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SEPA Microgrid Playbook and Design Framework

July 29, 2021 - 11:00 am EDT
Grid Modernization Webinar Series

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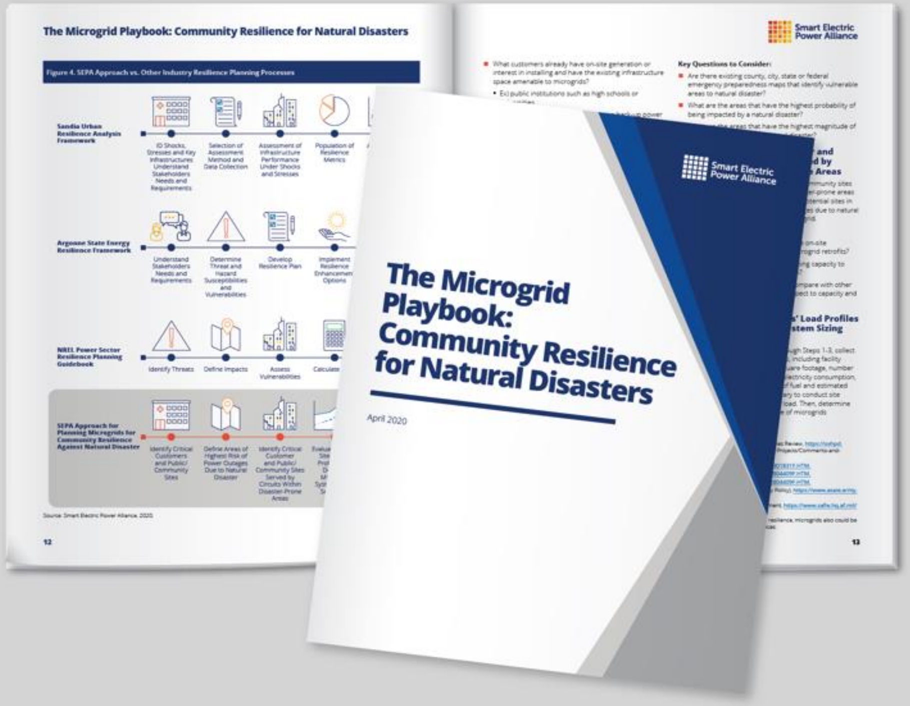

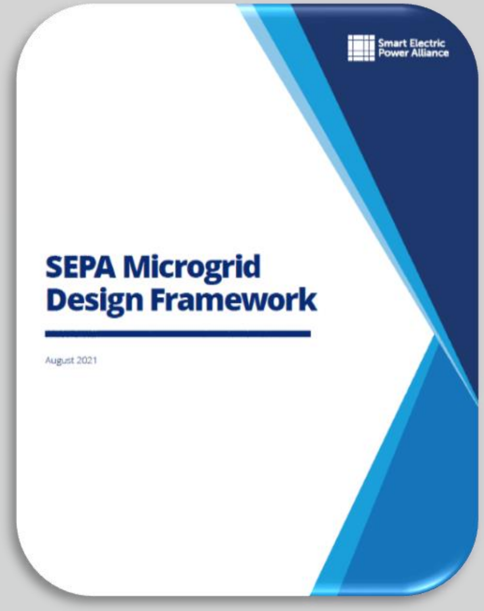

COMING SOON!

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Overview

Information in this presentation comes from The Microgrid Playbook: Community Resilience for Natural Disasters (published in April 2020) and the SEPA Microgrid Design Framework (to be published in Aug 2021)

As seen in California's wildfires, grid resilience is critical to maintaining vital services and structures. Many utilities are exploring microgrids as a great tool to ready the grid and its communities for natural disasters.

