

# Resiliency Strategies – WebEx Informational Session

## SCE and Sandia National Labs Kickoff for ReNCAT/Social Burden Index Pilot Project

Grid Resiliency and Microgrids Team, Energy Division

July 26, 2023, 10:00 – 11:00 am



California Public  
Utilities Commission

# WebEx and Call-In Information

## Join by Computer:

<https://cpuc.webex.com/cpuc/j.php?MTID=m04e4e8c38fb65b4d74b481af039c2210>

Event Password: GRMG (case sensitive, 4764 from phone and video systems)

Meeting Number: 2484 003 9193

## Join by Phone:

- Please register using WebEx link to view phone number.  
(Staff recommends using your computer's audio if possible.)

## Notes:

- Today's presentations are available in the meeting invite (follow link above) and will be available shortly after the meeting on <https://www.cpuc.ca.gov/resiliencyandmicrogrids>.
- The presentation portion of this meeting will be recorded and posted on <https://www.cpuc.ca.gov/resiliencyandmicrogrids>.
- While one or more Commissioners and/or their staff may be present, no decisions will be made at this meeting.

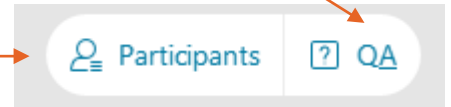
# WebEx Logistics

- All attendees are muted on entry by default.
- Questions can be asked verbally during Q&A segments using the “raise hand” function.
  - The host will unmute you during Q&A portions [and you will have a maximum of 2 minutes to ask your question].
  - Please lower your hand after you’ve asked your question by clicking on the “raise hand” again.
  - If you have another question, please “re-raise your hand” by clicking on the “raise hand” button twice.
- Questions can also be written in the Q&A box and will be answered verbally during Q&A segments.
- Closed Captioning can be turned on by clicking the “cc” button the lower left of your screen.

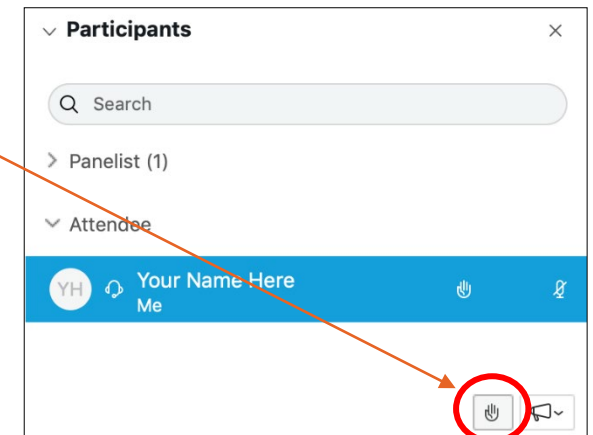
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**Access the written Q&A panel here**

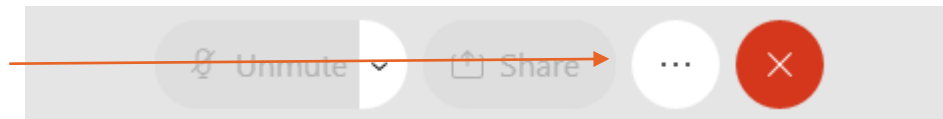


**2. Raise your hand by clicking the hand icon.**



**3. Lower it by clicking again.**

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# WebEx Event Materials

## Event Information: Resiliency and Microgrids Working Group Meeting


Registration is required to join this event. If you have not registered, please do so now. [English](#) : [San Francisco Time](#)

**Event status:** Not started ([Register](#))

**Date and time:** Tuesday, March 2, 2021 9:30 am  
Pacific Standard Time (San Francisco, GMT-08:00)  
[Change time zone](#)

**Duration:** 1 hour

**Description:**



**Event material:** [RMWG Meeting Material\\_EXAMPLE.docx](#) (31.7 KB)

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# Agenda

<b>I. Introduction (CPUC Staff)</b>	<b>10:00a – 10:05a</b>
• WebEx logistics, agenda review	
<b>II. Opening Remarks, Commissioner Shiroma</b>	<b>10:05a – 10:10a</b>
<b>III. Project Partnership Description (presented by Sandia and SCE)</b>	<b>10:10a – 10:15a</b>
<b>IV. Metrics Overview (presented by Sandia and SCE)</b>	<b>10:15a – 10:30a</b>
<b>V. Metric Integration (presented by Sandia)</b>	<b>10:30a – 10:35a</b>
<b>VI. Next Steps (presented by Sandia and SCE)</b>	<b>10:35a – 10:40a</b>
<b>VII. Q &amp; A and Discussion</b>	<b>10:40a – 10:55a</b>
<b>VIII. Closing Remarks, Adjourn (CPUC Staff)</b>	<b>10:55a – 11:00a</b>
• Provide information on the next meeting	

# Problem Statement: How can we optimize grid investments to maximize resiliency?

- The CPUC does not yet have an established definition or standard of resiliency that applies to grid planning and resource procurement processes.
- Furthermore, there is no established methodology for valuing resiliency as a grid service.
- Energy Division staff seeks to address these gaps by defining grid resiliency and developing a holistic and scalable problem-solving approach to building resilient grid infrastructure that could be applied to existing processes.
- Difference between **Quantifying** and **Valuing** resiliency:
  - ❖ Quantifying is to put numbers to the amount of risk reduction a given measure (or bundle of measures) achieves and the cost of that risk reduction, i.e., projects, events, and outcomes.
  - ❖ Valuing is to understand these numbers in terms of human impact, i.e., how much is the risk reduction worth relative to other solutions.

