Resiliency & Microgrids Working Group

Value of Resiliency – 4 Pillar Methodology: Pillar 1 Baseline Assessment

Resiliency and Microgrids Team, Energy Division

May 19, 2021

California Public
Utilities Commission

WebEx and Call-In Information

Join by Computer:

https://cpuc.webex.com/cpuc/onstage/g.php?MTID=e1422cc468ccc06137cd7d5058d7aa29d

Event Password: RMWG (case sensitive)

Meeting Number: 187 977 7732

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.

- This meeting will not be recorded and there will not be meeting minutes.

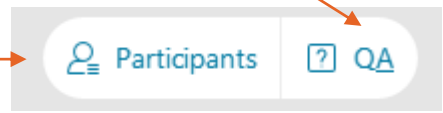
WebEx Logistics

- 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.

WebEx Tip

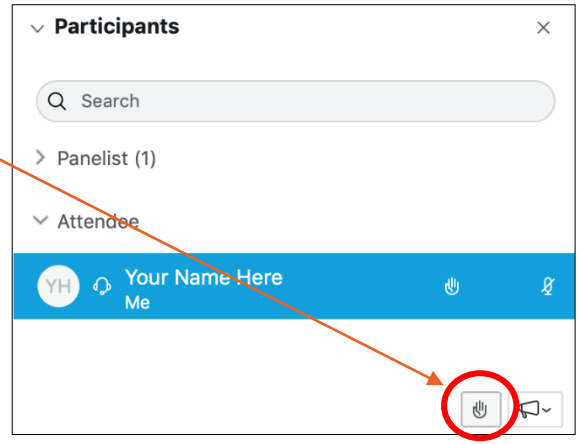
Access the written Q&A panel here

1. Click here to access the attendee list to raise and lower your hand.



2. Raise your hand by clicking the hand icon.

3. Lower it by clicking again.



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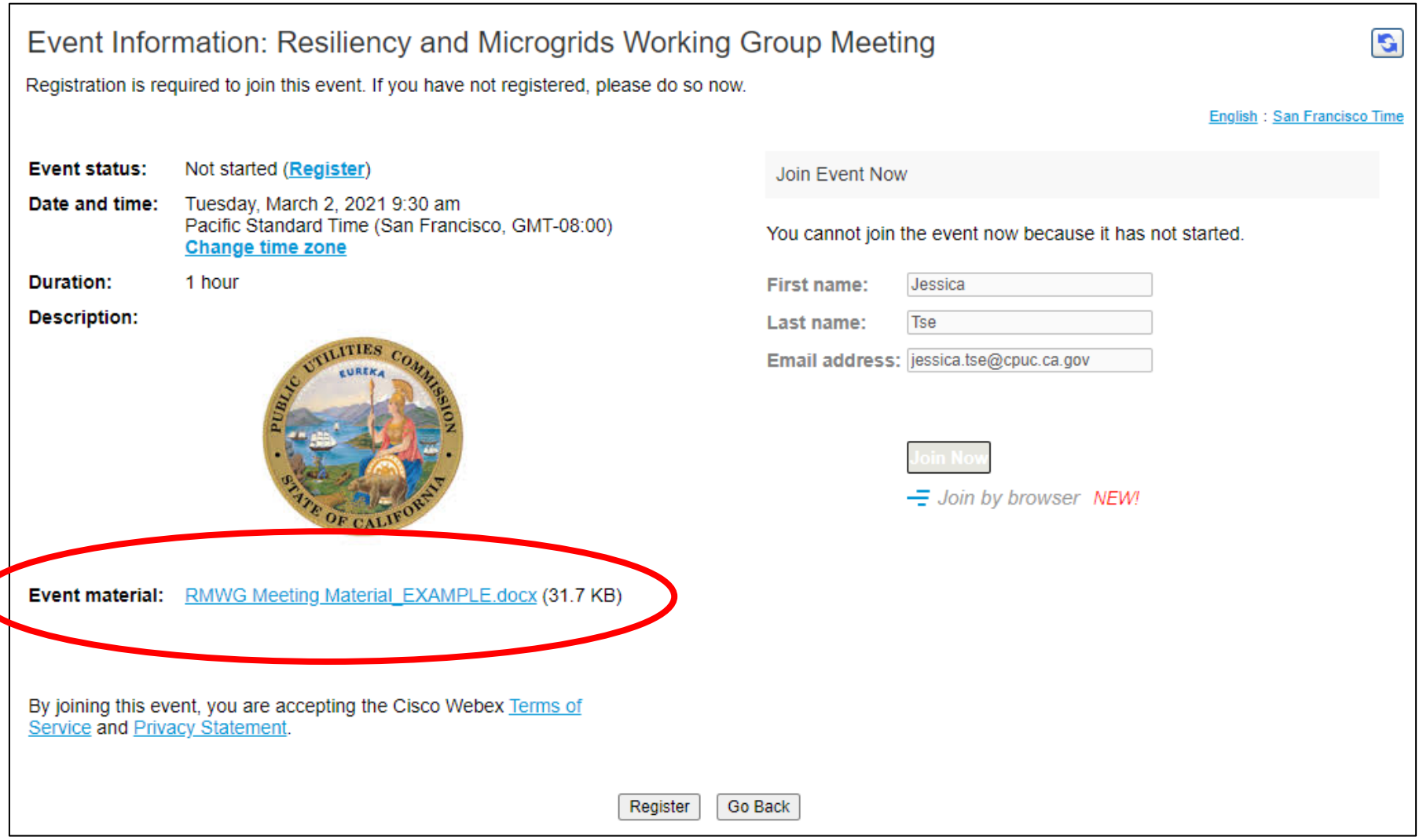
WebEx Event Materials



