RESILIENTPOWER

A project of CleanEnergyGroup

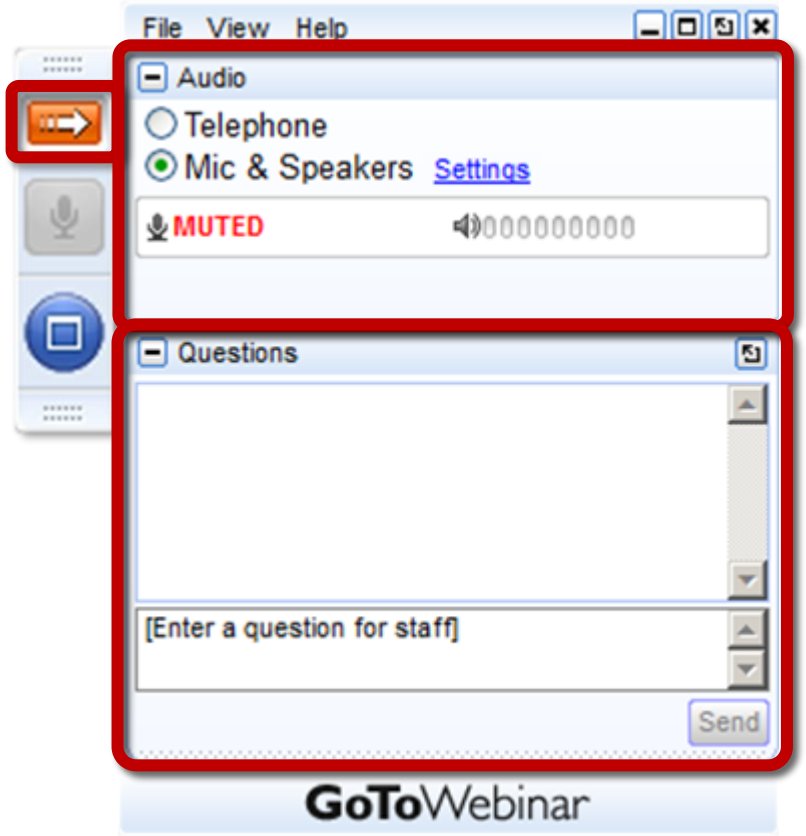
An Introduction to Community Resilience Hubs

CleanEnergyGroup

Innovation in Finance, Technology & Policy

June 16, 2021

WEBINAR LOGISTICS



Join audio:

- Choose Mic & Speakers to use VoIP
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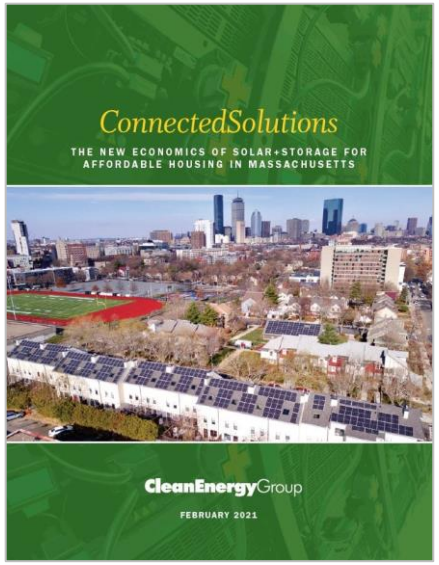
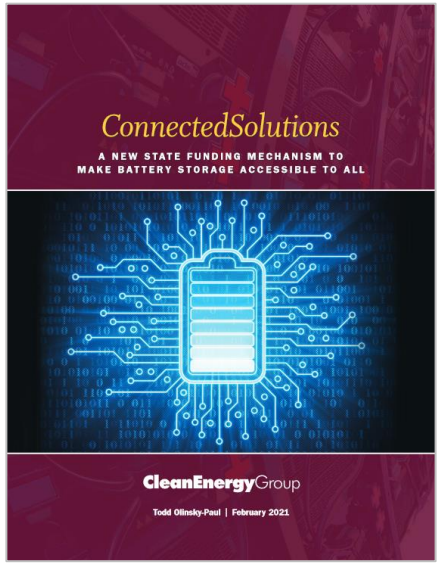
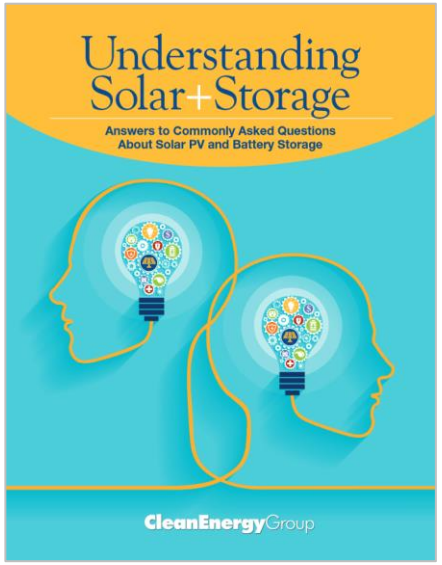
THE RESILIENT POWER PROJECT

- Increase public/private investment in clean, resilient power systems (solar+storage)
- Protect low-income and vulnerable communities, with a focus on affordable housing and critical public facilities
- Engage city, state and federal policy makers to develop supportive policies and programs
- Visit www.resilient-power.org for more information and resources







SUPPORTING 250+ PROJECTS ACROSS THE COUNTRY

Boulder: Nonprofit transportation center serving elderly and disabled residents

Boston: Multiple housing properties representing 1,000+ units of senior and affordable housing

DC: First solar+storage resilience center at affordable housing in DC

Puerto Rico: Supporting the installation of solar+storage at multiple community medical clinics

New Mexico: Added resilience for remote wildfire operations command center

WEBINAR SPEAKERS

Kristin Baja
Programs Director – Climate Resilience, Urban Sustainability Directors Network (USDN)

Seth Mullendore
Vice President, Clean Energy Group

Abbe Ramanan
Project Manager, Clean Energy Group

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SOLAR+STORAGE FOR ENERGY RESILIENCE

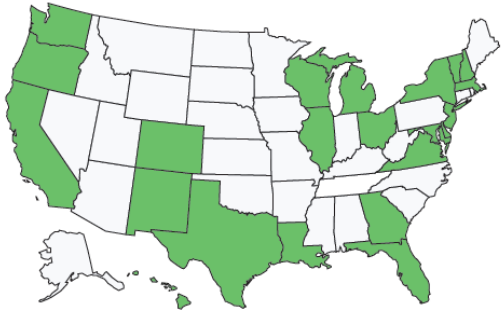
Seth Mullendore
Vice President
Clean Energy Group

THE **RESILIENT POWER PROJECT**

200-plus Community Facilities

The **Resilient Power Project** has advanced the exploration of resilient solar+storage for **247** community facilities in **89** low-income and underserved communities across **25** states and U.S. territories.