# Energy Division Workshop Series on Resiliency

- ✓ **May 10, 2022** - Interruption Cost Estimate (ICE) Calculator/Power Outage Economic Tool (POET)
- ✓ **July 7, 2022** – Sandia National Labs – Resiliency Node Cluster Analysis Tool (ReNCAT) and the Social Burden Index
- ✓ **May 10, 2023** – Lumen Energy Strategies (CEC EPIC funded) – 1<sup>st</sup> of 3 workshops – Resiliency Standards: Definitions
- ❑ **July 26, 2023** – SCE/Sandia (DOE funded) Kickoff ReNCAT project ← **today's event**
- ❑ **August 2023 (TBD)** – LBNL (DOE funded) – Final Reporting on Data Schema Pilot project
- ❑ **September 2023 (TBD)** – Lumen Energy Strategies (CEC EPIC funded) – 2<sup>nd</sup> of 3 workshops – Resiliency Metrics
- ❑ **October 2023 (TBD)** – SDG&E and SRJC use case demonstration of 4-Pillar Methodology
- ❑ **November 2023 (TBD)** – Lumen Energy Strategies (CEC EPIC funded) – 3<sup>rd</sup> of 3 workshops – Resiliency Methodologies
- ❑ **November 2023 (TBD)** – SCE/Sandia (DOE funded) ReNCAT project Phase 1 results



Exceptional service in the national interest

# Sandia's Social Burden and Southern California Edison's Community Resilience Metric

Microgrids Proceeding – Track 5 Value of Resiliency : Economic and Equity Impacts of Large Disruptions – Social Burden Index

**Sandia:** Olga Hart, Amanda Wachtel, Darryl Melander

**SCE:** Anna Brockway, Martin Blagaich

July 26, 2023 10:00 AM – 11:00 PM



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# AGENDA

## **Project Partnership**

Motivation and Purpose

Project Scope

## **Metrics Overview**

The Social Burden Metric

Community Resilience Metric

## **Metric Integration**

**Q&A**

The graphic features a central dark blue diamond with the text "Project Partnership" in white. This diamond is surrounded by a white border and is flanked by two diagonal lines that cross at the center. Each line is composed of several colored segments: cyan, purple, orange, green, and dark blue. The background is white with faint, light blue abstract shapes.

# Project Partnership



# Developing an Equitable Energy Resilience Metric for Energy Resilience Planning in California

- Sandia National Laboratories (Sandia), Southern California Edison (SCE), and the California Public Utilities Commission (CPUC) are investigating **how utilities could consider resiliency needs within current infrastructure investment planning**
- Sandia, SCE, and CPUC are teaming on a project to **test the use of Sandia's *Social Burden metric in California*** as a pilot metric reflecting equity considerations for energy resilience planning

## Expected outcomes:

- ✓ Identifying use cases for the metric
- ✓ Documenting benefits and drawbacks
- ✓ Understanding use case applications

## Potential use cases:

- ✓ Informing IOUs during the grid planning process
- ✓ Informing stakeholders about project prioritization
- ✓ Allowing the CPUC to assess regulatory considerations that include ESJ Action Plan items



# Developing an Equitable Energy Resilience Metric for Energy Resilience Planning in California

## In Scope:

- ✓ *Many dimensions and considerations in energy planning: this project considers **resilience and equity***
- ✓ ***Informing** decision making*

## Out of Scope:

- × **Other facets of energy planning**, including but not limited to, rate affordability and decarbonization
- × **Making** investment decisions

The graphic features a central dark blue diamond shape with the text "Metrics Overview" in white. This diamond is surrounded by a white border and is set against a background of two diagonal lines that intersect at the center. These lines are composed of several colored segments: teal, purple, orange, green, and dark blue. The overall design is clean and modern, with a focus on geometric shapes and a vibrant color palette.

# Metrics Overview

***Sandia's Social  
Burden Metric***

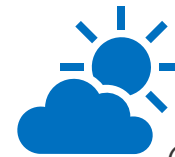






# Social Burden: measuring critical service availability and accessibility and prioritizing resilience investments to mitigate disproportionate harm from outages

Social Burden is a measure of: **equity** in service availability vs baseline capacity; **resilience** to disruption in service access



**"Blue Sky" Scenario:**  
Grid Powered,  
All Available  
Facilities  
"ONLINE"



**"Black Sky" Scenario:**  
Grid Outage,  
Some/All  
Facilities  
"OFFLINE"





# Sandia's Social Burden Metric: a Function of Effort and Ability

## Social Burden Metric

We can begin to estimate burden by comparing effort to ability:

### Effort

~Distance

*Q: How far must I travel to reach nearest supply point?*

**VS.**

### Ability

~Service Availability

*Q: What amount/quality is available?*

~ Baseline Capacity of the Population

*Q: How equipped am I to spend money, time, and energy in search of the service?*

Sandia's Social Burden metric goes beyond one service (e.g., USDA food deserts):

- Looks at the full suite of critical services
- Total burden can be combined or disaggregated spatially or by category

The metric provides a way to quantify, compare, and make decisions





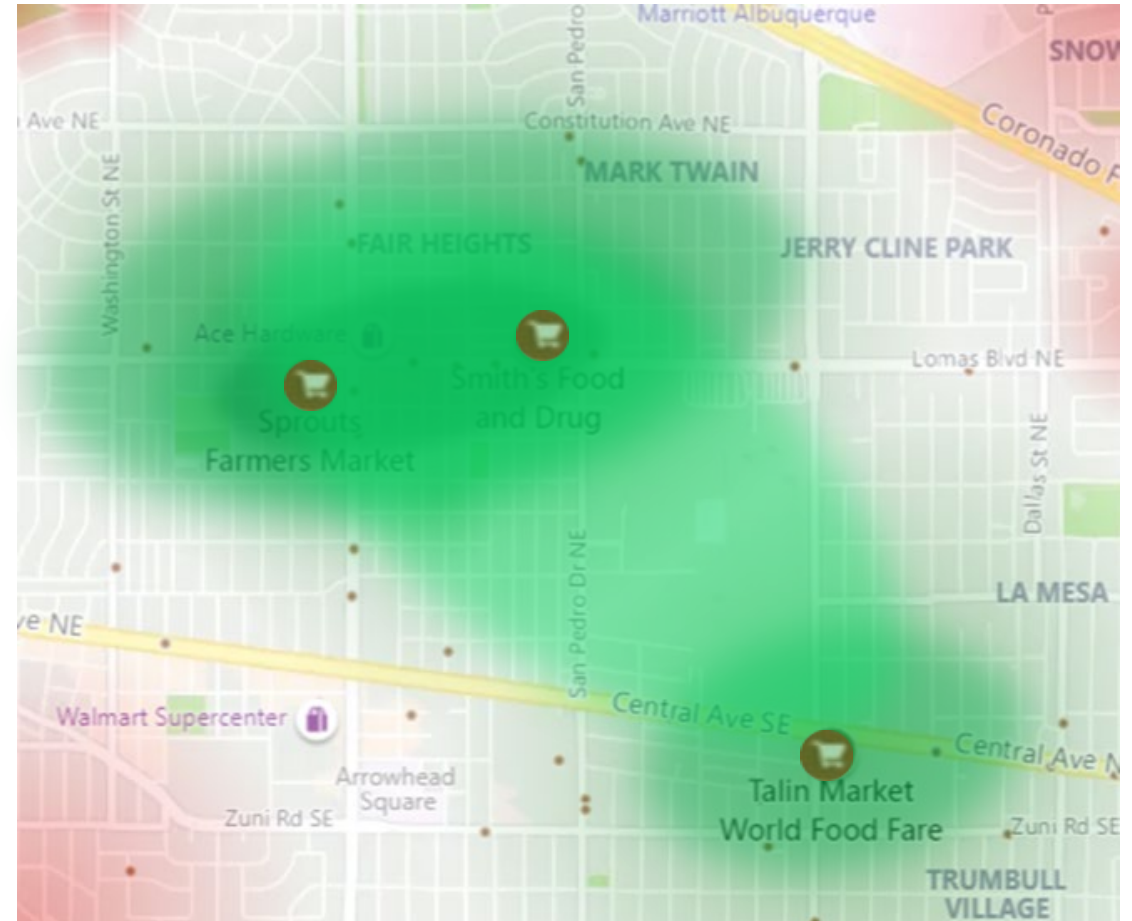
# Social Burden Explained

Burden to acquire a service:

- Increases with distance to facilities
- Decreases with additional facilities (diminishing returns, non-linear)
- Decreases with ability (typically average household income)

Burden aggregation:

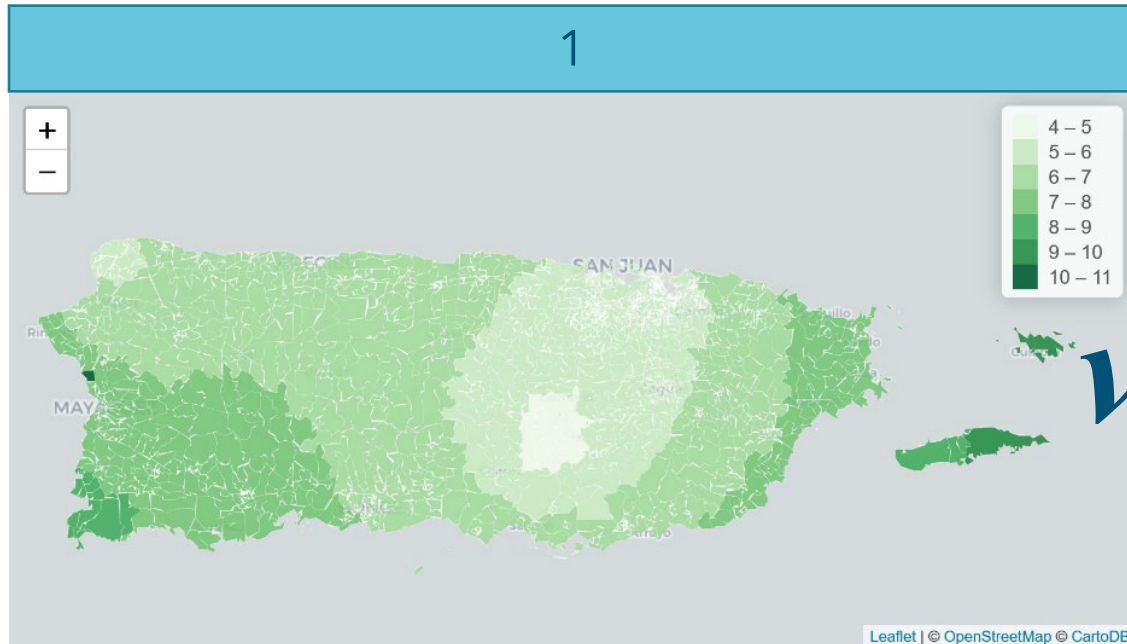
- Per-service burden calculated for each population block
- Burden summed across blocks
- Total burden summed across services



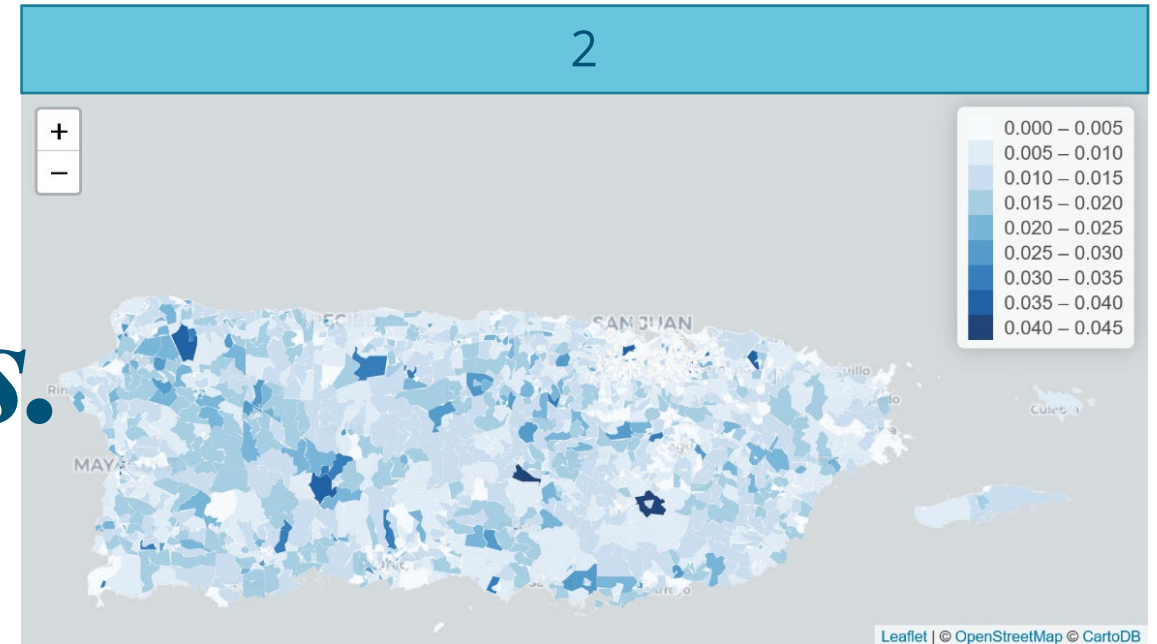


# The Impact of Including Social Burden in Planning for Equitable Distribution of Infrastructure Services

By considering the population's ability to acquire services and the available infrastructure's ability to provide those services, Social Burden uncovers a much more complex map of need [2] than looking at distance alone might suggest [1]. *See example application in Puerto Rico:*



Making resilience investments based on effort (distance) can provide **equal** access to critical services and enhanced resilience



Making resilience investments based on Social Burden can provide **equitable** access to critical services and enhanced resilience

vs.



## Key Attributes of the Social Burden Metric

Attributes of Sandia's Social Burden Metric implementation:

- Spatially-explicit;
- Consistent;
- Adaptable;
- Community-input oriented;
- Scalable.

