

# Resilience Working Group Meeting: Kick-off Meeting

July 22, 2019, 7:30 am – 12 pm

Ka Waiwai, 1110 University Ave, Honolulu, HI 96826

## Breakout Session Results

### Question #1: What threats should be considered?

#### Group 1/Red

Threats	Tier Level			Justification
	1	2	3	
Hurricane	6	0	0	<ul style="list-style-type: none"> <li>Location of hit and how widespread the hit is depends on how it will impact the rest of the state                             <ul style="list-style-type: none"> <li>Example: Oahu &gt; affects fuel, volcano, landslide</li> </ul> </li> <li>Storm related</li> </ul>
Flooding	5	1	0	<ul style="list-style-type: none"> <li>BWS requires power</li> <li>Consider impact to transportation</li> </ul>
Tsunami	4	2	0	<Nothing Written>
Earthquake	0	4	2	<Nothing Written>
Volcanic Activity	0	2	4	Determined by how many and which islands are affected. From a save and recovery impact, it would be better if not on Oahu.
Wild Fire	0	3	3	<ul style="list-style-type: none"> <li>Impacts communication and power</li> </ul>
Landslide	0	2	4	<Nothing Written>
Cyber Attack	3	3	0	<ul style="list-style-type: none"> <li>Will impact communication and smart grid</li> <li>BWS needs power vs “smart” power</li> </ul>
Physical Attack	0	3	3	<Nothing Written>

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### Question #1: What threats should be considered?

#### Group 2/Yellow

Threats	Tier Level			Justification
	1	2	3	
Hurricane	5	0	0	<ul style="list-style-type: none"> <li>Grouped with flooding.</li> <li>When storm hits all islands, unable to assist each other</li> <li>Resources for repairs</li> <li>Kahului set to retire in 2022 leaving only Maalaea</li> <li>Supply chain disruption due to port closure</li> <li>Most urgent and widespread</li> <li>If the ports close, it will take a long time to rebuild</li> <li>Most generation is coastal and central - Oahu</li> <li>Maalaea coastal area/critical centralized facility provides 60% generation</li> </ul>
Flooding	0	4	1	<ul style="list-style-type: none"> <li>Grouped with hurricane, but less catastrophic. Can also be from other issues other than hurricane</li> </ul>
Tsunami	5	0	0	<ul style="list-style-type: none"> <li>Grouped with earthquake. Water moving debris</li> </ul>
Earthquake	0	4	1	<ul style="list-style-type: none"> <li>Grouped with tsunami. Tier could change if triggers a tsunami</li> </ul>
Volcanic Activity	0	0	5	<ul style="list-style-type: none"> <li>No panel members from Hawaii Island</li> </ul>
Wild Fire	0	2	3	<ul style="list-style-type: none"> <li>Site specific. The fire could easily jump over roads and freeze transportation</li> </ul>
Landslide	0	0	5	<Nothing Written>
Cyber Attack	1	2	2	<ul style="list-style-type: none"> <li>Likelihood and then the impact it could have may not be as disruptive.</li> <li>May be easier to recover from than natural disaster such as hurricanes.</li> </ul>
Physical Attack	0	1	4	<Nothing Written>
Demand	1	0	4	Depends on the type of event

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### Question #1: What threats should be considered?

