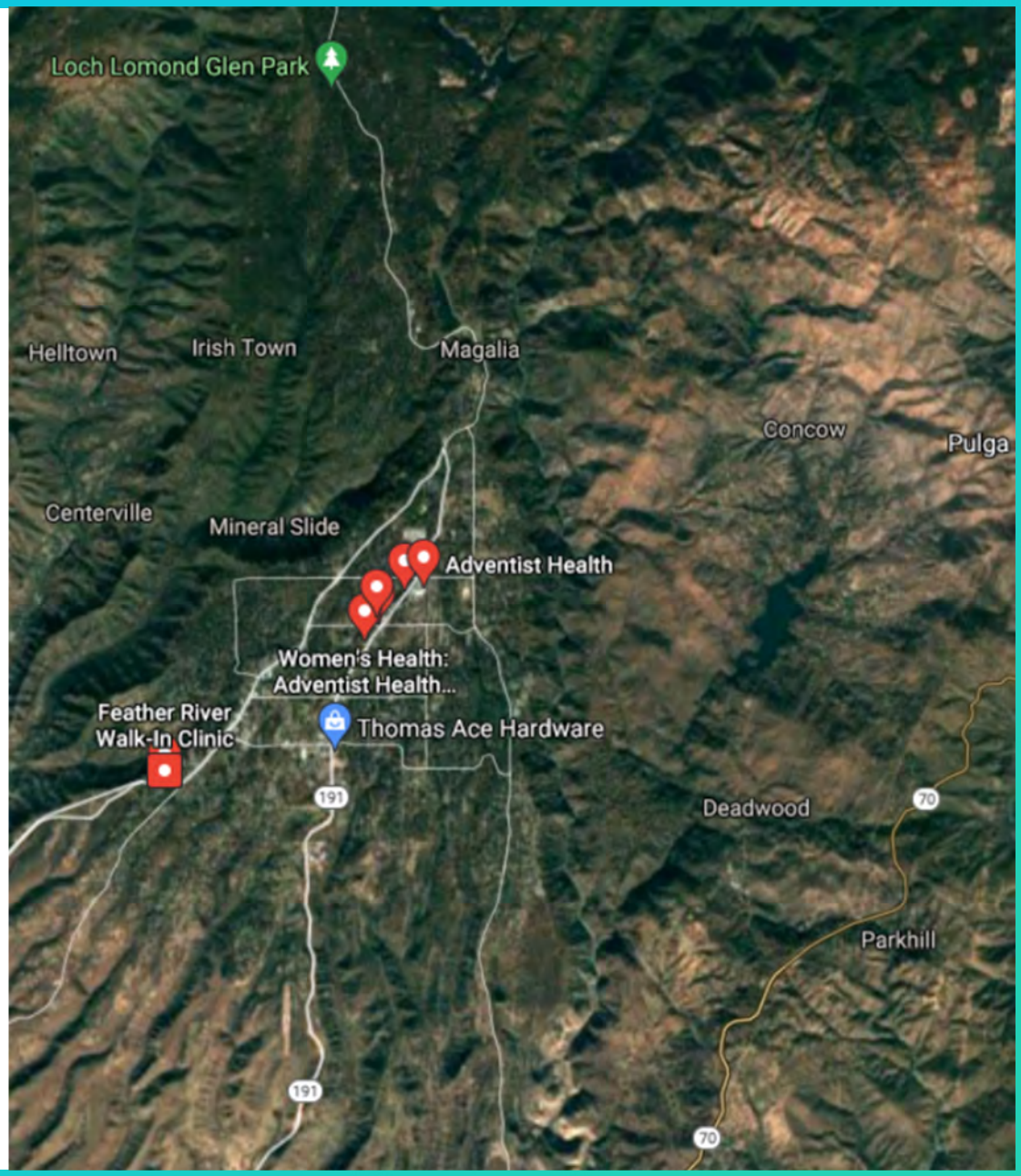
- 0.8 MW microgrid
- 360 kW of solar
- 232 kW / 928 kWh BESS
- 250 kW back-up generator

Adventist Health

Feather River Clinic Microgrid

Consensus Building

- Multiple stakeholders at various levels throughout organization and external:
  - Corporate team
  - Real estate team
  - On-site operations
  - On-site maintenance
  - California Office of Emergency Services
- Must bring everyone along the project journey and ensure all are aware of critical project milestones and regular status updates.



Santa Barbara USD

Community Benefits

- Ability to operate critical facilities during power outages, including lighting, food storage, data and communication systems.
- Provides backup power to safe spaces used by community during outages including first responders, students and families.
- Reduced utility bills with about 90% of the District's energy needs met by solar installed across 14 sites.