# SCE's Community Resilience Metric (CRM)

Social Burden Index - SCE and Sandia National Labs ReNCAT Pilot Project Kickoff

July 26, 2023



# SCE's Climate Adaptation and Vulnerability Assessment (CAVA)

- California's first CAVA, filed on May 13, 2022



- Developed **equity tools** in consultation with communities to help determine *where* adaptations need to be prioritized and *what* adaptations we would utilize
- Near-term climate adaptation measures are requested in recently-filed 2025-2028 General Rate Case

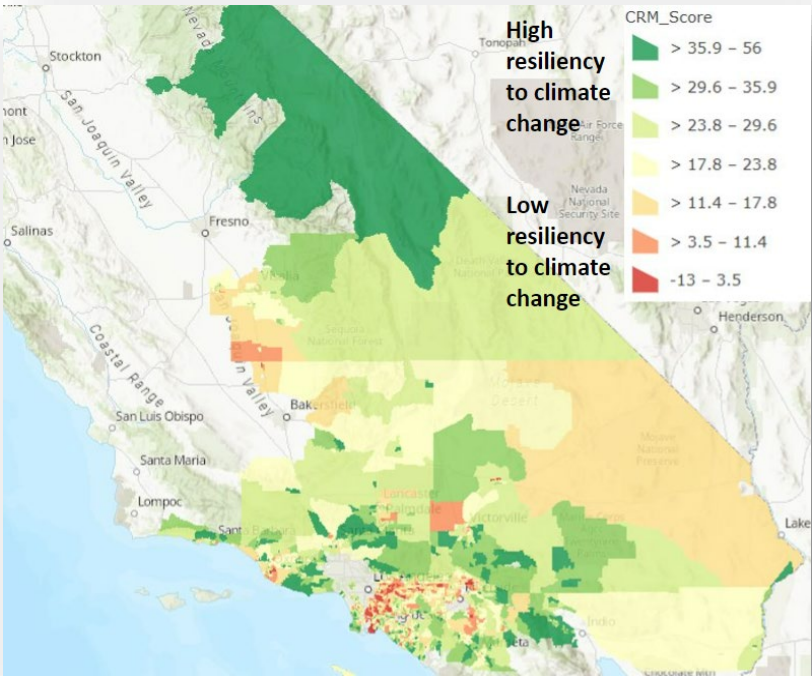
- For CAVA, CPUC directed SCE to:
- Analyze how to promote equity
  - Consult Disadvantaged and Vulnerable Communities (DVCs) in determining levels of adaptive capacity
  - Allow Community Based Organizations (CBOs) and DVC members to participate in the vulnerability assessment

SCE utilized opportunity to develop unique methods to best meet CAVA goals



Two equity metrics formalized to pilot prioritization and adaptation impacts for communities

### Community Resilience Metric (CRM)



A set of scores measuring the sensitivity and corresponding adaptive capacity of a particular community to potential loss of utility service

### Community Impact Metric (CIM)

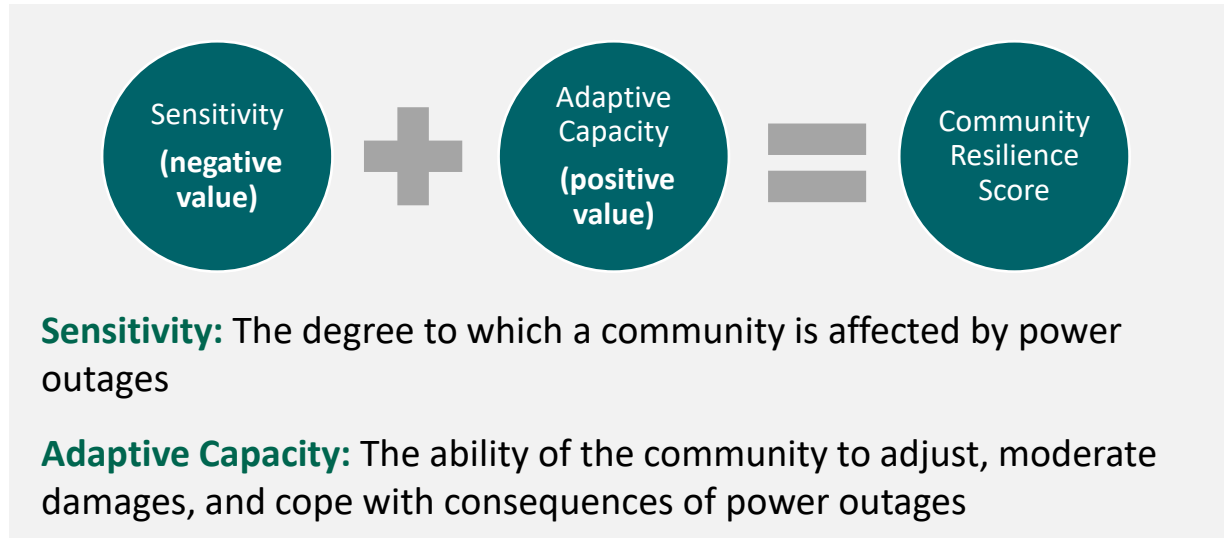
CIM Metric	Community Burdens	DVC Cost / Benefit Ratio	Interrupted Elec. Service Resolution	Non-Reliability Public Benefit	Local Employment Impact
Adaptation Option 1	Red square	Green square	Green square	Yellow square	Green square
Adaptation Option 2	Yellow square	Green square	Yellow square	Green square	Green square

Set of indicators measuring the positive, negative or neutral effect of an adaptation action on the community it is deployed in

# Community Resilience Metric (CRM):

Where do we build adaptations first?