Defining Key Terms

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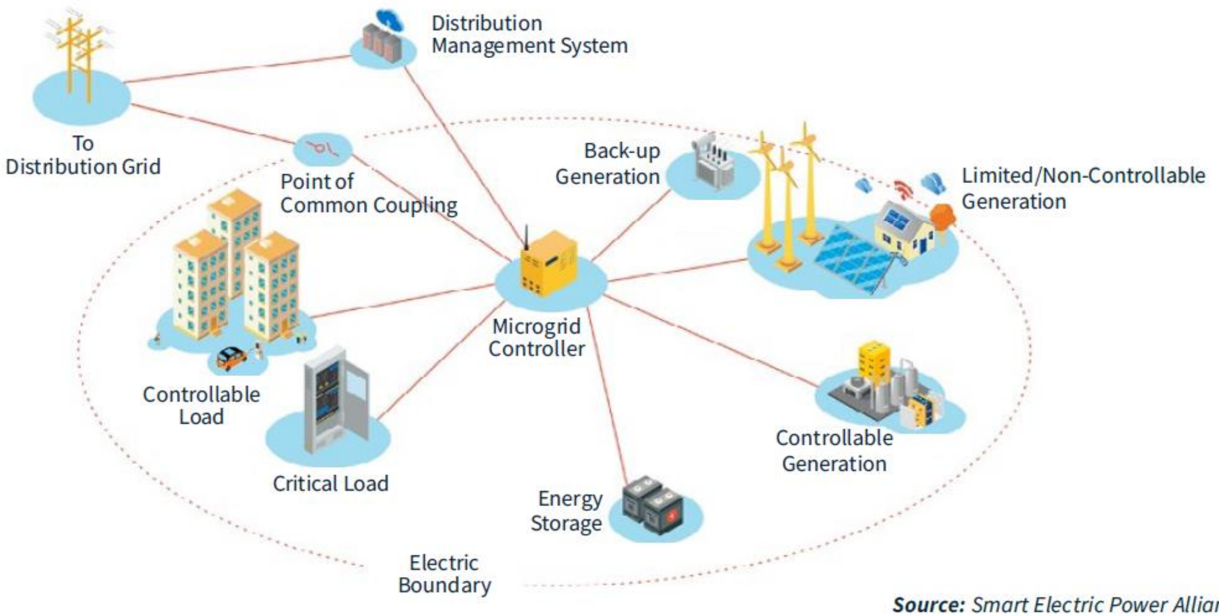
Microgrid

interconnected loads | distributed energy resources | defined electrical boundaries | single controllable entity | grid-connected or islanded mode

Resilience

resist | absorb | recover | adapt | change in conditions



Source: *Smart Electric Power Alliance, 2020*

Differing Perspectives on Value Proposition

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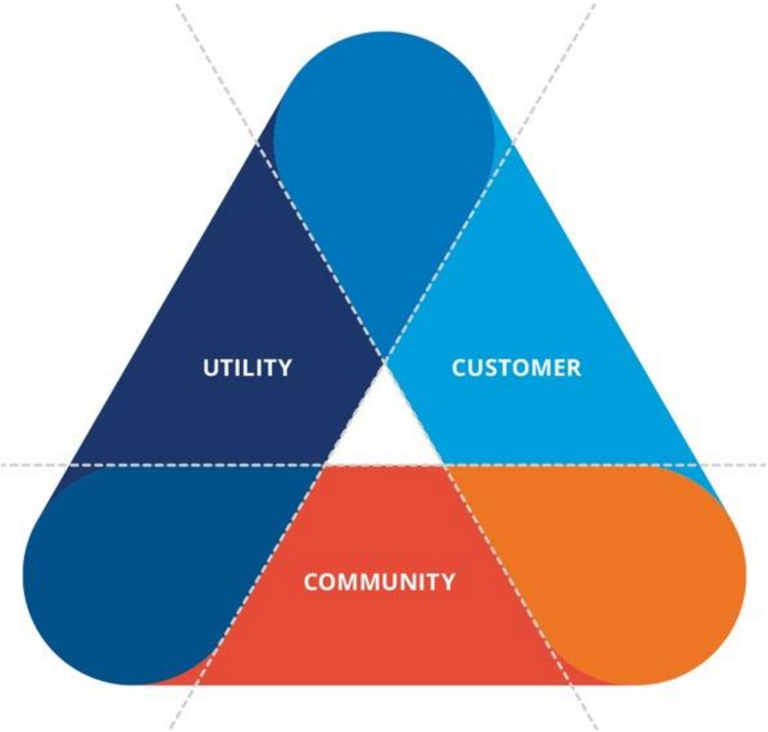
Reliability | continuity | lower consumption