#### Group 3/Blue

Threats	Tier Level			Justification
	1	2	3	
Hurricane	7	0	0	<ul style="list-style-type: none"> <li>• Constant threats throughout the year</li> <li>• Include other threats (flooding/wind)</li> <li>• High impact to harbors and delay imports</li> </ul>
Flooding	5	2	0	<ul style="list-style-type: none"> <li>• Area / location dependent</li> <li>• Includes sea level rise risk</li> </ul>
Tsunami	3	4	0	<ul style="list-style-type: none"> <li>• Low likelihood of happening</li> <li>• Not much can be done to prevent the threats</li> <li>• Includes sea level rise</li> <li>• High impact to harbors and delay imports</li> <li>• Can't do much to prevent, all you can do is evacuate</li> </ul>
Earthquake	1	4	2	<ul style="list-style-type: none"> <li>• Frequency differ based on location and island</li> <li>• Severity &amp; intensity varies by island. Some may impact Oahu</li> </ul>
Volcanic Activity	1	0	6	<ul style="list-style-type: none"> <li>• Please note that 6 representatives are from Oahu</li> <li>• Other island pool resources to support Big Island</li> </ul>
Wild Fire	2	1	4	<ul style="list-style-type: none"> <li>• Location dependent</li> <li>• Growing threat</li> </ul>
Landslide	0	2	5	<ul style="list-style-type: none"> <li>• Location dependent</li> </ul>
Cyber Attack	5	1	1	<ul style="list-style-type: none"> <li>• Growing threat</li> <li>• High impact on the entire system</li> </ul>
Physical Attack	4	3	0	<ul style="list-style-type: none"> <li>• Can't be prepared for. Difficult to predict.</li> </ul>
Renewable Energy Supply Disruption				<ul style="list-style-type: none"> <li>• Renewable output dependent on weather</li> <li>• 40 days of rain</li> </ul>

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### Question #1: What threats should be considered?

#### Group 4/Green

Threats	Tier Level			Justification
	1	2	3	
Hurricane	7	0	0	<ul style="list-style-type: none"> <li>• Very bad – affects whole State</li> <li>• Likelihood of occurrence is higher</li> <li>• Affects airport, coming in/out of State</li> </ul>
Flooding	2	5	0	<Nothing Written>
Tsunami	4	3	0	<ul style="list-style-type: none"> <li>• All in coastal areas, so impacts all areas (ports and airports)</li> </ul>
Earthquake	0	4	3	<ul style="list-style-type: none"> <li>• Frequency</li> </ul>
Volcanic Activity	2	5	0	<ul style="list-style-type: none"> <li>• 1 Ranking for Big Island</li> </ul>
Wild Fire	0	6	1	<ul style="list-style-type: none"> <li>• If affects transmission, not good. But lower likelihood</li> </ul>
Landslide	0	2	5	<ul style="list-style-type: none"> <li>• Elevation dependent</li> </ul>
Cyber Attack	6	1	0	<ul style="list-style-type: none"> <li>• &lt;Nothing Written&gt;</li> </ul>
Physical Attack	0	6	1	<ul style="list-style-type: none"> <li>• One attack could affect all facilities.</li> </ul>
Unavailability/Interruption of resources	2	0	5	<ul style="list-style-type: none"> <li>• Long periods of Clouds, eclipse, strikes</li> </ul>
Unavailability of fuels	7	0	0	<ul style="list-style-type: none"> <li>• Shipping/strike, shortages</li> </ul>

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## Breakout Session Results

### Question #1: What threats should be considered?

#### Group 5/Orange

Threats	Tier Level			Justification
	1	2	3	
Hurricane	8	0	0	<ul style="list-style-type: none"> <li>Increasingly likely</li> <li>Not contained; widest geographic impact</li> <li>Recovery resources</li> </ul>
Flooding	3	5	0	<ul style="list-style-type: none"> <li>Nationwide, most expensive disaster</li> <li>Difficult to predict</li> <li>Limited to flood-plain zones</li> <li>Tier 2 because it is the result of another disaster</li> <li>For islands, geographically allows for water runoff</li> <li>Critical infrastructure &amp; population located in coastal areas</li> </ul>
Tsunami	6	2	0	<ul style="list-style-type: none"> <li>Severity</li> <li>Critical infrastructure in tsunami zone</li> <li>Short notice</li> <li>Evacuation limitation (Big Island – 20 min)</li> </ul>
Earthquake	2	6	0	<ul style="list-style-type: none"> <li>No warning</li> <li>More localized</li> <li>Tier 2 because impact on infrastructure especially water</li> </ul>
Volcanic Activity	0	3	5	<ul style="list-style-type: none"> <li>Tier 3 because low exposure to infrastructure</li> </ul>
Wild Fire	1	3	4	<ul style="list-style-type: none"> <li>Tier 1 because likelihood increasing, exposure of utility lines</li> <li>Maui – PP's close to locations of brush fires</li> </ul>
Landslide	0	4	3	<ul style="list-style-type: none"> <li>Tier 2 because it causes damage to infrastructure</li> <li>Long recovery                             <ul style="list-style-type: none"> <li>e.g. Pali</li> </ul> </li> <li>Can be predicted</li> </ul>
Cyber Attack	4	3	1	<Nothing Written>
Physical Attack	0	3	5	<Nothing Written>
Fuel Supply Interruption	2	2	3	<Nothing Written>