**Prioritizes** the timing/order of adaptations based on socioeconomic indicators that approximate a **community's resilience to power outages**



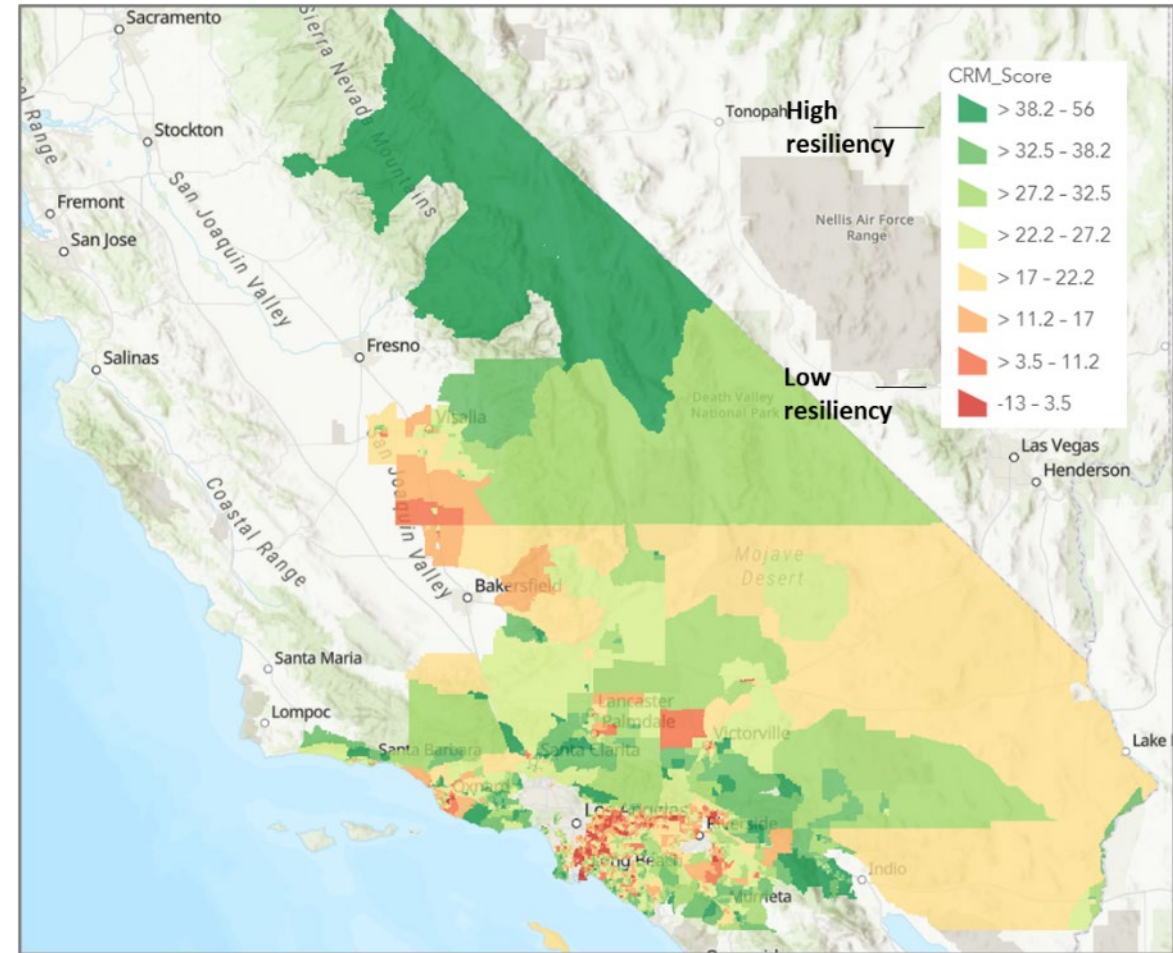
Example:

There is a heat wave in my neighborhood.

I am elderly, however, my community has organized a program to transport residents to Cooling Centers

Sensitivity

Adaptive Capacity



Assigns a score to each census tract based on 12 indicators of Adaptive Capacity and 25 indicators of Sensitivity



# Community Resilience Metric Methodology

- Indicators are equally weighted within each domain and combined to get final scores
- Data pulled from California’s Healthy Places Index, CalEnviroScreen, and the U.S. Census
- Factors, weighting, and results were reviewed with community leadership groups and communities through surveys

		Sensitivity Indicators			
		Built Environment	Health	Housing	Socio-Economic
Domain Groupings	Indicators	CalEnviroScreen Pollution Burden*	Asthma	Group Quarters	Educational Attainment
		Noise Pollution	Cardiovascular Disease	Housing Burden	Elderly Living Alone
			Children	Housing Quality	Foreign Born
			Diabetes	Mobile Homes	Linguistic Isolation
			Disability	Renters	Outdoor Workers
			Health Insurance		Poverty
			Medical Baseline		Race/Ethnicity
					Rural Communities
					Single Female Head of Household
					Tribal and Indigenous
					Unemployment


Adaptive Capacity Indicators			
Community Built Environment	Governance and Services	Individual Built Environment	Transportation
Permeable Surface Cover	Cooling Centers	Air Conditioning	Transit Access
Tree Canopy/ Green Space	Emergency Services/ Responders	Telecommunications Access	Vehicle Access
	Medical Facilities		
	Planning Level		
	Supermarket Access		
	Voters		

Ability score is meant to represent how difficult it is to reach available services and deal with sudden changes in the environment.