25 States and Territories

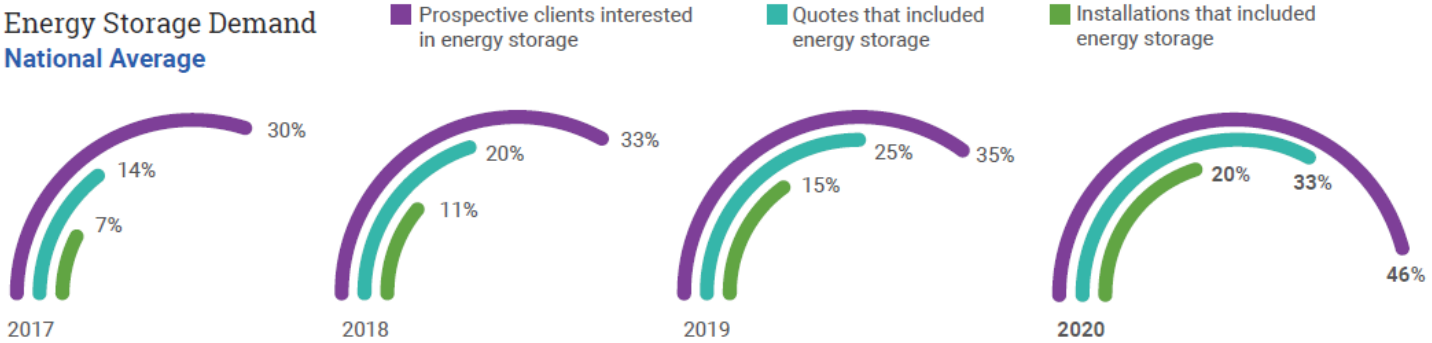


$850,000 in Grant Awards

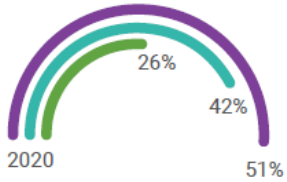
Clean Energy Group has awarded **80** technical assistance and capacity-building grants totaling **$850,000** to **48** local nonprofit organizations working to advance resilient solar+storage in their communities.

48 Local Nonprofits

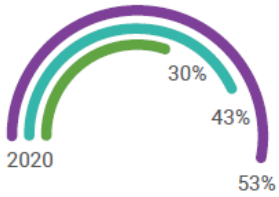
Energy Storage Demand
National Average



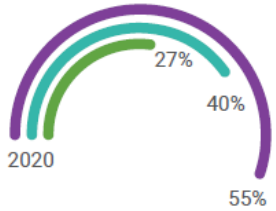
California



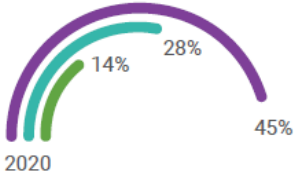
Florida



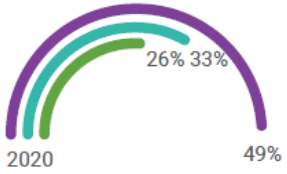
North Carolina



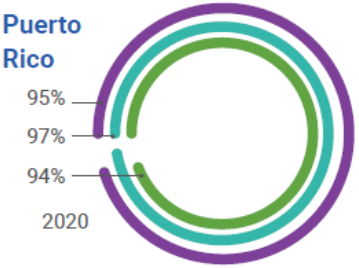
Texas



Arizona

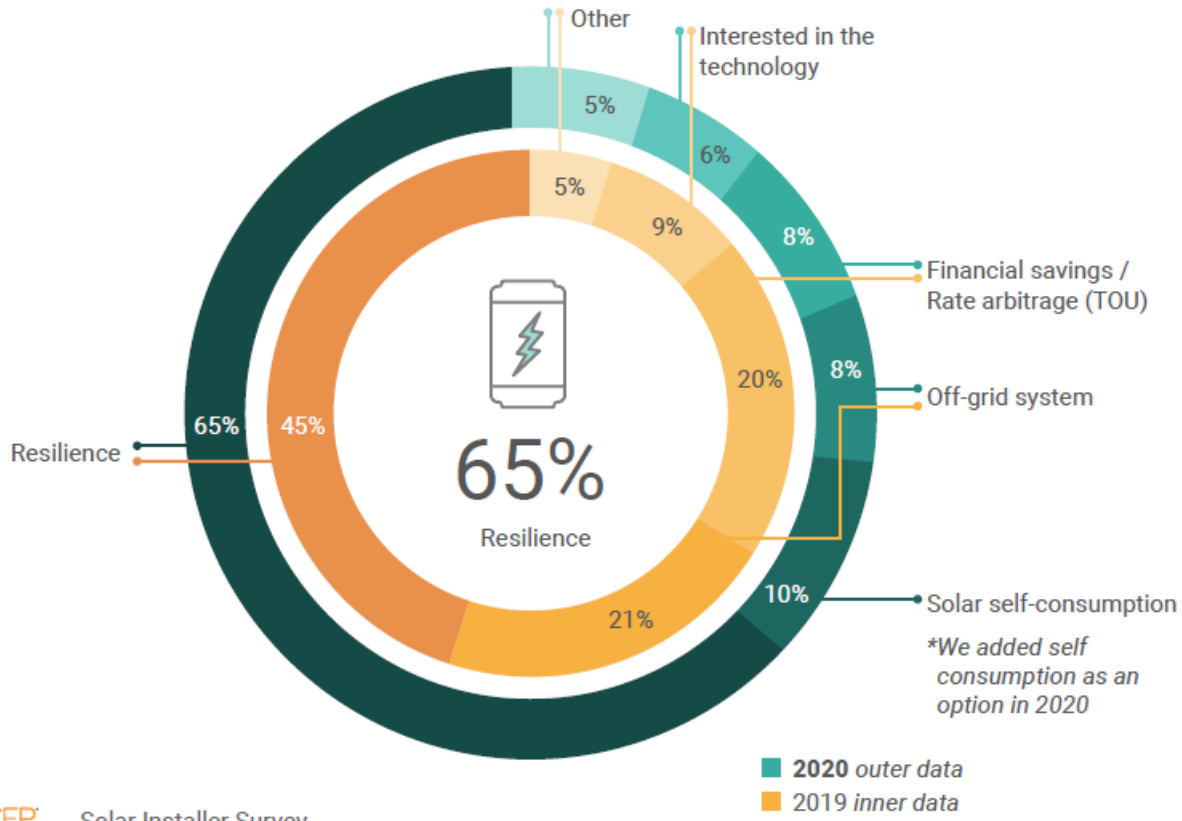


Puerto Rico



ENERGY STORAGE:

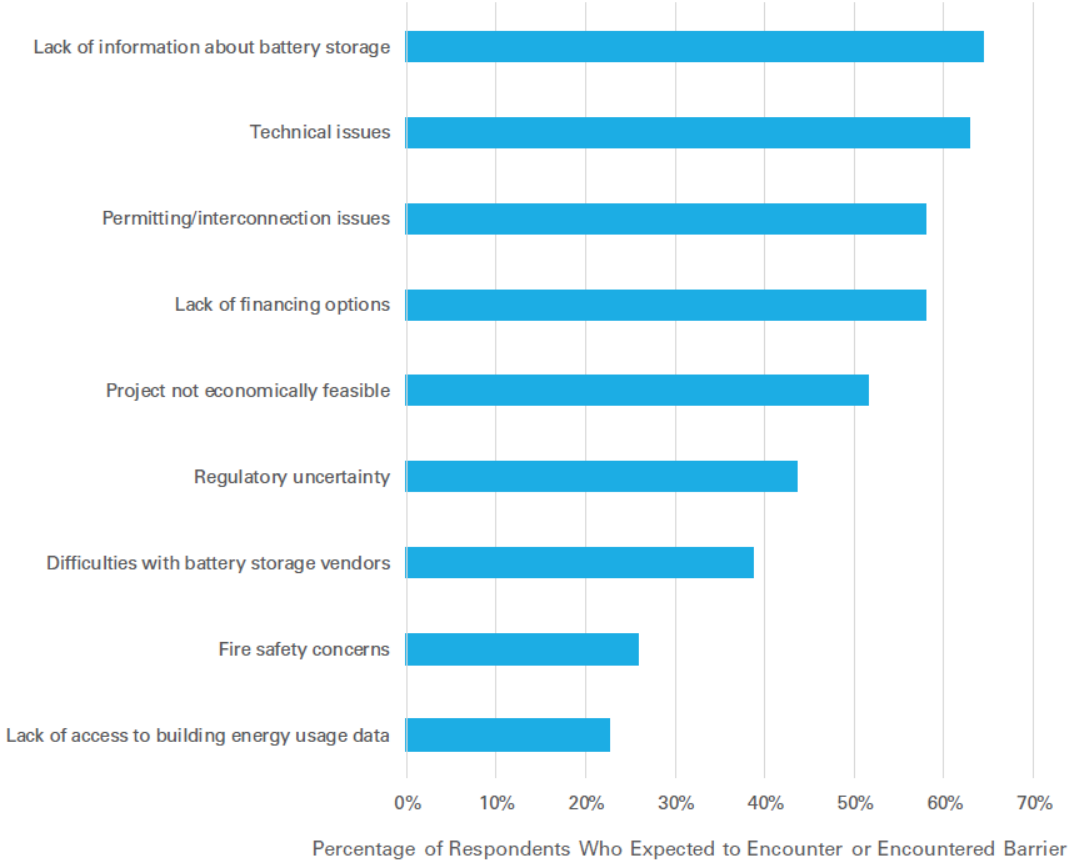
Primary Drivers and Barriers to Storage



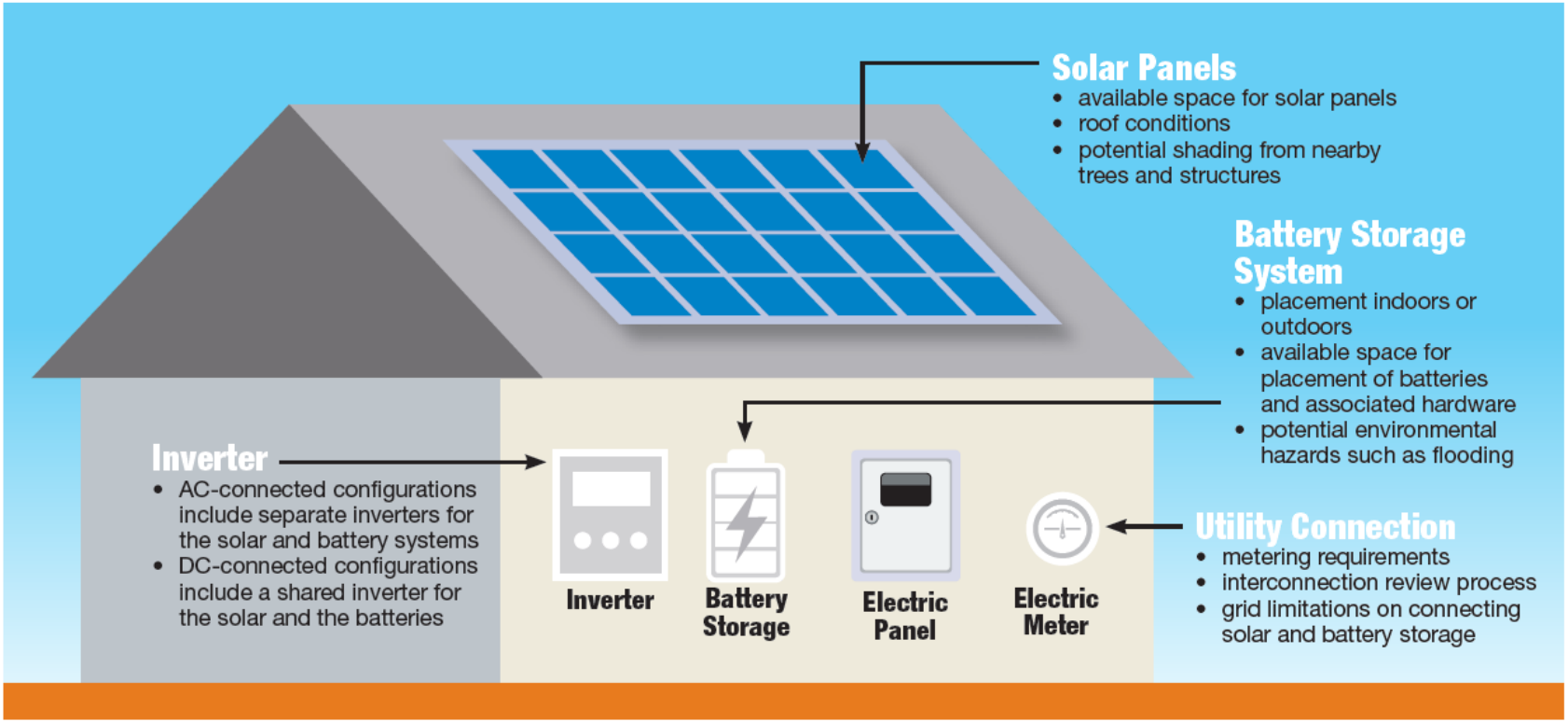
energysage NABCEP Solar Installer Survey