Preliminary Resiliency & Microgrids Working Group Schedule

Month	Resiliency and Microgrids Working Group Topics			
February	Standby Charges	Multi-Property Microgrid Tariff		
March				
April				
May			Value of Resiliency	
June				
July				
August				Microgrid Interconnection
September				
October				
November	Customer-Facing Microgrid Tariff Revisit			
December				
January				
February				

Value of Resiliency: Working group participants to discuss resiliency valuation through an all-hazard approach to disruptions and mitigations by examining metrics, methodologies, and policy applications.

Value of Resiliency – 4 Pillar Methodology
Pillar 1: Baseline Assessment

May 19, 2021

Rosanne Ratkiewich

Julian Enis

Resiliency and Microgrid Team

California Public
Utilities Commission

Agenda

I. Introduction (CPUC Staff) 2:00 – 2:05
- WebEx logistics, agenda review

II. Value of Resiliency: Pillar 1–Baseline Assessment 2:05 – 3:25
- What to protect and where is it?
  - Q&A
- What threatens it?
- How well are we doing now to protect it?

III. Q & A and Discussion 3:25 – 3:55
- Open Discussion

IV. Closing Remarks, Adjourn 3:55 – 4:00
- Provide information on the next meeting

The Problem to Solve: How can we optimize grid investments to maximize resiliency?

4 Pillars of Resiliency Valuation

I. **Baseline Assessment**
   I. What do we want to protect and where is it?
   II. What threatens it?
   III. How well are we doing now to protect it?

II. **Mitigation Measure Assessment**
   II. What protection options do we have?
   III. What does the best job at protecting the most?
   IV. What does it cost?

III. **Resiliency Scorecard** – scoring resiliency configuration characteristics

IV. **Resiliency Response Assessment (post-disruption or modeling)** –
   II. How well did the investments do in reaching resiliency targets?
   III. Did the investments reduce impacts on the community?

Resiliency Valuation Methodology – 4 Pillars

I. Baseline Assessment:

What do we want to protect and where is it?

1) Define Geographical area of study
2) Define Load Tiers or Consequence Categories (Critical, Priority, Discretionary)
3) Identify Resiliency Targets within Load Tiers

What threatens it?

4) Define Hazards to consider (All-Hazard assessment, analysis, ranking, weighting)
5) Conduct assessment of current Resiliency when disrupted from Hazard 1, Hazard 2, Hazard 3 (according to Hazard assessment)

How well are we doing now to protect it?

6) Results of Resilience Assessment – Identify Resiliency deficits and priorities and Resiliency Metric Reporting of Baseline levels

Resiliency Valuation Methodology
I. Baseline Assessment

Based on:
- Electrical infrastructure
- City or County Lines
- Project scope
- Local/Tribal Gov't Hazard Mitigation plans

Identify:
- Resource availability/ limitations such as land available, zoning, current generation and/or storage
- Commercial and industrial economy
- Wealth disparities
- Population demographics and needs

Map:
- Critical Facilities, Critical Infrastructure, Essential service assets, C & I, retail, residential

1. Define Geographical Area of Study

2. Define Load Tier Assets: Critical, Priority, Discretionary

Load Tier assets example:
- Critical:
  Critical Facilities, Critical Infrastructure, Medical Baseline, Emergency 1st Responder systems, DAC, VC, Food Banks, Evacuation Centers
- Priority
  Essential services such as gas stations, charging stations, banks, food supply chain: grocery stores, food distribution centers, agricultural centers
- Discretionary
  Commercial/Industrial, Retail stores, residential neighborhoods, recreational centers

- Who defines what is in these Load Tier assets? Collaboration between:
  - ❖ Local Government/Tribes
  - ❖ IOUs
  - ❖ Developers

3. Identify Resiliency Targets in Load Tiers

- Resilience duration required
- Maximum duration of outage to withstand
- # and % of Critical, Priority and Discretionary loads served
  - # of Critical Facilities
  - # of Emergency Services
  - # of Critical Infrastructure
  - # of Community Resource Centers
  - # of Essential Services
  - # of Cumulative Customers without power

Resiliency Valuation Methodology
I. Baseline Assessment

1. Define Geographical Area of Study

- Each area of consideration has **unique location-based considerations** of hazards, resources, and demographics.
- **Collaboration** between local and tribal governments and utilities **is critically important.**
- **Local & Tribal governments understand their communities needs best**, have knowledge of critical infrastructure, Emergency planning, Hazard Mitigation Plans, zoning, business and residential development plans, economic dynamics, and socio-economic impacts.
- Location based mapping can result in **optimized resiliency planning**.