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## Breakout Session Results

**Question #1: What threats should be considered?**

**Group 5/Orange (cont.)**

Threats	Tier Level			Justification
	1	2	3	
Greenhouse Gas Emissions	1	2	5	<Nothing Written>

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## Breakout Session Results

### Question #1: What threats should be considered?

#### Group 6/Pink

Threats	Tier Level			Justification
	1	2	3	
Hurricane	7	0	0	<ul style="list-style-type: none"> <li>Loss of backup generation, limited resources</li> <li>Wind speed, storm surge, flooding</li> <li>High probability, high impact</li> </ul>
Flooding	1	5	1	<ul style="list-style-type: none"> <li>Most common; Regional</li> <li>Harbors Impact</li> <li>Tier 2 because the group thought it was more of a localized issue as opposed to island wide</li> </ul>
Tsunami	5	2	0	<ul style="list-style-type: none"> <li>Large impact</li> <li>Shore based impact is high (Harbors, Airport, Generation)</li> </ul>
Earthquake	0	3	4	<ul style="list-style-type: none"> <li>Small magnitude historically</li> </ul>
Volcanic Activity	0	1	6	<ul style="list-style-type: none"> <li>Big Island – Localized</li> </ul>
Wild Fire	0	3	3	<ul style="list-style-type: none"> <li>Common but regional</li> </ul>
Landslide	0	0	6	<ul style="list-style-type: none"> <li>Very uncommon</li> </ul>
Cyber Attack	4	1	2	<ul style="list-style-type: none"> <li>Scada impact hacking</li> </ul>
Physical Attack	1	4	2	<Nothing Written>
High Winds	0	1	6	<Nothing Written>
Climate Change	2	5	0	Increased temperature. Sea level rise.
Lightning	0	0	7	<Nothing Written>

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## Breakout Session Results

**Question #2: What criteria should be used to prioritize customer segments with regard to grid resilience needs?**

### Group 1/Red

Customer Segment	Tier Level			Justification
	1	2	3	
Defense	3	2	1	<ul style="list-style-type: none"><li>• Communication and public safety important to determine where to clear debris</li></ul>
Hospitals and Healthcare	6	0	0	<Nothing Written>
Water and Sewage	0	3	3	<Nothing Written>
Public Safety	5	1	0	<Nothing Written>
Transportation and Fuel	4	2	0	<ul style="list-style-type: none"><li>• Airports</li><li>• Harbors</li></ul>
Telecommunications	4	2	0	<ul style="list-style-type: none"><li>• Smart grid becomes more dependent on reliable power</li><li>• Example EV's, distributed solar</li></ul>