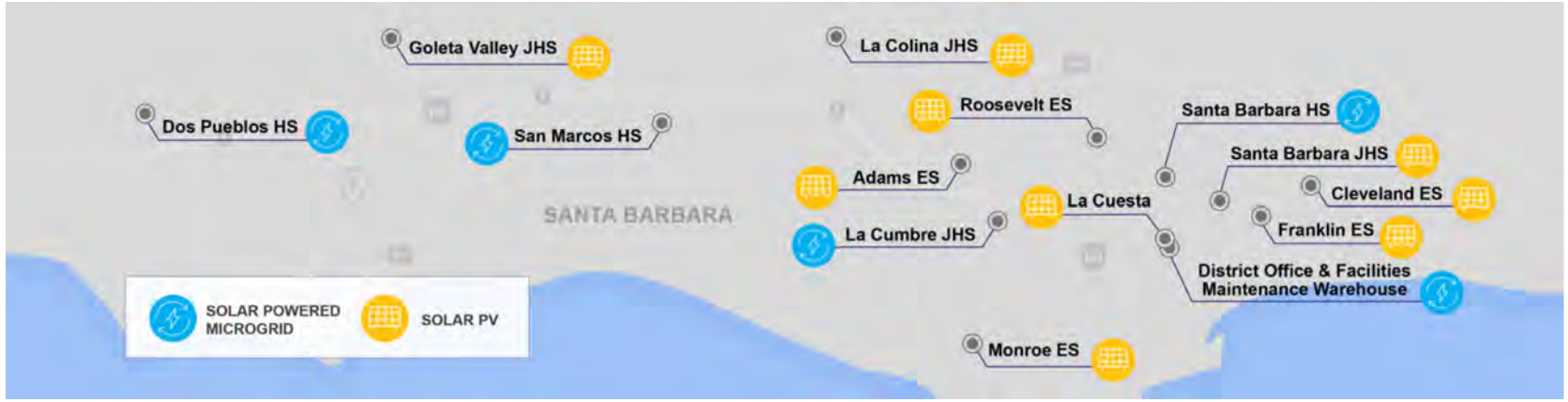
SITE DESIGN

- 4.2 MW of solar across 14 sites
- 6 microgrids with a total of 2.5 MW of solar & 1.9 MW / 3.8 MWh of battery storage

Santa Barbara USD

Valuable Partnerships

- District, Clean Coalition and Sage Renewables appreciated value of resiliency from beginning and understood district's important role as a safe place for both students and the broader community during outages.
- With a forward-thinking approach, District was an incredible champion and partner throughout critical milestones.
- District wanted a long-term partner to build, own and maintain systems.



Solano County

Community Benefits

- Maintain critical operations during power outages and PSPSs at Beck Campus, Downtown campus, Vallejo Campus and Fairfield Library.
- Enhance fiscal stewardship by reducing utility expenditures and exposure to rising utility rates.
- Support long-lasting lighting, HVAC, water conservation, and EV charging stations.
- Community engagement with online, real-time dashboard for public viewing.
- Workforce development with Solano County Office of Education including real-world experience for students in Juvenile Court and Community Schools Construction program; COE engineering school and girl's camp.