Resiliency Valuation Methodology
I. Baseline Assessment

HYPOTHETICAL USE CASES ==>	Example 1: Fire Station	Example 2: Main Street	Example 3: Substation	Example 4: County
1. Geography	Fire Station property	Feeder serving Main Street	Area served by substation, circuits and feeders	County lines

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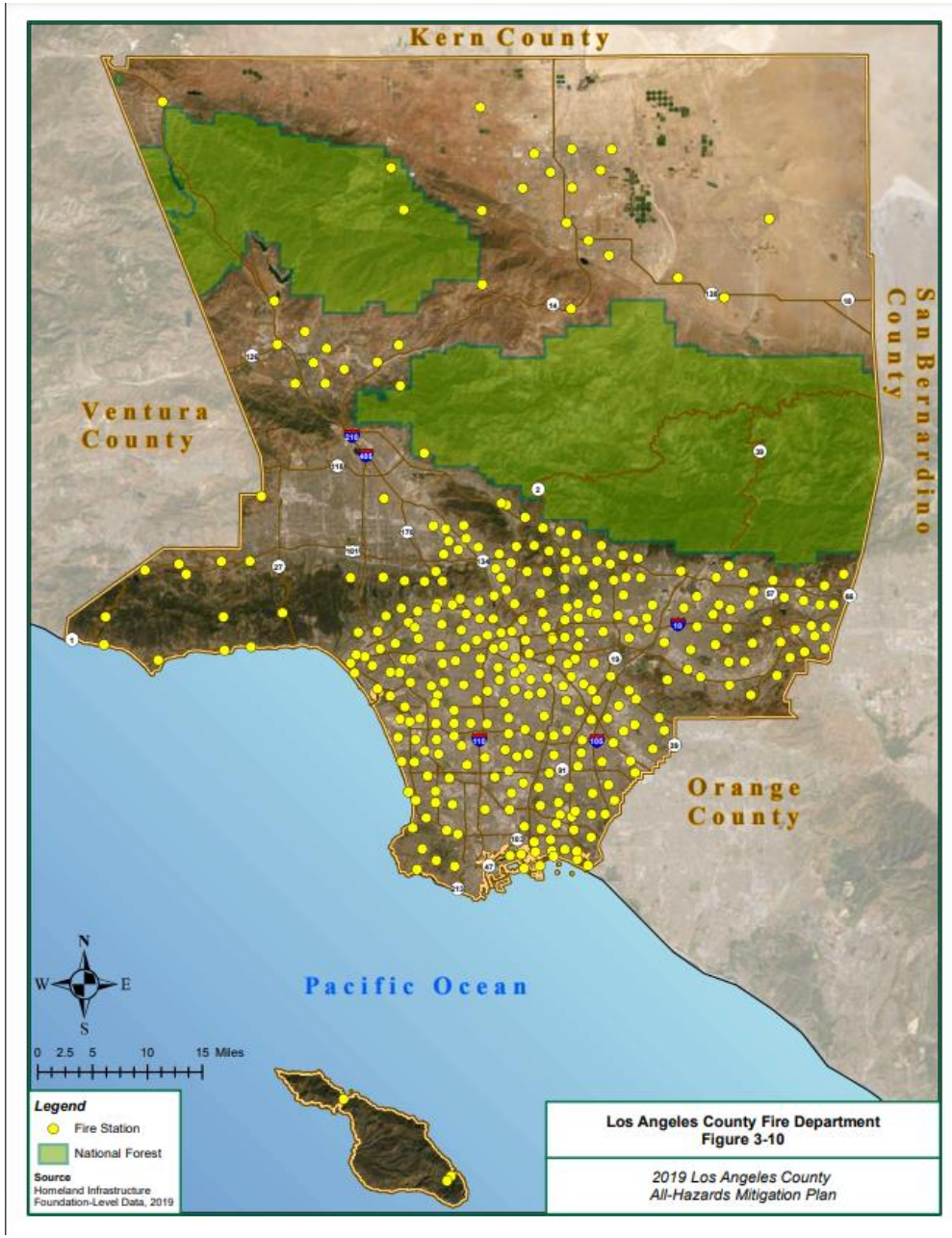
Resiliency Valuation Methodology
I. Baseline Assessment

2. Define Load Tier Assets: Critical, Priority, Discretionary

- Load Tier Assets should reflect resiliency priorities and goals
  - ➔ **Electric utilities** may **prioritize** electric utility **infrastructure**
  - ➔ **Local/Tribal government** may **prioritize community/societal resiliency**

- **Resiliency metrics will pivot off these defined Load Tiers**

Critical loads	**Critical Facilities , Emergency 1st Responders, Community Resource Centers, Charging stations, evacuation centers, hospitals, critical infrastructure (water, waste-water, natural gas, communication, transportation, data centers), local and tribal government buildings**
Priority loads	Essential services such as gas stations, charging stations, banks, food supply chain: grocery stores, food distribution centers, agricultural centers, restaurants), minimum load to residents to maintain refrigeration, critical infrastructure not included as Critical Facilities (data centers, water delivery system, waste, communication and transportation systems)
Discretionary loads	All other loads ➔ Commercial/Industrial, Retail stores, residential neighborhoods, recreational centers



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2. Define Load Tiers	**Critical:** Fire Station; **Priority:** Nothing; **Discretionary:** Nothing	**Critical:** Police station, Public Works building; **Priority:** Bank, grocery store; **Discretionary:** retail stores	**Critical:** 2 Police stations, Hospital, Emergency Call Center; Community Resource Center, Water and Wastewater facility; **Priority:** 5 grocery stores, 3 gas stations, 4 banks, food distribution center; **Discretionary:** 140 residential customers, 10 businesses	**Critical:** 25 Police Stations, 15 Fire Stations, 6 Hospitals, 8 Water and wastewater facilities, 3 CRCs, evacuation center, 4 Food banks, 3 telecommunications centers; **Priority:** 25 grocery stores, 15 banks, 40 full-service schools **Discretionary:** 3000 residential customers, 500 businesses, 300 retail stores

Resiliency Valuation Methodology
I. Baseline Assessment

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Resiliency Valuation Methodology
I. Baseline Assessment

3. Identify Resiliency Targets – Measurements of Performance Based Design

A minimum level of resiliency could be defined as maintaining Critical Tier load levels for a defined duration.