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## Breakout Session Results

**Question #2: What criteria should be used to prioritize customer segments with regard to grid resilience needs?**

### Group 2/Yellow

Customer Segment	Tier Level			Justification
	1	2	3	
Defense	3	2	0	<ul style="list-style-type: none"> <li>• Defense vs Military deployment</li> <li>• Incorporate all aspects on customer segment National vs _____</li> <li>• The mission</li> <li>• What is the reliability of the utility</li> <li>• Which is more vulnerable – Bases vs Hotels</li> <li>• How do you prioritize?</li> </ul>
Hospitals and Healthcare	4	0	1	<ul style="list-style-type: none"> <li>• Critical life lines; emergency support functions</li> </ul>
Water and Sewage	5	0	0	<ul style="list-style-type: none"> <li>• Critical life lines; emergency support functions</li> <li>• Separate Health and Sewer                             <ul style="list-style-type: none"> <li>○ Health threat if sewer</li> </ul> </li> </ul>
Public Safety	4	1	0	<ul style="list-style-type: none"> <li>• Critical life lines; emergency support functions</li> <li>• Fire, Police, EMS</li> <li>• First Responders</li> </ul>
Transportation and Fuel	4	0	1	<ul style="list-style-type: none"> <li>• Critical life lines; emergency support functions</li> <li>• Harbors are critical</li> <li>• Roadways</li> <li>• Split category. Separate category for fuel and another for transportation.</li> <li>• Utilities have their own fuel requirements</li> <li>• What we plan for today can be different as the grid is built out</li> </ul>
Telecommunications	5	0	0	<ul style="list-style-type: none"> <li>• Critical life lines; emergency support functions</li> </ul>
Shelters	3	1	1	<Nothing Written>

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**Question #2: What criteria should be used to prioritize customer segments with regard to grid resilience needs?**

### Group 3/Blue

Criteria for Prioritizing
<ul style="list-style-type: none"> <li>Backup plan being in place</li> </ul>

Threats	Tier Level			Justification
	1	2	3	
Defense	5	2	0	<ul style="list-style-type: none"> <li>7 (days) of fuels (emergency backup for critical infrastructure)</li> <li>Multiple sources of reservoir for water</li> </ul>
Hospitals and Healthcare	7	0	0	<ul style="list-style-type: none"> <li>1/3 of hospital on backup generator for minimum of 96 hours</li> <li>Some hospital 100% on backup</li> <li>Still rely on availability of fuels</li> <li>Water is critical, most hospital have no backup water</li> </ul>
Water and Sewage	3	4	0	<ul style="list-style-type: none"> <li>Without power there is still sewage (3-5 days) running on emergency generator</li> <li>With fuel source can last for a long time</li> </ul>
Public Safety	5	2	0	<ul style="list-style-type: none"> <li>Includes HIEMA and DEM</li> </ul>
Transportation and Fuel	3	4	0	<ul style="list-style-type: none"> <li>Affects ability of all backup generators</li> <li>Affects ability to move supply from ports</li> </ul>
Telecommunications	3	4	0	<ul style="list-style-type: none"> <li>Minimum requirement for telecommunication is changing</li> <li>Major infrastructure services have backup telecommunication (Satellite, radio)</li> <li>Customer may have emergency generators may no longer work</li> </ul>

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## Breakout Session Results

**Question #2: What criteria should be used to prioritize customer segments with regard to grid resilience needs?**

### Group 4/Green

Criteria for Prioritizing
<ul style="list-style-type: none"> <li>Mission Critical functions</li> </ul>

Threats	Tier Level			Justification
	1	2	3	
Defense	2	4	1	<Nothing Written>
Hospitals and Healthcare	7	0	0	<Nothing Written>
Water and Sewage	6	1	0	<ul style="list-style-type: none"> <li>High % of dialysis patients</li> <li>For sanitization</li> <li>Sewage impact on public health</li> </ul>
Public Safety	7	0	0	<ul style="list-style-type: none"> <li>Police, Prisons, Fire Dept, EMS (All first responders)</li> <li>Operation centers</li> <li>Garbage impacts public safety (Especially if H-Power is not working)</li> </ul>
Transportation and Fuel	4	3	0	<ul style="list-style-type: none"> <li>Includes harbor, airports, roadways</li> </ul>
Telecommunications	7	0	0	<Nothing Written>
School/Shelters	4	3	0	<Nothing Written>
Hospitality	0	3	4	<Nothing Written>