Barriers

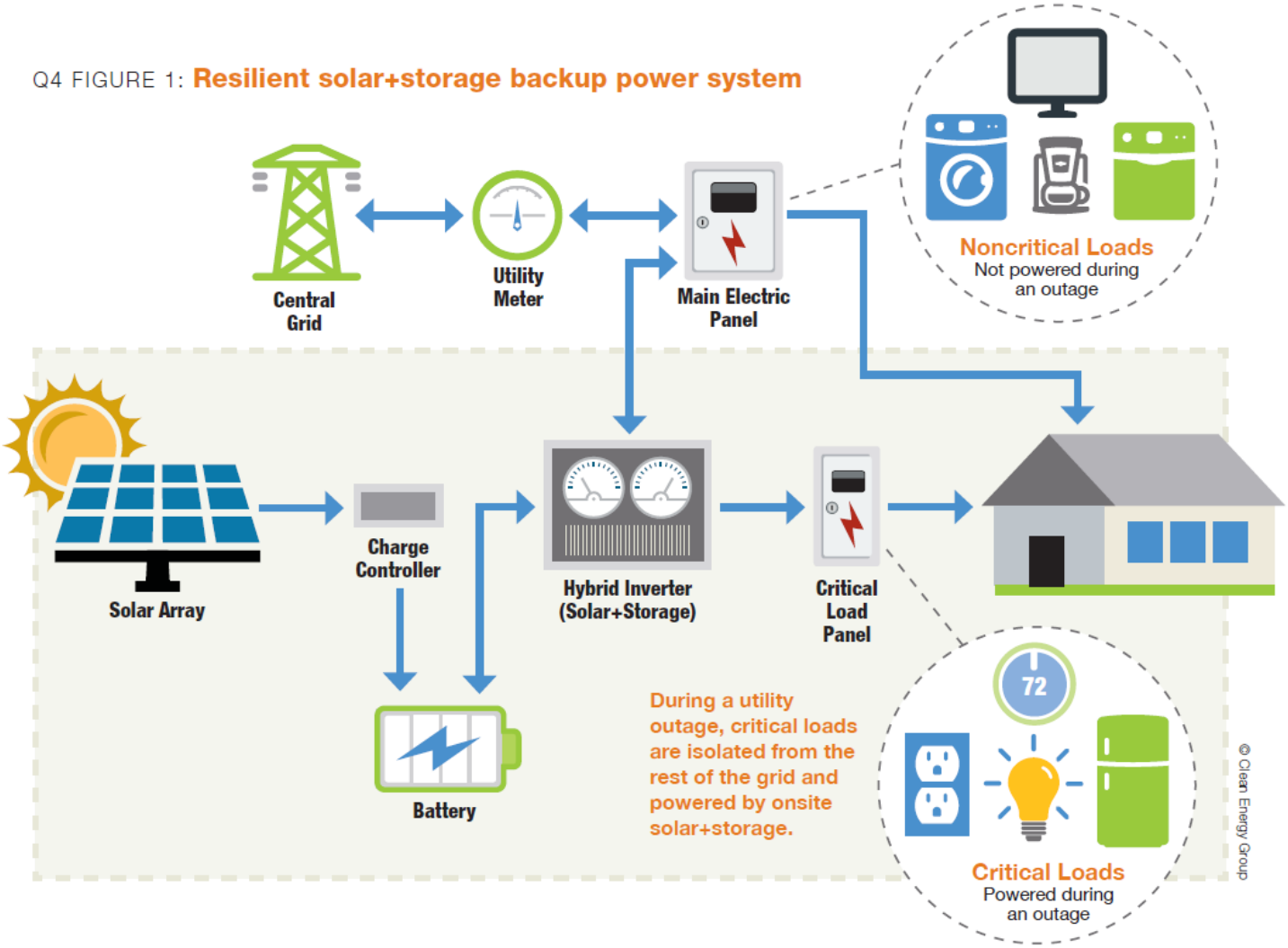
65% respondents either expected to encounter or had encountered a lack of information about battery storage, the highest percentage of all barriers. Technical issues ranked as a close second.