When comparing resiliency measures to maintain power within the defined geographical area during a disruption event, **the level of public benefit provided within that geographical area could be quantified by noting**:

- # of Critical Facilities supported at X% of load level
- # of Community Resource Centers at X% of load level
- # of Charging stations (cars, laptops, phones) with Y capacity of charging[1]
- # food storage/prep facilities available (freezers, fridge, grocery stores, restaurants, food banks)
- # of banks, gas stations
- # of other facilities providing social continuity (schools, preschools, daycare, businesses)

[1] As V2B technology becomes adopted, this charging capacity can present both load requirement and mobile generation which could also expand the effective geographical boundary of public benefit of the mitigation measure being studied.

We want to show that:

1. **Community resiliency has improved**,
2. But we also want to show **the mitigation measure chosen has the highest resiliency capacity against the most potential hazards**,
3. And we want **the cost-effectiveness measure to indicate what that resiliency capacity costs** so that when choosing resiliency mitigation measures, we are **balancing cost with resiliency capacity**.
4. **GHG and PM levels** over time (over what time are they emitted) with these resiliency measures would factor in as a ranking attribute.
5. The contributions of the mitigation measure to **"Blue Sky" operations** would also be factored in as a ranking attribute. This attribute would be ranked by **how much the measure contributes to grid and state policy goals**. Does it contribute to DER goals? Does it reduce utility infrastructure investment? Does it reduce ratepayer costs? Does it reduce DAC, L-I community rates? Does it contribute to eliminating racism and balancing equity in the energy system? Does its installation and operation contribute to the local economy?

Resiliency Valuation Methodology
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3. Resiliency Targets	**Critical:** 90% load profile for 72 hrs	**Critical:** 80% load profile for 24 hrs; **Priority:** 50% load for 24 hrs; **Discretionary:** 0% load	**Critical:** 85% load profile for 48 hrs; **Priority:** 40% load for 24 hrs; **Discretionary:** 50% load to DAC residential customers	**Critical:** 100% load profile for 24 hrs; **Priority:** 60% load for 24 hrs; **Discretionary:** 50% load to DAC residential customers

Resiliency Valuation Methodology
I. Baseline Assessment

3. Identify Resiliency Targets – Measurements of Performance Based Design

Resiliency Metrics List - DRAFT

The metrics below are a preliminary list of potential metrics to be used to determine a Baseline Assessment of resiliency, as well as assess the effectiveness of mitigation measures designed to increase resilience.

- **Geographical boundaries**
- **Performance data**
  - Expected Energy Not Served (EENS)
  - CAIDI/CAIFI
  - MGs in area - pre/post disruption: duration, Energy served, energy not served, CF/services included in load
  - Circuit load profiles (blue sky)
  - Circuit reliability metrics w/MED, planned outages and ISO outages, PSPS outages
  - Data from the Rotating Outage report that may have relevance for resiliency reporting such as:
    - Substation areas - this is more for everyone
    - Mid feeder areas -- who stayed online, who would have lost power, how many customers in what category, and CF, CRC
- **Outage (Islanded) performance:**
  - Outage (islanded) performance on circuit-by-circuit basis
  - How much of the load are they picking up?
  - If any load curtailment:
    - How did they curtail? (utility driven or customer cooperation?)
    - How did they choose to curtail what they did? (Load Tier assets – Critical, Priority, Discretionary)
  - What durations did they experience?
  - Cause of outage?
  - How many outages/when in the last 1 yr, 3 yr, 5yr?

Resiliency Valuation Methodology
I. Baseline Assessment

3. Identify Resiliency Targets – Measurements of Performance Based Design

Resiliency Metrics List - DRAFT

The metrics below are a preliminary list of potential metrics to be used to determine a Baseline Assessment of resiliency, as well as assess the effectiveness of mitigation measures designed to increase resilience.

- **Community Data**
  - # of residential customers
  - # of non-residential customers
  - # of Medical Baseline, DAC, VC, LI
  - SGIP data maps
  - Tribal population data and geography
  - Local governments affected/geographical areas
  - Median income
  - Food Bank data
  - Business (Comm/Indus/Retail)
    - Revenue and/or production costs
    - Lag time in recovery of costs
  - Customer outage costs vs Utility outage costs – Value of Service or Value of Lost Load
  - Any data on non-MG participants that used power or the assets powered within the MG during any of these outages?