The CRM is a useful proxy for ability score as it captures underlying characteristics that represent population wellbeing and dimensions that income alone cannot capture.

\*The Built Environment domain under Sensitivity is the only domain for which all indicators are not weighted equally. The CalEnviroScreen Pollution Burden score is weighted as 12/13 while the Noise Pollution score is weighted as 1/13. This is due to the fact that the CalEnviroScreen score is a weighted value representing 12 relevant pollutants.



The graphic features a central dark blue diamond with the text 'Metric Integration' in white. This diamond is surrounded by a white border and is flanked by two diagonal lines that cross at the center. Each of these lines is composed of several colored segments: cyan, purple, orange, green, and dark blue. The background is white with a faint, light blue grid pattern.

# Metric Integration



## Existing Social Burden Formulation: Generic Definition

***Social Burden =***

***Effort to Obtain Service***<sub>people, services</sub>

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***Service Levels***<sub>facilities, services</sub> × ***Baseline Capacity***<sub>people</sub>

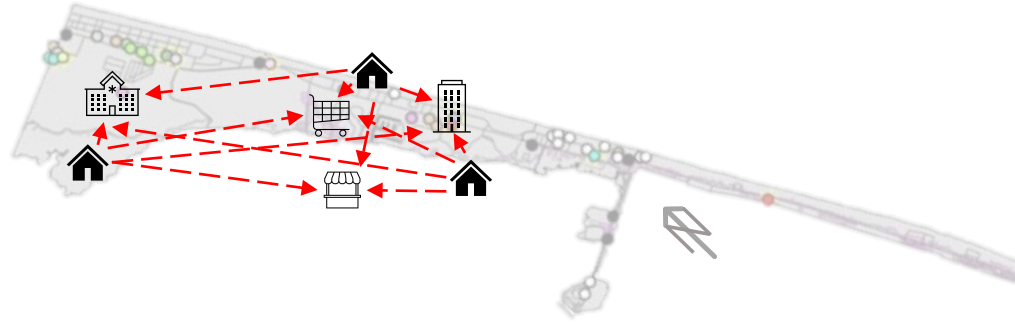
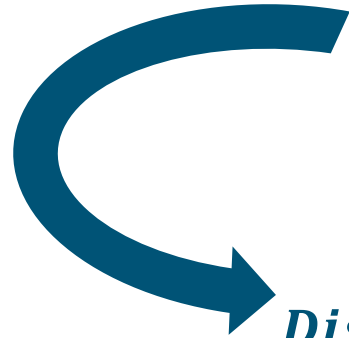
### Inputs and their proxies must be:

- Quantitative (numeric)
- Available at meaningful spatial scales
- Conceptually congruent



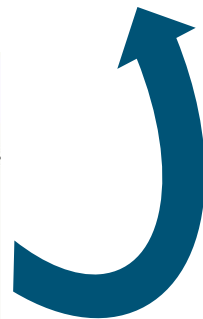
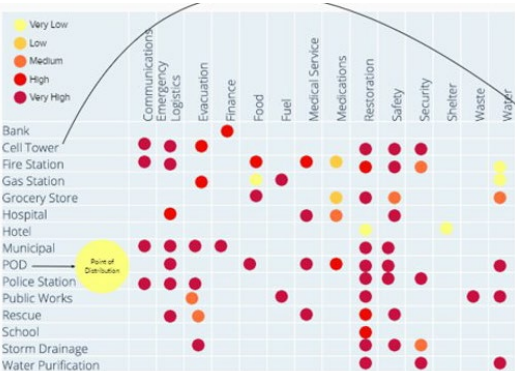
# Existing Social Burden Formulation: Common Implementation

ReNCAT uses the distance from the centroid of census blocks to calculate effort



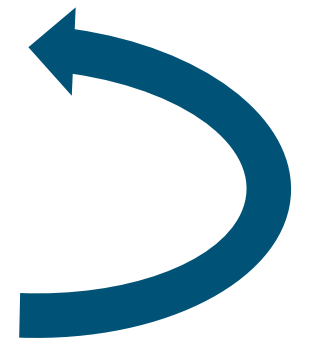
*Distances to Services*<sub>people, services</sub>

$$SB = \frac{\text{Distances to Services}_{people, services}}{\text{Service Levels}_{facilities, services} \times \text{Median Household Income}_{people}}$$