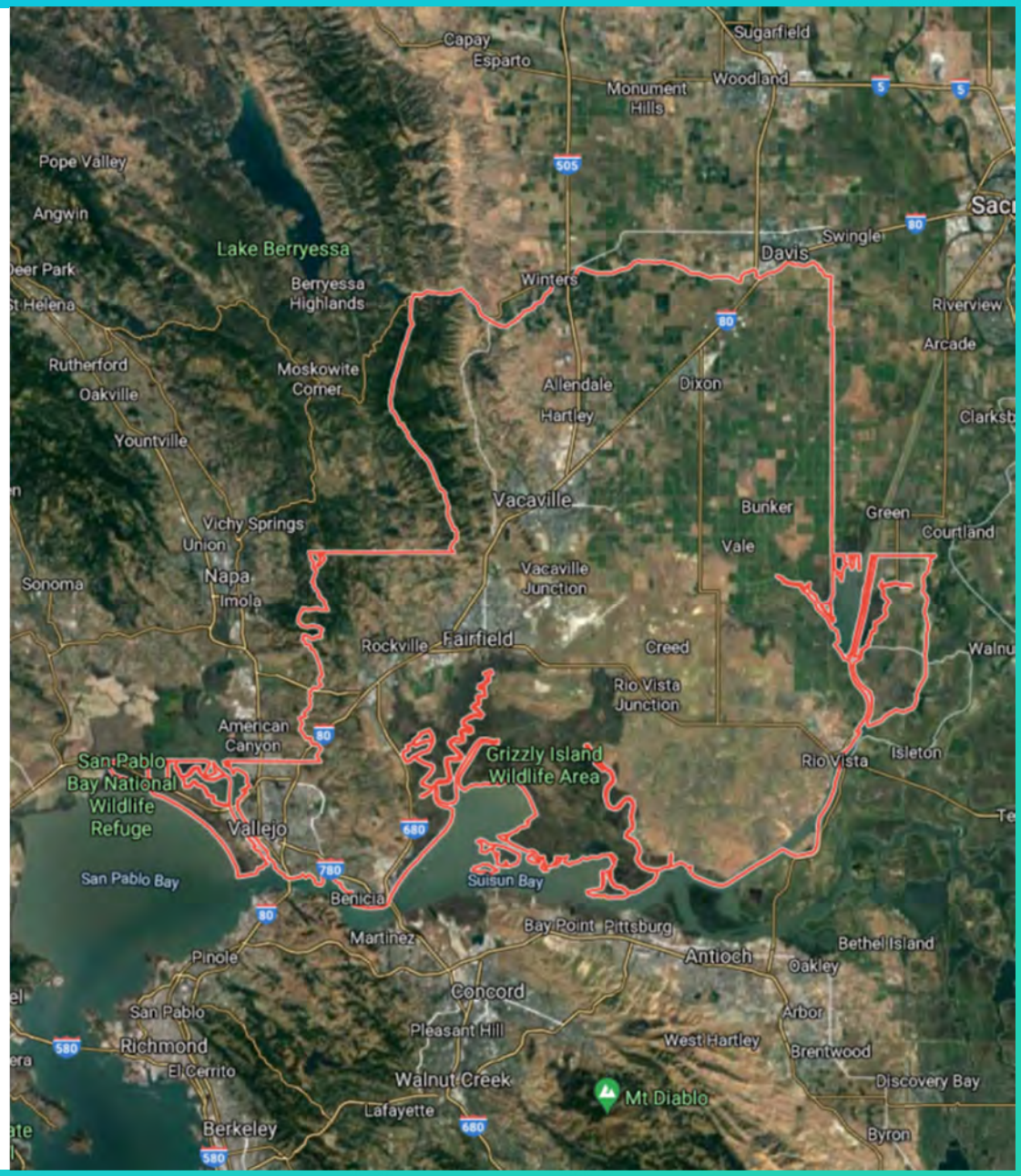
SITE DESIGN

- 5.4 MW across 4 microgrids
- 2.3 MW of solar
- 2 MW / 7.9 MWh battery storage

Solano County

Site Selection

- Community microgrids were developed as part of a broader strategy to support additional energy services throughout Solano County including new lighting, HVAC, EV charging stations and solar panels installations.
- Analyzed energy usage across County facilities to identify ideal microgrid locations for optimal energy savings. Recommendation included microgrids for Beck Campus, Downtown campus, Vallejo Campus.
- Worked with County to support their request for microgrid at Fairfield Library.



Water District Microgrid

Community Benefits

- Ability to maintain critical operations during power outages.
- Create resiliency for water and wastewater supply for 40 square-mile region with 223 miles of drinking water pipelines and 27 reservoirs with 34 million gallons of storage capacity.
- Savings of $73 million over lifetime of project and District will receive $7 million in incentives under CA's Self Generation Incentive Program.

SITE DESIGN

- 19.3 MW across 3 microgrids
- 12.8 MW of solar
- 3.3 MW/ 13.2 MWh battery storage
- 3.2 MW of back-up generation

Water District Microgrid

Forward Looking

- One of the first water districts in California to take a proactive approach to the challenges and opportunities inherent in the water-energy nexus.
- Building resiliency now ensures water district is prepared for future outages and power interruptions and protects water supply to local community.
- District sought out partner because of experience and expertise in resiliency.

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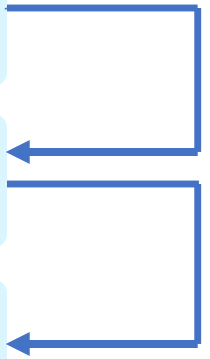
Policy Updates

Microgrid Key Regulatory/Policy Initiatives

SB 1339 (Stern - 2018)	*Commercialization of microgrids*
CPUC Microgrid Proceeding (R.19-09-009)	*Microgrid Tariffs, Standby charges* *Track 4 coming soon*
Resiliency and Microgrids Working Group Microgrid Incentive Program	*Ordered from Track 2 Decision* *Supports energy resilience for vulnerable populations impacted by grid outages*
High DER Future Proceeding	*Enable evolution of grid capabilities and operations to integrate solar, storage, and EVs*
Active Policy	*Federal Incentives* *Legislative Activities*



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Q&A

Thank you!