National security | critical infrastructure | public institutions

Public health and safety | emergency preparedness

Sectors and Use Cases for Microgrids

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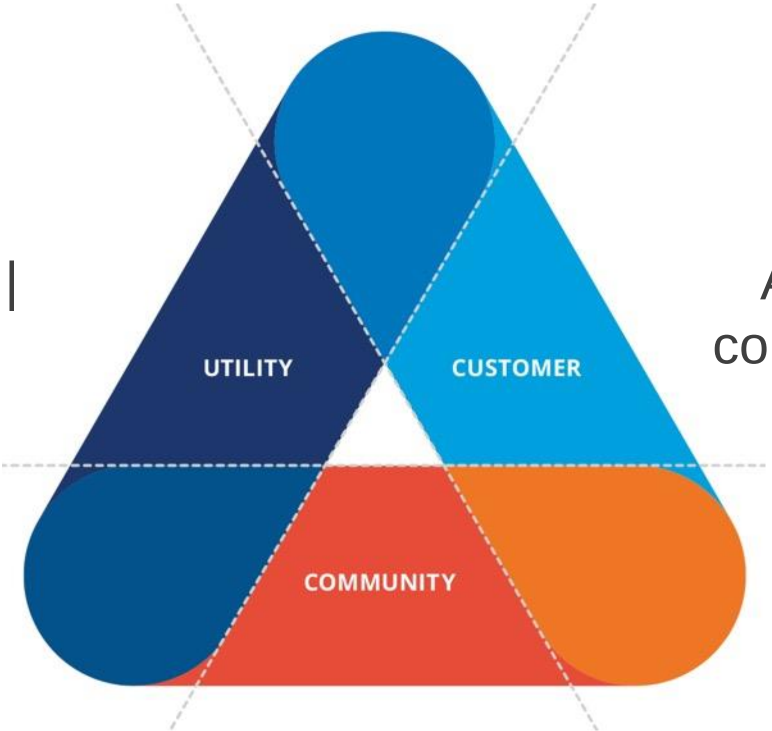
Utility operations | grid reliability | community resiliency



Agriculture | residential | industrial | commercial | higher education | military

Public safety | radio towers | public water | public institutions | healthcare

Strategies for Mitigating Earthquake Threat

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Microgrid Hardening:

- Onsite fuel storage and seismic rated equipment
- ASCE seismic standards
- Shock mount storage systems

Building Resilience:

- Address geotechnical siting concerns
- Structural and equipment seismic hardening

Strategies for Mitigating Hurricane Threat

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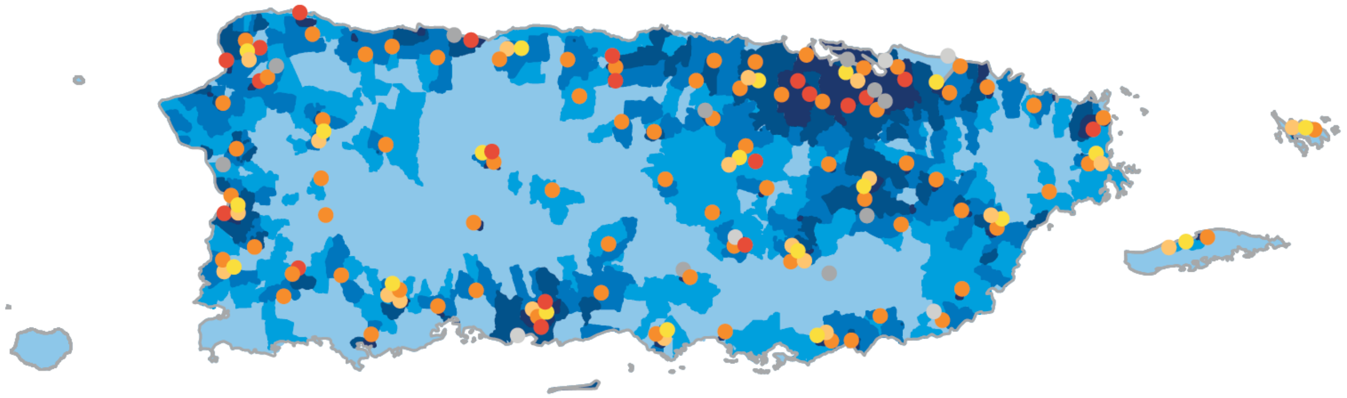