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**Question #2: What criteria should be used to prioritize customer segments with regard to grid resilience needs?**

### Group 5/Orange

Criteria for Prioritizing
<ul style="list-style-type: none"> <li>Life sustaining</li> </ul>
<ul style="list-style-type: none"> <li>Life safety</li> </ul>
<ul style="list-style-type: none"> <li>THIRA/SPR and Hazard Mitigation Plans</li> </ul>

Threats	Tier Level			Justification
	1	2	3	
Defense	1	3	3	<ul style="list-style-type: none"> <li>Tier 2 because backup is not self-sufficient</li> <li>Tier 3 because self-reliant; local resources focused on local communities, instead of federal facilities</li> <li>Tier 2 and 3 because already have backup generators (not full capacity)</li> </ul>
Hospitals and Healthcare	6	1	0	<ul style="list-style-type: none"> <li>Tier 2 because already have backup generators (not full capacity)</li> </ul>
Water and Sewage	7	0	0	<ul style="list-style-type: none"> <li>Cost, feasibility to import water</li> <li>More / cascading effect on health hazards</li> </ul>
Public Safety	6	1	0	<ul style="list-style-type: none"> <li>Ability to respond</li> </ul>
Transportation and Fuel	5	2	0	<ul style="list-style-type: none"> <li>Tier 1 because of airports / sea ports are important</li> <li>Oahu-central point for shipping</li> <li>Vulnerability assessments for each county already exists</li> </ul>
Telecommunications	2	5	0	<ul style="list-style-type: none"> <li>Tier 2 because most is backed up/redundant</li> <li>Tier 1 because importance of calling for help / warning messages</li> </ul>
Vulnerable customers / residents	1	3	3	<ul style="list-style-type: none"> <li>Tier 3 because unsure how to differentiate these from other customers on grid</li> <li>Tier 2 because important to identify vulnerable customers</li> <li>Tier 1 because awareness of customers with life-supporting equipment</li> </ul>

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**Question #2: What criteria should be used to prioritize customer segments with regard to grid resilience needs?**

### Group 6/Pink

Customer Segment	Tier Level			Justification
	1	2	3	
Defense	7	0	0	<ul style="list-style-type: none"> <li>• Maintain order, resupply involvement</li> <li>• Monitoring military missions</li> </ul>
Hospitals and Healthcare	6	1	0	<ul style="list-style-type: none"> <li>• Have backup – short term</li> <li>• People start dying quick</li> <li>• Refrigeration for drugs</li> </ul>
Water and Sewage	4	3	0	<ul style="list-style-type: none"> <li>• For cooling towers (Servers)</li> <li>• Treatment plants pumped not gravity</li> <li>• Public health crisis</li> </ul>
Public Safety	7	0	0	<ul style="list-style-type: none"> <li>• Maintain order</li> <li>• First response</li> </ul>
Transportation and Fuel	5	2	0	<ul style="list-style-type: none"> <li>• Need to get to where the problems are</li> <li>• Fuel, Food Supply - limited resources</li> <li>• Oahu has only port for large ships</li> <li>• Pipeline for all but gasoline</li> </ul>
Telecommunications	4	3	0	<ul style="list-style-type: none"> <li>• Need communication to handle emergency</li> <li>• Prioritization</li> <li>• First responders</li> <li>• Military has best means of communication</li> </ul>
Shelters / Mass Feeding Stations	2	5	0	<Nothing Written>