- **Community Outage Impact Data**
  - Cumulative daily # of customers without power / served with MG
  - # of Critical Facilities, Community Resource Centers, Emergency 1st Responder resources without power / served with MG

Resiliency Valuation Methodology
I. Baseline Assessment

3. Identify Resiliency Targets – Measurements of Performance Based Design

Resiliency Metrics List - DRAFT

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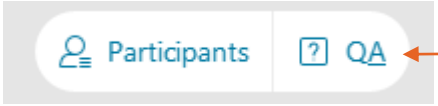
- **Infrastructure Data**
  - ENERGY infrastructure:
    - Energy infrastructure - substations, Transmission, circuits, distribution feeders
    - EV charging infrastructure
    - Current energy generation resources
    - Current energy storage resources
    - Fuel Type/source
    - GHG emission data?
  - COMMUNITY Infrastructure:
    - #, location and load of Critical Facilities, Community Resource Centers, Emergency 1st Responder resources
    - #, location and load of essential services (food supply chain, gas, EV (see below), banks, pharmacies, schools/childcare)
    - Location and load of Critical Infrastructure (other than energy)-- water (emergency response and potable), telecommunications, transportation

- **Mitigation Measure Options**
  - CapEx and O&M costs of mitigation measures they considered
  - Comparative recovery costs before and after mitigation measure implementation

Discussion and Q&A

WebEx Tip

Option 1:



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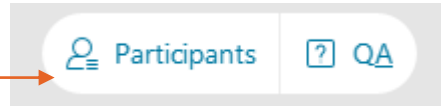

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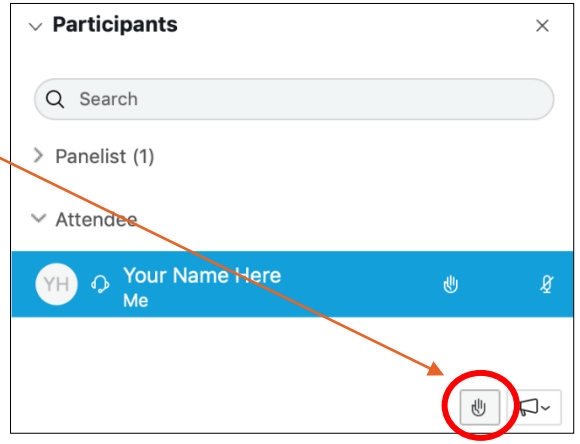


Discussion Questions

- How should Load Tier Assets be defined and by whom?
- How should resiliency targets (% and duration) should be determined?
- Should we be setting a statewide resiliency target goal (e.g. 100% of critical facilities) or should it be a location-based determination by the local community?
- What are your questions?

Resiliency Valuation Methodology
I. Baseline Assessment

- **For defined geographical area:**
- Determine primary disruptive hazards within geographical scope, apply weightings and rankings according to probability, magnitude, geographical impact and economic impact
  - Climate Change hazards such as:
  - Extreme weather,
  - Sea level rise
  - Cybersecurity hazards
  - Physical attack hazards
- Identify impact on Load Tier Assets
- Who conducts all-Hazard assessment?:
  - Cities, Counties, Local Government
    - Hazard Mitigation Plans
    - UNDDR Disaster Resilience Framework for Cities/Counties
  - IOUs
    - RAMP (modified)

4. Conduct All-Hazard Assessment for defined geographical area

5. Conduct current Resiliency Assessment baseline of Load Tiers

For each hazard (in ranking/ weighted order):

- Graph *historical* load not served (CAIDI w/MED) over time for geographical scope
- Graph *projected* load not served (CAIDI w/MED) over time for geographical scope
- Identify impacts on resiliency targets
- Evaluate utility costs of Energy Not Served
- Evaluate public costs of Energy Not Served
  - ❖ Interruption Cost Estimator (ICE)*
  - ❖ Value of Service estimates *

* with updated surveys

From results of Baseline Assessment:

- Identify priority resilience deficits
- Identify resilience priorities
- Identify resilience metrics to assessment mitigation impacts

6. Results of Resiliency Baseline Assessment

Hazards to Mitigate with Resiliency Measures

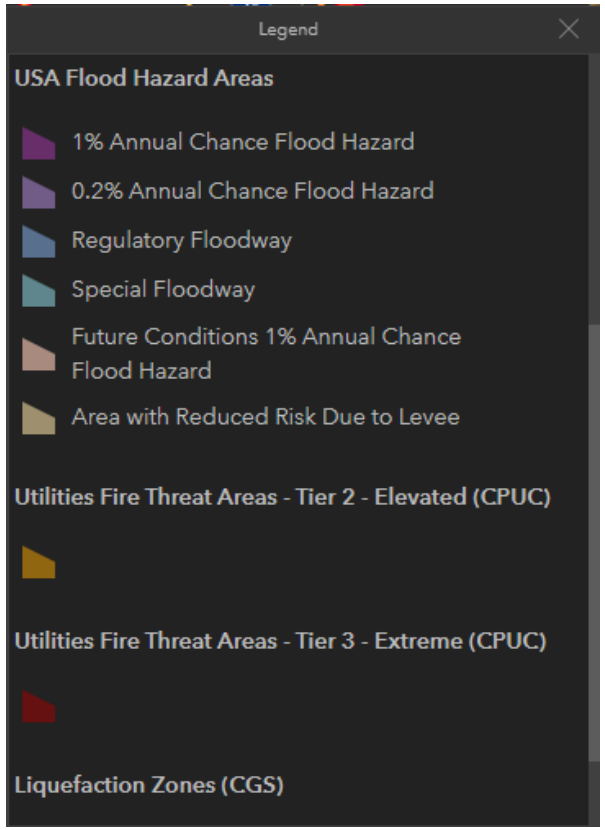
Nevada County
Local Hazard Mitigation Plan Update
August 2017

United Nations Office for Disaster Risk Reduction (UNDRR) – **Disaster Resilience Scorecard for Cities - Quick Risk Estimator tool:** provides a framework for local governments to assess hazards unique to their area.