Q1 FIGURE 1: **Factors to consider when planning a solar+storage system**



Q4 FIGURE 1: **Resilient solar+storage backup power system**



Resilient Power Feasibility Analysis

CALIFORNIA INDIAN MUSEUM & CULTURAL CENTER

Weaving Native Culture Into The Future

AMERICAN MICROGRID SOLUTIONS

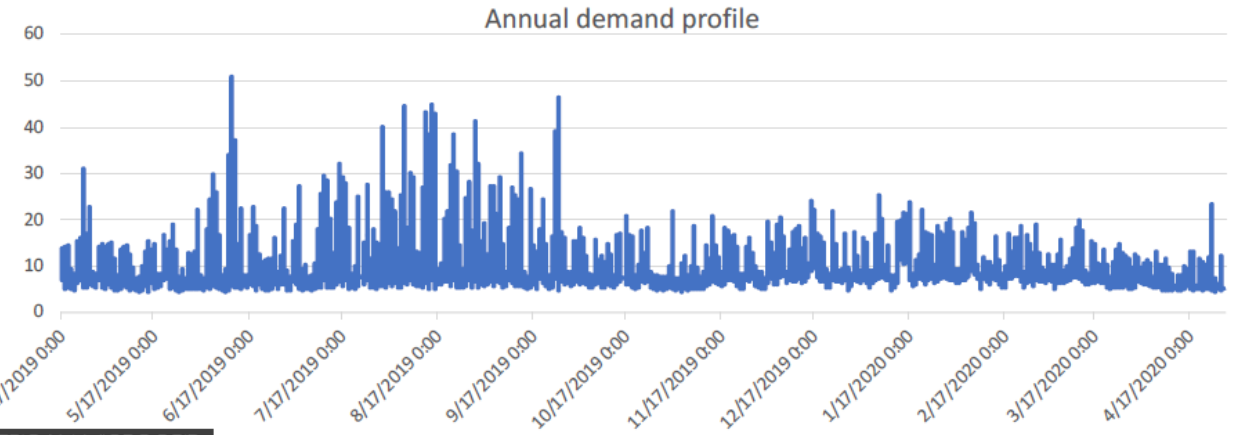
Utility

	Current rate tariff	New rate tariff as of March 2021
Electric Utility	Sonoma Clean Power / PG&E	Sonoma Clean Power / PG&E
Rate Tariff	A-1	B-1
Customer Charge	$0.82136 / meter / day	$0.82136 / meter / day
Energy	SCE: Summer: 0.10571 Winter: 0.06558 PG&E: Winter: 0.127 Summer: 0.147	SCE: Summer peak: 0.14955 Summer part-peak: 0.10032 Summer off-peak: 0.07951 Winter peak: 0.0943 Winter off-peak: 0.07818 Winter super off-peak: 0.06177 PG&E: Winter: 0.131 Spring: 0.131 Summer: 0.151
Demand Charge	N/A	N/A
Rate Escalation	2.5%	

PG&E stipulates all customers on rate tariff A-1 or A-6 will be transition to tariff B-1 starting March 2021; therefore, analysis assumes B-1 tariff

Load

	Primary Meter
Data	Interval data was available from mid-April 2019 to mid-April 2020
Usage	The following could affect the modeled demand profile: upgraded HVAC (reduce demand), opening up the adjacent warehouse (increase demand)
Annual usage	~77,700 kWh
Peak	51.2kW
Critical Load	Critical load assumed to be 100% for resilience analysis



Solar Assumptions

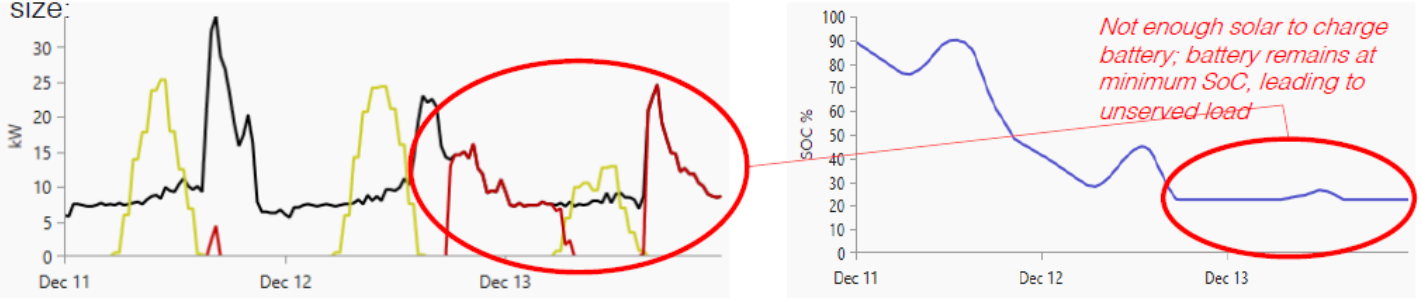
Type	Roof-mount
Turnkey Installation Cost	$3.00/watt
Maintenance Cost	$5.00/kW/yr.
Annual degradation	0.5%
Incentives	✓ Federal ITC 26% ✓ MACRS Depreciation 100% bonus ✓ MACRS CA State Depreciation
Design	SolarCraft PV design
Lifespan	25 years with inverter replacement between at year 16 at a cost of $150/kW
Design Approach	• AMS utilized the latest PV design from SolarCraft to evaluate the impact of different design solutions • AMS used assumptions regarding O&M, CAPEX, and degradation which may different from SolarCraft assumptions

	Rooftop
Capacity	74.25 kWp
Production (Y1)	97,171 kWh
% of total usage	100%+

Resilience

Critical load	100% of site load
Outage duration	72 hours
Target confidence interval	75%
Design consideration	Battery sizes, when paired with additional solar, will allow for operating in islanded mode for a longer period of time. However, during normal operation, larger systems may not pay off, and may actually detract from project returns.

Confidence interval: ensuring that at least 75% of time, do not see unmet load at particular storage size:



Results

	Economic Solar	Solar + Small Battery[1]	Resilient Power 1[2]
Solar	74.25	74.25	74.25
Storage	N/A	10kW / 26kWh	60kW / 360kWh
Financial			
Capital Cost	240,570	267,570	571,050
IRR	11.4%	10.7%	11%
$NPV_{@8\%}$	69,856	64,217	81,234
Simple Payback (years)	7.2	7.5	4.3
Offtaker Savings Y1	21,490	21,600	21,700
Sustainability			
Renewable Generation (kWh)	97,171	97,171	97,171
Resilience			
Resilience* (@100% critical load)	N/A	N/A	72 Hours

*Actual hours will vary by time of day, time of year, availability of solar for re-charge

[1]Assumes standard SGIP incentive of $350/kWh

[2]Assumes equity resilience SGIP incentive of up to $1000/kWh

MAYCROFT APARTMENTS

SOLAR: 64.2 kW
STORAGE: 56 kWh
RESILIENCE: Refrigeration, fans, microwave, lighting, TV, outlets

QUESTIONS ?

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Find us online:
www.resilient-power.org
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RESILIENCE HUBS

A Holistic Approach to Shifting Power to Communities

Kristin Baja (“Baja”)
Program Director, Climate Resilience
USDN

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WHO IS USDN

TRADITIONAL APPROACH

HISTORY


REJECT THE COOKIE CUTTER

RESILIENCE FOR HUBS

- Social Infrastructure
- Comprehensive
- Community centered
- Focused on shifting power and capacity to communities
- Self determination
- Health & Well-being

HOW & WHERE HUBS STARTED

RESILIENCE HUBS

Resilience Hubs are community- serving facilities augmented to support residents, coordinate communication, distribute resources and increase adaptive capacity while enhancing quality of life. They provide an opportunity to effectively work at the nexus of community resilience, emergency management, climate mitigation, and social equity while also providing opportunities for communities to become more self-determining, socially connected, and successful before, during, and after disruptions.