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## Breakout Session Results

**Question #3: What kinds of mitigating actions should be taken to address grid resilience needs? By whom?**

### Group 1/Red

Mitigation Actions	Responsible Party			Description of Mitigation Action
	U	C	O	
Cost-benefit analysis of hardening vs. distributed sources by geographic area	X			<ul style="list-style-type: none"> <li>One mile line in urban core vs. ___?</li> <li>Need legislature to look for funds to pay for rural</li> </ul>
Cost-benefit analysis of hardening vs. distributed sources by geographic area			X	<ul style="list-style-type: none"> <li>Funding for resilience efforts</li> </ul>
Realignment of coastal highways outside of tsunami zone			X	<Nothing Written>
Additional generation systems and distributed generation	X			<Nothing Written>
Customers need to have back up systems for digital equipment		X		<Nothing Written>
Have backup generator for their operations		X		<Nothing Written>
OH to UG conversion for all utilities electrical and communication	X	X	X	<ul style="list-style-type: none"> <li>Cost to be shared/need legislature support</li> </ul>
Replace/ strengthen poles and have enough to replace.	X			<ul style="list-style-type: none"> <li>Have in supply</li> </ul>

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## Breakout Session Results

**Question #3: What kinds of mitigating actions should be taken to address grid resilience needs? By whom?**

### Group 1/Red (cont.)

Mitigation Actions	Responsible Party			Description of Mitigation Action
	U	C	O	
Upgrade building codes to stabilize roofs for PV			X	<Nothing Written>
Encourage customers to utilize resilience DER	X	X	X	<Nothing Written>

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## Breakout Session Results

**Question #3: What kinds of mitigating actions should be taken to address grid resilience needs? By whom?**

### Group 2/Yellow

Mitigation Actions	Responsible Party			Description of Mitigation Action
	U	C	O	
Access to resources	X	X	X	<ul style="list-style-type: none"> <li>• People</li> <li>• Fuel Reserves</li> <li>• Communication on Wheels (CoW)</li> <li>• Power on wheels</li> <li>• Ensuring access to resources / spare resources                             <ul style="list-style-type: none"> <li>○ How to long to get the resources</li> </ul> </li> </ul>
Demand/Response/Load Control	X	X	X	<ul style="list-style-type: none"> <li>• Load demand on system</li> <li>• Other: Regulatory considerations</li> </ul>
Contingency Planning	X	X	X	<ul style="list-style-type: none"> <li>• Stakeholder engagement</li> </ul>
Micro Grid	X	X		<ul style="list-style-type: none"> <li>• Utility Grid Scale</li> <li>• Customer isolated planning</li> <li>• Independent vs utility connected grid                             <ul style="list-style-type: none"> <li>○ How do they interact?</li> </ul> </li> <li>• Grid design – Connectivity                             <ul style="list-style-type: none"> <li>○ Utility asset, collective good</li> </ul> </li> </ul>
Operations & Maintenance	X	X		<ul style="list-style-type: none"> <li>• Example, onsite generation</li> <li>• Need to be a responsible consumer                             <ul style="list-style-type: none"> <li>○ Follow the rules</li> <li>○ Influence the rules</li> <li>○ Getting involved in the process</li> </ul> </li> <li>• Military bases responsible for their maintenance</li> </ul>
Training & Exercises	X	X	X	<ul style="list-style-type: none"> <li>• Government Entities</li> </ul>
Best Practices	X	X	X	<ul style="list-style-type: none"> <li>• Technology and Practices</li> </ul>