Table ES-2 Nevada County Hazard Identification Assessment

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Ag Hazards: Severe Weather/Insect Pests	Significant	Highly Likely	Critical	High	High
Avalanche	Limited	Highly likely	Negligible	Low	Low
Climate Change	Extensive	Likely	Critical	Medium	High
Dam Failure	Significant	Occasional	Catastrophic	High	Low
Drought and Water Shortage	Extensive	Likely/ Occasional	Critical	Medium	Low
Earthquake	Extensive	Unlikely	Critical	Medium	Low
Flood: 100/500–year	Extensive	Occasional/Unlikely	Critical	High	Medium
Flood: Localized/Stormwater	Significant	Highly Likely	Limited	Medium	Medium
Hazardous Materials Transportation (interstates, railroads, pipelines)	Limited	Likely	Limited	Medium	Low
Landslide, Debris & Mud Flows	Significant	Likely	Critical	Medium	Low
Levee Failure	Limited	Unlikely	Limited	Low	Low
Severe Weather: Extreme Cold, Snow, and Freeze	Significant	Highly Likely	Limited	Medium	Medium
Severe Weather: Extreme Heat	Significant	Likely	Critical	Medium	Medium
Severe Weather: Heavy Rains and Storms (wind/tornado/hail, lightning)	Significant	Highly Likely	Critical	Medium	High
Subsidence	Significant	Likely	Negligible	Medium	Medium
Volcano	Significant	Unlikely	Limited	Low	Low
Wildfire (smoke, tree mortality, conflagration)	Extensive	Highly Likely	Catastrophic	High	High

Hazards to Mitigate with Resiliency Measures



Risk Assessment Mitigation Phase (RAMP)

SCE WMP Proposed Mitigation Measures & Budgets

SCE RAMP Proposed Mitigation Measures, Budgets, Risk Impacts and RSE

Capital Investments

Wildfire Mitigation Plan Proposed Mitigations					RAMP Wildfire Mitigations									
							Implementation Period		Cost Estimates ($M)		Expected Mean Value (MARS)		Tail Average (MARS)	
	SB901 Activity Identifier	Activity/Program	Capital Cost 2019 ($M) ($Nominal)(2019 Goal)	O&M Cost 2019 ($M) ($Nominal)(2019 Goal)	ID	Name	Start Year	End Year	Capital	O&M	MRR	RSE	MRR	RSE
D&C	AT-1	Alternative Technology Pilots	0.2	NA										
	AT-2	GSRP Wildfire Mitigation Program Study	NA	0.6										
	AT-3	Alternative Technology Evaluations	NA	0										
	AT-4	Alternative Technology Implementation	NA											
I&M	IN-1	Distribution Enhanced Overhead Inspections and Remediation in HFRA	102.8	144.9										
	IN-2	Transmission Enhanced Overhead Inspections and Remediation in HFRA	9.9	25										
	IN-3	Quality Oversight/Quality Control of EOI	NA											
	IN-4	Infrared inspection of energized overhead distribution facilities and equipment	NA	0.5	M4	Infrared Inspection Program	2018	2023	x	$3	0.29	0.1029	0.95	0.3321
	IN-5	Infrared inspection, corona scanning and high-definition imagery of energized overhead transmission facilities and equipment	NA	5.7										
	NA	AGP - Drive by of overhead distribution facilities and equipment	NA											
D&C	NA	Automatic Reclosers Replacement Program	2.4	NA	M2	Remote-controlled Automatic Reclosers and I	2018	2019	$28	$3	0.97	0.0311	3.35	0.1075
	NA	Capacitor Bank Replacement Program	18.1	NA										
I&M	NA	Detailed inspection of Transmission facilities and equipment	NA	5.7	M8	Fusing Mitigation	2018	2020	$68	$23	0.23	0.0025	0.74	0.0081
	NA	Deteriorated Pole Program	251.2	NA										
	NA	Insulator Washing	NA	1.2										
	NA	IPI - intrusive pole inspections to identify rot and decay	NA	6.1										
	NA	OOI - Detailed inspections of Distribution overhead facilities and equipment	NA	8.6										
D&C	NA	Overhead Conductor Program	143.9	NA	C1	Overhead Conductor Program (Bare & Covere	2018	2023	$103	x	0.09	0.0009	0.3	0.003
	NA	PCB Transformers Replacement Program	1.5	NA	C2	FR Overhead Distribution Transformer	2018	2023	$81	x	0.06	0.0007	0.18	0.0022
OP	NA	Performance of joint patrols with fire agencies	NA											?
I&M	NA	Pole Brushing	NA											
	NA	Pole Loading Program	NA	26.4										?
OP	NA	PSPS/De-energization Protocol Support Costs	NA	4.3										
I&M	NA	Road and Right-of-Way Maintenance	NA	3.9										
	NA	Substation Inspection and Maintenance	NA	2.2										
	NA	Supplemental inspections of HFRA	NA	69.1 Distribution 11.3 Transmissio										
	NA	Transmission Line Rating Remediation	157.9	8.2										?
OP	OP-1	Annual SOB 322 Review	NA											
	OP-2	Wildfire Infrastructure Protection Team Additional Staffing	NA	0.5										
	PSPS-1	De-Energization Notifications	NA	1.3	M3	PSPS Protocol and Support Functions	2018	2023	x	$21	1.90	0.0892	6.66	0.3119
SCA	SA-1	Additional Weather Stations	5.4	0.6	M7	Enhanced Situational Awareness	2018	2023	$31	$26	0.84	0.0149	3.19	0.0561
	SA-2	Fire Potential Index Phase II	NA	0.6										
	SA-3	Additional HD Cameras	2.3	2.6										
	SA-4	High-performing Computer Weather Modeling System	3.8	0.1										
	SA-5	Develop Asset Reliability and Risk Analytics Capability	0.5	NA										
D&C	SH-1	Covered Conductor	47.4	1.0	M1	Wildfire Covered Conductor Program	2018	2023	$1,161	x	1.64	0.0014	5.28	0.0045
	SH-2	Evaluation of Undergrounding in HFRA	0	0										
	SH-3	Composite Poles and Crossarms	5.1	0.1	M9	Fire Resistant Poles (M1 Scope)	2018	2023	$137	x	0.60	0.0044	2.26	0.0165
	SH-4	Branch Line Protection Strategy	46.1	0.9										
	SH-5	Remote Controlled Automatic Reclosers Installations	4.9	0.1										
	SH-6	Remote Controlled Automatic Reclosers Setting Updates	NA	0.3										
	SH-7	Circuit Breaker Fast Curve	9.1	0.2										
I&M	VM-1	Hazard Tree Mitigation Program (HTMP)	NA	25.5	M5	Expanded Vegetation Management	2018	2023	x	$370	0.38	0.001	1.23	0.0033
	VM-2	Expanded Pole Brushing	NA	0.9										
	VM-3	Expanded Clearance distances at time of maintenance	NA	28.0										
	VM-4	DRI quarterly inspections and removals	NA	41.5										
	VM-5	LiDAR inspections of Transmission	NA	3.7										
		TOTALS	$812.5	$351.2					$1,609	$447	7.02	0.0034	24.14	0.0117