Baseline Capacity frequently approximated using Median Household Income

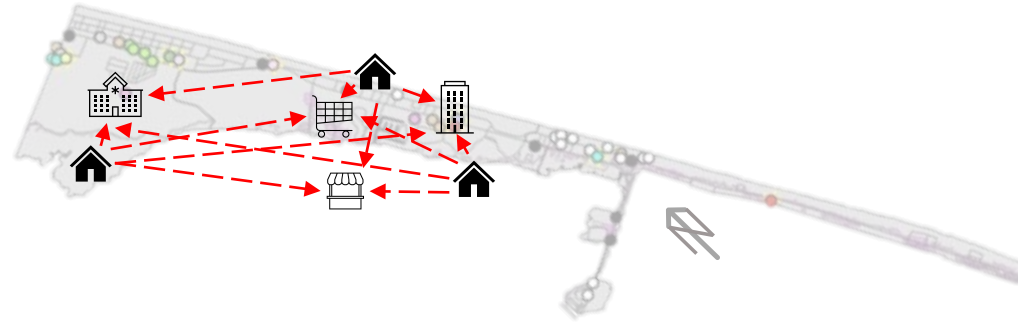
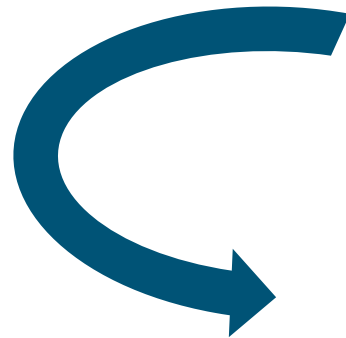
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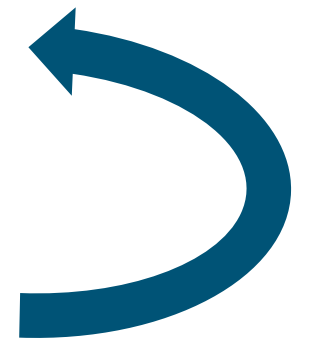
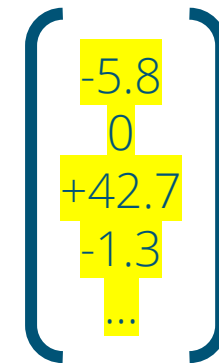
These proxies can be tailored when needed



# Integration of SCE's CRM into Social Burden



$$SB = \frac{\text{Distances to Services}_{\text{people, services}}}{\text{Service Levels}_{\text{facilities, services}} \times \text{CRM}}$$



- ✓ Definition of CRM as a composite of community adaptive capacity and sensitivity paints more complete, multi-faceted picture of baseline capacity; CRM is quantitative and data available at spatial scales that is appropriate with some transformation



**Next Steps**

# Next Steps

## 1. Blue-sky social burden calculation

- Baseline mapping of social burden across SCE service territory, assuming no outages.
- To include SCE's Community Resilience Metric (CRM) in population ability score.
- Will help illustrate pre-existing disparities in access to non-electric services. Will serve as a "best-case" target for the level of social burden during a power outage.

## 2. Black-sky social burden calculation


- Mapping of social burden for specific power outage scenarios (to be provided by SCE).
- Will demonstrate the compounding impacts of likely outage locations with underlying availability of services and population means.

## 3. Tool sharing and use

- Sandia will provide the calculation tool in a format that SCE can use to perform additional calculations of social burden with additional outage scenarios to inform planning decisions.

## Potential uses

- **For SCE:** Review tool as potential approach to help integrate community needs and equity considerations into grid planning and investment decision making.
- **For the public:** Provide an intuitive, spatially explicit, quantitative, and methodical insight into existing disparities in non-electric service.
- **For both:** Potential shared method to communicate select quantitative impacts of investments in electric and non-electric services for customers.

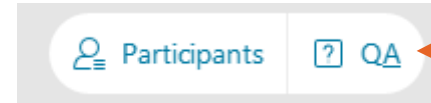


**Break for  
Discussion and  
Questions**

# Discussion and Q&A

## WebEx Tip

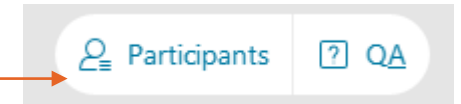
Option 1:



Access the written Q&A panel here

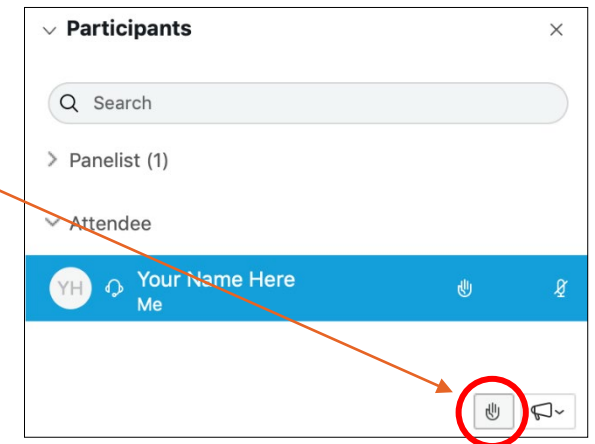
Option 2:

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# Closing Remarks

## For more information:

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**Julian Enis**  
**Julian.Enis@cpuc.ca.gov**

**<https://www.cpuc.ca.gov/resiliencyandmicrogrids/>**