Kristin Baja @USDN

Resilient Services and Programming	Resilient Communications	Resilient Building and Landscape	Resilient Power Systems	Resilient Operations
The Hub has additional services and programs that build relationships, promote community preparedness, and improve residents' health and well-being. Examples: • Maker Space • How To Courses (ex. computers) • Job Trainings and Recruitment • Health Services	Building relationships and respect within the neighborhood (service area) year-round. Ensuring the ability to communicate within and outside the service area during disruptions. Examples: • CERT Training with extra section for proactive outreach • Radio • Translated Info	Strengthening the resilience of the facility to ensure that it meets operational goals in all conditions. Identify opportunities to utilize surrounding landscape for resilience benefits. Examples: • Air Filtration • Water Capture and reused • Weatherization • Earthquake-proof	Ensuring uninterrupted power to the facility during a hazard while also improving the cost-effectiveness and sustainability of operations in all three resilience modes. Examples: • Hybrid Power Solutions include battery-back up and generator • Solar Panels	Ensuring personnel and processes are in place to operate the facility year-round and also continue operating during disruption and recovery. Examples: • Site Leadership • Accessibility • Site Retrofits and Assigned Task Management

USDN RESILIENCE MODES

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Everyday (non disruption)	All infrastructure and services are available No major disruptions are present Primary focus is on community services and programming and relationship-building
Disruption	Disruption to normal everyday function for any duration. Disruptions can include natural disasters, health-disasters (pandemic) and human-influenced disruptions. Disruption can vary from minutes to months or years.
Short-term	Related to shocks or events that hit relatively quickly
Long-term	Related to disruptions that last longer and impact “everyday mode” such as global pandemic or war
Recovery	Process of returning to everyday mode. The aftermath of the disruption during which the community works to restore normal or better conditions. Can last days to years.


EVERYDAY MODE

DISRUPTION

RECOVERY

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PHASING IN OVER TIME

Baseline

What elements do we need for this site to transition from it's current use to a community 'Resilience Hub'

Optional

What elements does this site need in order to better meet community needs in all resilience modes?

Ideal

If we had all the money, capacity and support desired, what would your site have?

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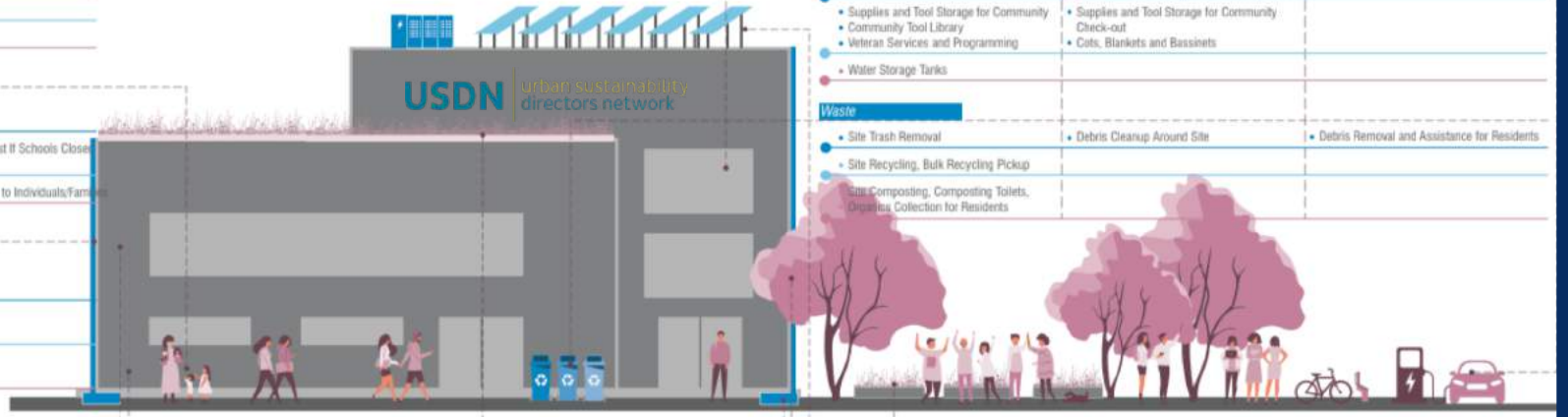
Resilience Hub

BASE
OPTIONAL
IDEAL



NORMAL FUNCTION	DURING DISRUPTION	RECOVERY FUNCTION
Health & Wellness		
• Fitness Opportunities • Showers + Restrooms • Health Screenings		
Medical		
• Mental Health Basic First AID • AED Supplies	• Mental Health Resources • Access to Basic First Aid and Medical Supplies	• Mental Health Resources • Distribution (Public Health Dept) of Meds Post-Event
• Needle Exchange, Vaccination - Flu, Etc.	• Hospital Personel Assigned to Site • Potassium Iodine Stockpile	
• Medical Advisory Services • Medical Centers "Adopt-A-Site"	• Triage for Disruption • Medical Professional onsite	
Food Services		
• Kitchen + Meal Prep Location • Storage Pantry	• Emergency Food Services/Meals Ready to Eat • Supplies for Making Food Onsite	
• Children's Food Services		
• Community Gardens and Greenhouses		
Child and Pet Care		
• Playground • Allegies Consideration		
• Before + After School Care • Dog Parks, Cat Cafes, Chicken Coops	• Child Care / Activities • Separate Space for Pets (Indoor and Outdoor)	• Child Care Post Event Assist If Schools Close
• Partnership with Shelter/Humane Society	• Therapy Animals	• Therapy Animals Assigned to Individuals/Families
Water		
• Potable Water Station	• Potable Water Filling Stations • Water Bottle Distribution • Ice Chests and Ice Distribution	
• Water Education • Water Reuse and Water Gardens	• Containers Provided for Water Collection	
• Onsite Water Filtration • Solar Hot Water	• Onsite Water Filtration • Solar Hot Water	