WMP Color Legend	no. of tasks	Capital ($M)	O&M ($M)
Design & Construction (D&C)	15	$278.7	$3.2
Inspection and Maintenance (I&M)	22	$521.8	$334.1
Operational Practices (OP)	2	$0.0	$6.1
Situational/Conditional Awareness (SCA)	5	$12.0	$3.9
Response and Recovery (R&R)	0	$0.0	$0.0
	44	$812.5	$347.3

44 mitigations

10 mitigations

Resiliency Valuation Methodology
I. Baseline Assessment

HYPOTHETICAL USE CASES ==>	Example 1: Fire Station	Example 2: Main Street	Example 3: Substation	Example 4: County
4. All-Hazard Assessment	PSPS power outages	PSPS power outages; flooding	Flooding, earthquake liquefaction zone, sea level rise	Wildfire (HFTD – Tier 3), high winds, high heat events

Resiliency Valuation Methodology
I. Baseline Assessment

For defined geographical area:

- Determine primary disruptive hazards within geographical scope, apply weightings and rankings according to probability, magnitude, geographical impact and economic impact
  - Climate Change hazards such as:
  - Extreme weather,
  - Sea level rise
  - Cybersecurity hazards
  - Physical attack hazards
- Identify impact on Load Tier Assets
- Who conducts all-Hazard assessment?:
  - Cities, Counties, Local Government
    - Hazard Mitigation Plans
    - UNDDR Disaster Resilience Framework for Cities/Counties
  - IOUs
  - RAMP (modified)

4. Conduct All-Hazard Assessment for defined geographical area

5. Conduct current Resiliency Assessment baseline of Load Tiers

For each hazard (in ranking/ weighted order):

- Graph *historical* load not served (CAIDI w/MED) over time for geographical scope
- Graph *projected* load not served (CAIDI w/MED) over time for geographical scope
- Identify impacts on resiliency targets
- Evaluate utility costs of Energy Not Served
- Evaluate public costs of Energy Not Served
  - ❖ Interruption Cost Estimator (ICE)*
  - ❖ Value of Service estimates *

* with updated surveys

From results of Baseline Assessment:

- Identify priority resilience deficits
- Identify resilience priorities
- Identify resilience metrics to assessment mitigation impacts

6. Results of Resiliency Baseline Assessment

Resiliency Valuation Methodology
I. Baseline Assessment

5. Conduct Current Resiliency Assessment - Baseline of Load Tiers

For each hazard (in ranking/ weighted order):

- Graph *historical* load not served (CAIDI w/MED) over time for geographical scope
- Graph *projected* load not served (CAIDI w/MED) over time for geographical scope
- Identify impacts on resiliency targets
- Evaluate **utility costs of Energy Not Served**
- Evaluate **public costs of Energy Not Served**
  - Interruption Cost Estimator (ICE)*
    - Value of Service estimates *