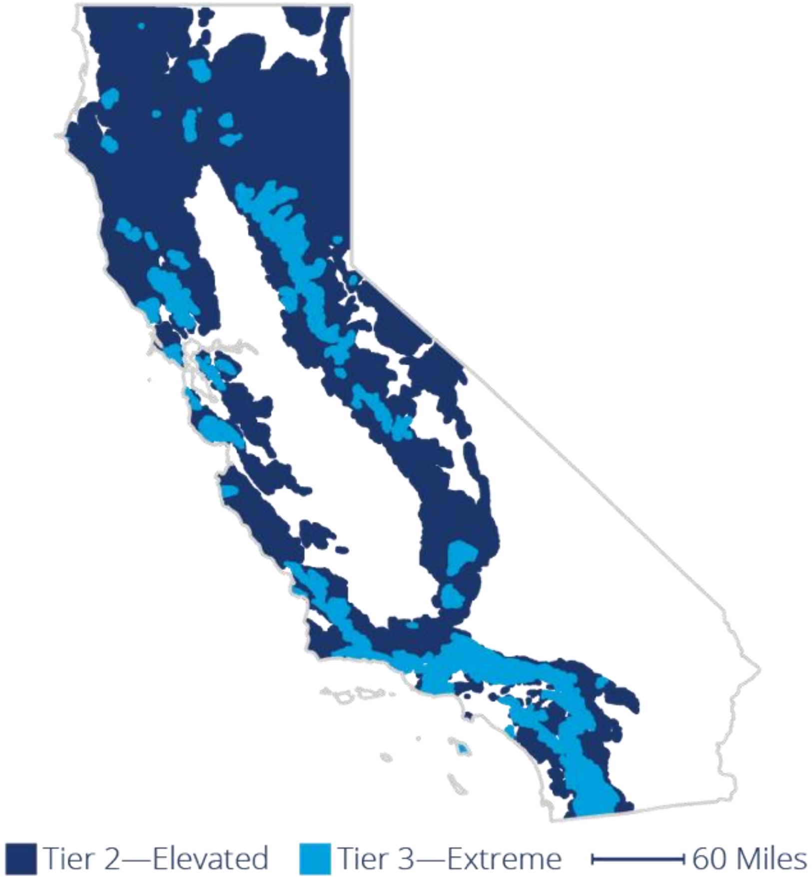
Microgrid Hardening:

- Choose low-risk, high elevation sites
- Use NEMA rate enclosures and ASCE rooftop load standards
- Use flexible solar racking and anchoring and store fuel onsite

Building Resilience:

- Design according to IBC provisions relating to wind, water, and impact damage
- Elevate structures to mitigate flood damage