NORMAL FUNCTION	DURING DISRUPTION	RECOVERY FUNCTION
Transportation		
• EV Charging • Bike Classes • Car/Bike/Scooter/Ride Share • Transit Accessible	• Shuttles to the Hub • Evacuation Meet Up/Assistance • Shuttle to Shelter	• Shuttles to Supply & Service Centers
Accessibility		
• Accessible Elevator, Accessible Bathrooms, Gender Neutral, Hearing, Visual Impairment, EEAP-Evac Assistance Enrollment	• Clear Sites - Keep Accessible, Designated Rep to Clear Doses + Keep Ramps, Site Open, Backup Powere to Elevators	• Assistance For Hearing + Visually Impaired for Recovery, Design Improvements
Storage & Resources		
• Drinkable Water	• Potable Water and Water Bottle Storage • Food Storage • Baby Formula and Diaper Storage, Distribution	
• Supplies and Tool Storage for Community • Community Tool Library • Veteran Services and Programming	• Supplies and Tool Storage for Community Check-out • Cots, Blankets and Bassinets	
• Water Storage Tanks		
Waste		
• Site Trash Removal	• Debris Cleanup Around Site	• Debris Removal and Assistance for Residents
• Site Recycling, Bulk Recycling Pickup		
• Site Composting, Composting Toilets, Organics Collection for Residents		

NORMAL FUNCTION	DURING DISRUPTION	RECOVERY FUNCTION
Communications		
• Free Internet and Wifi/Computer Access • Monthly Meeting Location for Community	• Charging Stations • Door Knocking and Help/Safe Communications • Reverse 911 • Translation Services and Support	• Recovery Hub with Resources
• Radio and Media Access • HOA Meeting Location • Proactive "Open Space" Programming	• Police and Fire Collaboration • CERT Leaders Assigned to Blocks/Areas	
• Translation Services	• Radio and Media Communication and Support	
Education		
	• Mold Education	
• Flood Insurance - Why Buy Early? • CERT Training • Bike Service and Repair	• How to Fill Out Your Insurance Forms Properly • Stay Out of Standing Water	
• Programming for Elderly, Veterans, Children, and Other Special Interest Groups		

NORMAL FUNCTION	DURING DISRUPTION	RECOVERY FUNCTION
Stormwater Management / Green Infrastructure		
• Shade Trees		
• Permeable Pavers		
• Bioswales • Greenroofs		
Floodproofing and Flood Considerations		
• Shade Trees	• Backflow Prevention Devices	
• Seal Walks and Engineered Flood Vents		
• Waterproofing Site • Elevate Electrical and Mechanical Systems		

NORMAL FUNCTION	DURING DISRUPTION	RECOVERY FUNCTION
Energy		
• Weatherization • Energy Efficiency		
• Solar PV and Battery Backup • Passive Cooling	• Fuel Storage and Supply	
• Resilient HyRs • Energy Storage • Distributed Generation/Microgrid • Community Solar		

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RESILIENCE HUB WORKSHOP

Headers
Five Main Resilience Areas
Sub-headers in blue boxes

Three Modes
Identification of needs in Everyday, Disruption and Recovery

All Options
Identification for Baseline Optional Ideal

SERVICES & PROGRAMMING

What do Community Members need/want from the site?

Examples: Maker space, tool checkout, senior programs, youth specific, mental health support, proactive healthcare, computer access, job training, coordinate care, etc.

Proactive communication in all three modes.

- Relationship building
- Access to Wi-Fi & computers
- Site activation in disruption
- CERT Level 11 (USDN)
- Onsite connectivity
- Community connectivity

COMMUNICATIONS

Building- air filtration & air quality, heating & cooling, roof & windows, insulation, storage, etc.

Landscape- shade spaces, food generation (greenhouse), trauma and healing spaces, community gathering

BUILDING & LANDSCAPE

POWER SYSTEMS

Renewable Energy Systems:
Solar Panels and Heat Pumps

Battery Backup Systems:
Hybrid or full battery for entire site operations

Electrical Panel and Retrofits

Community Energy Benefits?

How will the site operate in all modes?

How will the site serve all users?

Management in all modes?

Examples- security, safety, interaction points, ADA accessibility, etc.

OPERATIONS

RESILIENT NEIGHBORHOODS

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- Multiple Hubs within Neighborhood or Area
- Specialize in specific elements (ex. services and programming) within the neighborhood
- Ideal for larger areas with multiple trusted sites (already exist)
- Connectivity and cohesiveness
- Connection to nature and nature-based solution integration
- Works at the Nexus of Equity, Resilience and GHG Mitigation

Return On Investment

- Economic Stability
- Public Health and Safety
- Job Training & Opportunities
- Social Equity
- Community Cohesion
- Green Space and Parks Connectivity
- Municipal Cost Savings
- Community Energy Cost Savings
- Resources & Materials
- Emergency Coordination
- Mental Health Benefits

MAKING THE CASE

Chronic under-investment

A legacy of discriminatory policies and practices have made low-income and communities of color more vulnerable to all types of impacts and disruptions.

Shift Power and Capacity to Communities

Can help reduce stress on systems and infrastructure such as public safety, hospitals and transportation while increasing community adaptive capacity.

Year-Round Holistic Approach

Resilience Hubs can become community cornerstones where neighbors come together to better understand one another, cooperate toward common goals and bolster the health of their shared community. They can also help expedite and improve logistics for support networks and other relief agencies in the event of a disruption by providing established and well-trusted sites where people can access relief materials and resources easily and efficiently.

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HUBS IN COVID TIME

1. **Community-based testing and vaccination sites.** Hubs are local by design and can provide free testing in a trusted space, minimizing public transportation and worry of health insurance or citizenship proof.
2. **Neighborhood Distribution Centers** that provide residents with access to healthy food, clean water, soap, and items such as toilet paper, antibacterial wipes, sanitizers, and medical supplies.
3. **Locations to coordinate childcare and meals** to ensure children have access to healthy food and clean water throughout the day, while supporting parents that still have to work.
4. **Organize virtual platforms** to connect neighborhoods, coordinate volunteers, and share response funds among individuals who lost jobs or small businesses forced to close. Communities are attempting this informally with mutual aid networks.
5. **Equity-centered proactive planning**, providing opportunities to anticipate what's next, while prioritizing the needs of those with the most risk and least resources – all the while supporting different language, ethnic and cultural differences.
6. **Provide redundancy.** Many systems we rely on to support physical distancing – power, water, internet, etc. – are intact in developed countries (less so in developing countries). In crises such as earthquakes or hurricanes, these systems are often undermined, creating a need for Hub-like backup.

https://news.trust.org/item/20200327105242-opnw2

USDN RESOURCES- WEBSITE

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WHAT?

Resilience Hubs are community-serving facilities augmented to support residents, coordinate communication, distribute resources, and reduce carbon pollution while enhancing quality of life. Hubs provide an opportunity to effectively work at the nexus of community resilience, emergency management, climate change mitigation, and social equity while providing opportunities for communities to become more self-determining, socially connected, and successful before, during, and after disruptions.