* with updated surveys

Resiliency Valuation Methodology
I. Baseline Assessment

HYPOTHETICAL USE CASES ==>	Example 1: Fire Station	Example 2: Main Street	Example 3: Substation	Example 4: County
4. All-Hazard Assessment	#1. PSPS power outages	#1. PSPS power outages; #2. flooding	Flooding, earthquake liquefaction zone, sea level rise	Wildfire (HFTD – Tier 3), high winds, high heat events
5. Current Resiliency Assessment baseline of Load Tiers * Not reflected here are noted historical and projected frequencies of each hazard per case study, nor are costs reflected here	**TARGET: Critical:** 90% load profile for 72 hrs; **Priority:** none; **Discretionary:** 10% load **CURRENT Resiliency from: Hazard #1** PSPS Power outages: **Critical:** 30% load profile for 4 – 8 hrs depending on curtailment and use	**TARGET: Critical:** 80% load profile for 24 hrs; **Priority:** 50% load for 24 hrs; **Discretionary:** 0% load **CURRENT Resiliency from: Hazard #1** PSPS Power outages: **Critical:** 50% load profile for 24 hrs; **Priority:** 0% load; **Discretionary:** 0% load **Hazard #2** Flooding: **Critical:** 0% load profile for 24 hrs; **Priority:** 0% load; **Discretionary:** 0% load	**Critical:** 85% load profile for 48 hrs; **Priority:** 40% load for 24 hrs; **Discretionary:** 50% load to DAC residential customers **CURRENT Resiliency from: Hazard #1** Flooding: **Critical:** 50% load profile for 24 hrs; **Priority:** 0% load; **Discretionary:** 0% load **Hazard #2** Earthquake liquefaction zone: **Critical:** 0% load profile for unknown hrs; **Priority:** 0% load; **Discretionary:** 0% load **Hazard #3** Sea level rise: **Critical:** 0% load profile for unknown hrs; **Priority:** 0% load; **Discretionary:** 0% load	**Critical:** 100% load profile for 24 hrs; **Priority:** 60% load for 24 hrs; **Discretionary:** 50% load to DAC residential customers **CURRENT Resiliency from: Hazard #1** Wildfire (HFTD Tier 3): **Critical:** 0% load profile for 24 hrs; **Priority:** 0% load; **Discretionary:** 0% load **Hazard #2** High winds: **Critical:** 70% load profile for unlimited hrs; **Priority:** 75% load; **Discretionary:** 80% load **Hazard #3** High heat events: **Critical:** 50% load profile for unlimited hrs; **Priority:** 30% load; **Discretionary:** 30% load

Resiliency Valuation Methodology
I. Baseline Assessment

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6. Results of Resiliency Baseline Assessment

Resiliency Valuation Methodology
I. Baseline Assessment

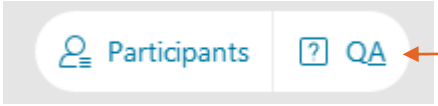
6. Results of Resiliency Baseline Assessment

From results of Baseline Assessment:
- Identify priority resilience deficits
- Identify resilience priorities
- Identify resilience metrics to assessment mitigation impacts

Discussion and Q&A

WebEx Tip

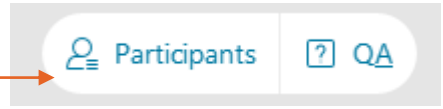
Option 1:



Access the written Q&A panel here

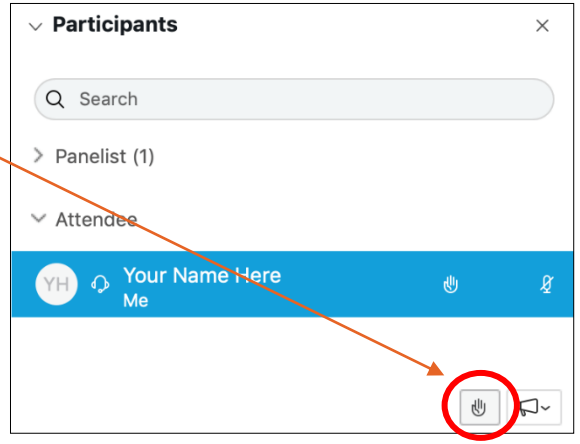
Option 2:

1. Click here to access the attendee list to raise and lower your hand.



2. Raise your hand by clicking the hand icon.

3. Lower it by clicking again.



Discussion Questions

- How many counties and/or cities have created Hazard Mitigation Plans? How often are these updated?
- How available is the data from these plans for public-private collaborative efforts?
- What agencies should be collecting and/or coordinating this info? CalOES? Local Emergency Planning Departments?
- What are your questions?

Resiliency Valuation Methodology

4 Pillars of Resiliency Valuation – The Details

I. Baseline Assessment

II. Mitigation Measure Assessment

III. Resiliency Scorecard

IV. Resiliency Response Assessment (post-disruption)

Upcoming Meetings

- **Thursday, June 3, 2021, 2-4PM**
  Topic: Value of Resiliency – Pillar 2: Mitigation Measure Assessment; Sandia and Lawrence Berkeley Labs presentation of Resiliency and Reliability Optimization modeling tools

- **Thursday, June 17, 2021, 2-4PM**
  Topic: Value of Resiliency – Pillar 3: Resiliency Scorecard; Sandia Labs presentation of Resiliency Node Cluster Analysis Tool

- **Thursday, July 1, 2021, 2-4PM**
  Topic: Value of Resiliency – Pillar 4: Resiliency Assessment Post-disruption; additional presentations TBD

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