Strategies for Mitigating WIldfireThreat

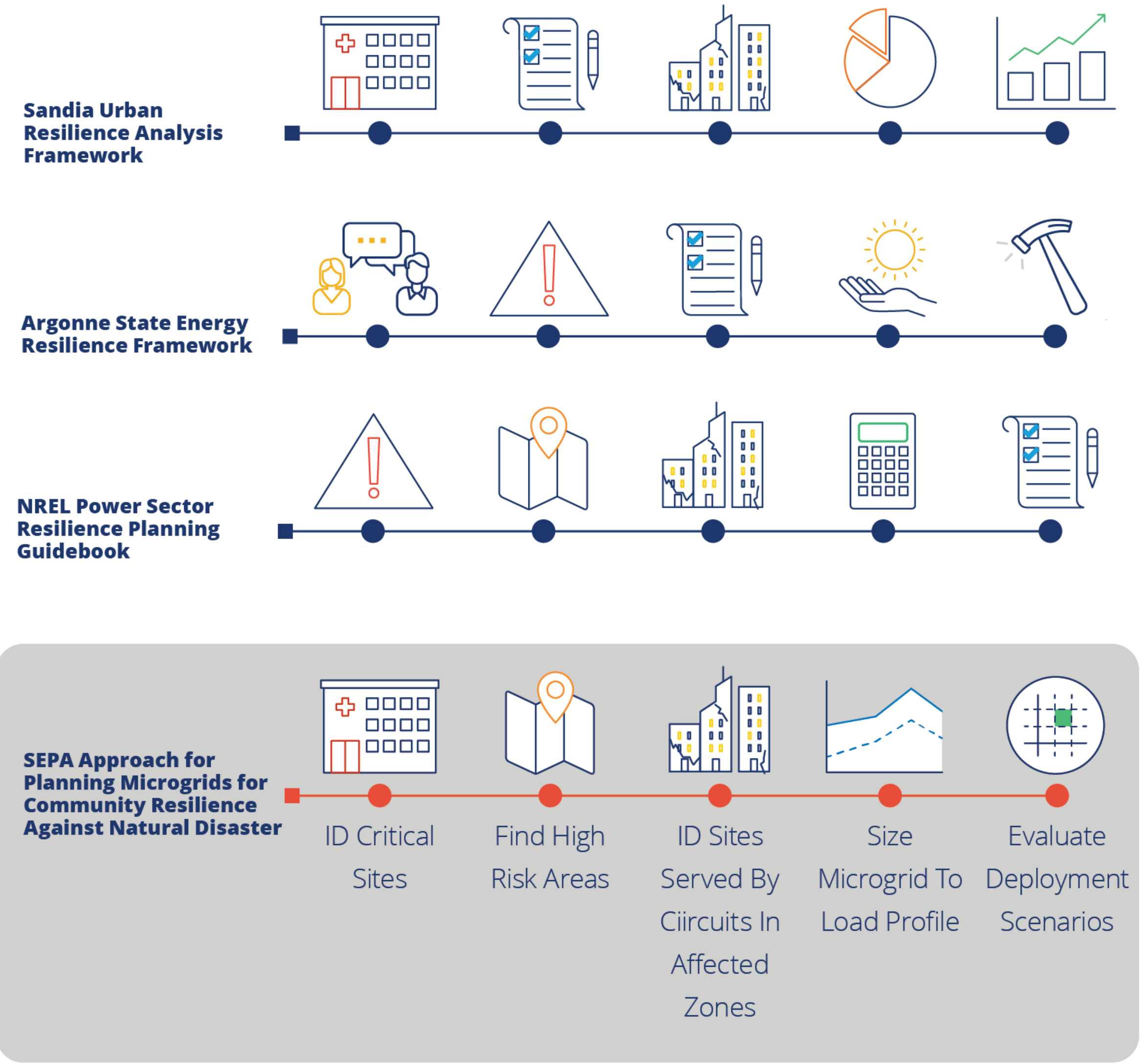


Microgrid Hardening:

- Bury electrical systems and facilities
- Store fuel for generators onsite
- Follow IBC and IWUIC codes for buildings
- Site solar and storage away from flammables and site with fire suppression systems

SEPA’s Five-Step Approach

A holistic, community-centric approach.



Step One: ID Critical Sites

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Examples:

Hospitals, correctional facilities, (waste)water treatment facilities, schools, fire, police, radio towers, evacuation and shelter sites.

Key Considerations:

- Which critical facilities and customer types are targets for microgrids?
- Which customers have or are interested in onsite generation?
- Which sites have space amenable to microgrids?
- Which customers and facilities get priority?

Step Two: Find High Risk Areas

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Examples:

Flood prone areas, high wind/dry vegetated areas, earthquake shock and liquefaction areas, etc.

Key Considerations:

- Are there public emergency preparedness maps to reference?
- What areas have the highest natural disaster impact risk?
- Where areas will face the harshest impact from a natural disaster?

Step Three: ID Sites Based on Siting Criteria

Tools:

Initial map and list of potential site-specific microgrid sites

Siting Criteria:

- Critical sites
- Natural disaster threats
- Reliability hotspots
- Energy burden and population density
- Geographic constraints
- Environmental justice and equity

Key Considerations:

- How many sites have onsite generation that can be retrofitted for microgrids?
- Does the local circuit have sufficient hosting capacity for interconnection?
- How do disaster-prone areas line up with capacity and reliability constraints?
- How do disaster-prone areas line up with

Step Four: Size Microgrid to Load Profile

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Tools:

- Preliminary microgrid design and modeling
- Low, moderate, and aggressive-renewable microgrid scenario systems sizing and cost estimations

Key Considerations:

- How much of the load profile should generation assets be sized for?
- How much generation can be renewable?
- What is the necessary size of the microgrid to meet the application?

Step Five: Develop Microgrid Deployment Strategy

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Examples:

- Site-specific microgrid installations at critical sites
- Regional community microgrid installations involving multiple critical sites in a cluster

Key Considerations:

- Are there clusters of critical sites that could be packaged together as a larger scale microgrid?
- What areas would benefit from site-specific microgrids versus regional microgrids with more than one critical site?

SEPA Microgrid Design Framework

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1. Identify roles and responsibilities and consider regulatory implications.
2. Understand the customer and analyze the site.
3. Collect and analyze energy consumption and load profile data.
4. Consider customer resiliency needs and screen for different solutions.
5. Consider economic factors that impact the customer and/or utility.
6. Identify potential microgrid services and operating modes.
7. Consider different fuel mix approaches.
8. Identify microgrid assets.
9. Determine the sizing and capacity of the microgrid
10. Conduct engineering and interconnection analysis.

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