WHY?

Climate change is happening now. Due to a history of marginalization and disinvestment, people of color, immigrants, refugees, and lower-income populations experience increased exposure and sensitivity to climate hazards and a reduced capacity to adapt. Resilience Hubs are intended shift power to neighborhoods and residents, provide opportunities to address root causes of disproportionate exposure and sensitivity to climate impacts, and enhance communities' capacity to adapt.

HOW?

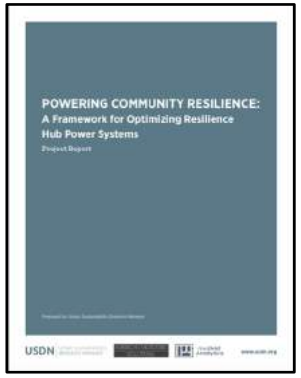
Resilience Hubs are flexible both in their application and design. Sites are as diverse as the communities they serve. Hubs typically require enhancements and upgrades that improve their capacity to provide service in all three operating conditions (everyday, disruption, and recovery). Upgrades can range in complexity and cost. This website and the *USDN Guide to Developing Resilience Hubs* provide guidance for developing a Resilience Hub in your community.

http://resilience-hub.org/

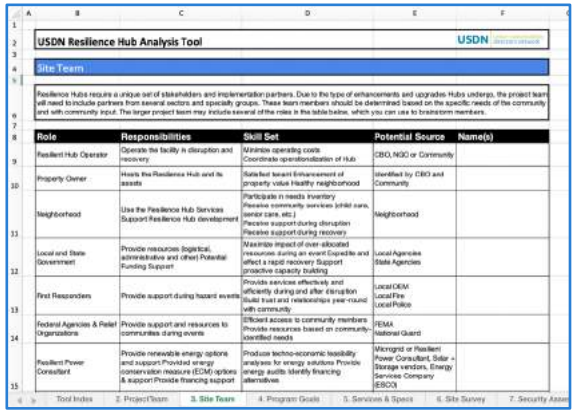
USDN RESOURCES

- Introduction to Hubs
- Simple and Easy to Understand
- Power Shifting and basic language as the focus

- Step-by-Step Guidance for Hub Development
- Steps align with Analysis Tool

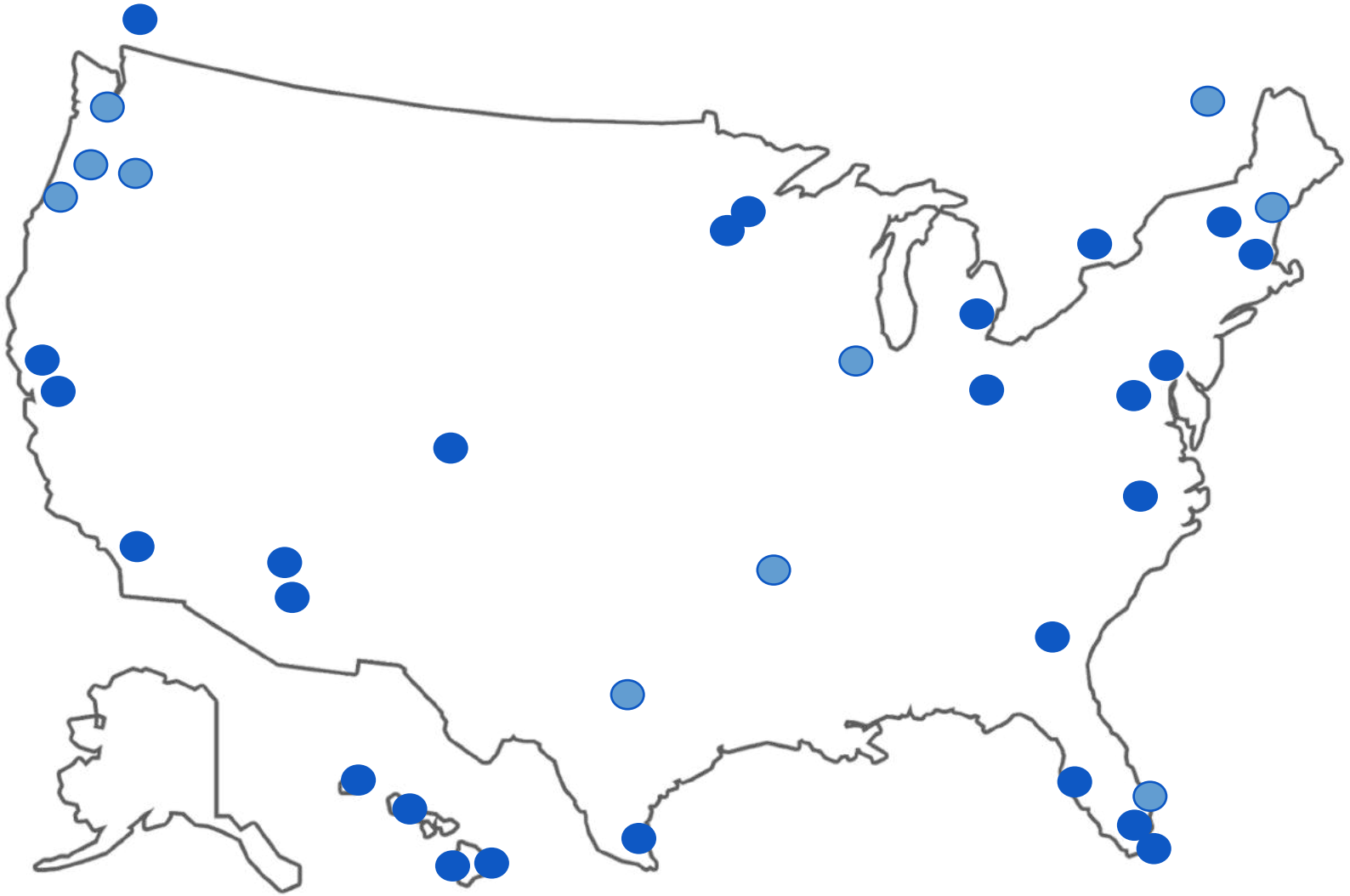


- Solar & Storage Framework
- Techno-Economic Feasibility Analysis
- Cost of energy
- Hybrid Solution



- Project & Site Team
- Program Goals
- Services & Specs
- Site Survey
- Security & Kitchen Assessments

USDN HUBS IN PROGRESS




FUNDING PUZZLE

CASCADING BENEFITS

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Thank you for attending our webinar

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