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## Breakout Session Results

**Question #3: What kinds of mitigating actions should be taken to address grid resilience needs? By whom?**

### Group 3/Blue

Mitigation Actions	Responsible Party			Descript of Mitigation Action
	U	C	O	
Micro Grid / Mini Grid	X	X	X	<ul style="list-style-type: none"> <li>Utility and/or customer can setup microgrid                             <ul style="list-style-type: none"> <li>Cost sharing</li> <li>e.g. Schofield Power Generation</li> </ul> </li> <li>Development of tariffs</li> </ul>
Distributed Generation	X	X	X	<ul style="list-style-type: none"> <li>Dispatchable generation on customer site</li> <li>Identify potential site</li> <li>Development of tariffs</li> <li>Other funding services to incentivize</li> </ul>
Mobile Generators / Substations	X	X	X	<ul style="list-style-type: none"> <li>Please see “Distributed Generation”</li> <li>Need to know who has the resource</li> </ul>
Identify and prioritize area of concerns for people with life safety power requirement	X	X	X	<ul style="list-style-type: none"> <li>Identify where data exist</li> <li>Consolidate plan based on data</li> </ul>
Storage (Distributed Storage)	X	X	X	<ul style="list-style-type: none"> <li>Please see “Distributed Generation”</li> <li>Please see “Micro Grid / Mini Grid”</li> </ul>
Education	X	X	X	<ul style="list-style-type: none"> <li>Coordinated campaign (Social media)                             <ul style="list-style-type: none"> <li>Let people know of what to expect</li> <li>Guide for customers during the events</li> </ul> </li> <li>Provide customer options</li> </ul>
Grid Hardening	X			<Nothing Written>
Planning and Coordination between entities				<ul style="list-style-type: none"> <li>Figure out who has what</li> <li>Prioritize where they would be deployed</li> </ul>
Consider expansion of HPower				<ul style="list-style-type: none"> <li>Store excess capacity</li> </ul>

# Resilience Working Group Meeting: Kick-off Meeting

July 22, 2019, 7:30 am – 12 pm

Ka Waiwai, 1110 University Ave, Honolulu, HI 96826

## Breakout Session Results

**Question #3: What kinds of mitigating actions should be taken to address grid resilience needs? By whom?**

### Group 4/Green

Mitigation Actions	Responsible Party			Descript of Mitigation Action
	U	C	O	
Harden HECO Infrastructure	X			<ul style="list-style-type: none"> <li>• During replacement used galvanized steel</li> <li>• Bury lines underground</li> <li>• Harden substations from flooding and wind</li> </ul>
More Back-up Generators		X		<ul style="list-style-type: none"> <li>• Hospitals, telecom, hotels, shelters, waste water facilities, military</li> </ul>
More Microgrid for Critical Infrastructure	X			<ul style="list-style-type: none"> <li>• Time duration/ how long will they last as interim                             <ul style="list-style-type: none"> <li>○ At least 1-month</li> </ul> </li> </ul>
Increase Storage for fuel/ Battery Back-up	X	X	X	<Nothing Written>
Grid Restoration Plan	X			<Nothing Written>
Contingency Plans	X	X	X	<ul style="list-style-type: none"> <li>• Having diverse resources</li> <li>• Telecom hardening</li> <li>• Microwave hardening</li> </ul>
Generation in Diverse Locations (IPP)	X		X	<ul style="list-style-type: none"> <li>• So they don't all go down at once</li> <li>• Different renewable resource types (Solar, wind, geothermal, etc)</li> </ul>
Education and Outreach	X	X	X	<ul style="list-style-type: none"> <li>• Emphasis on others</li> </ul>
Rate Differential for Off-peak Time of Use	X			<Nothing Written>
IPPs Donate Resources			X	<ul style="list-style-type: none"> <li>• Tesla did it in Puerto Rico</li> </ul>
Coordination of Community Resources			X	<ul style="list-style-type: none"> <li>• Make sure each shelter has what they need</li> </ul>
More and Decentralize Spares	X			<ul style="list-style-type: none"> <li>• Adding/increasing inventory of critical assets</li> </ul>
Vegetation Management	X	X		<Nothing Written>
Harden our Facilities for Hurricane	X			<ul style="list-style-type: none"> <li>• For more than just our central areas</li> </ul>

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## Breakout Session Results

**Question #3: What kinds of mitigating actions should be taken to address grid resilience needs? By whom?**

### Group 4/Green (cont.)

Mitigation Actions	Responsible Party			Descript of Mitigation Action
	U	C	O	
Ban Mylar Balloons			X	<Nothing Written>
Only Sell Energy Efficient Appliances			X	<Nothing Written>
Security on Our IT System/Cyber Attack Testing Officer	X			<Nothing Written>
Physical Terrorism/Emergency Drills	X	X	X	<Nothing Written>

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## Breakout Session Results

**Question #3: What kinds of mitigating actions should be taken to address grid resilience needs? By whom?**

### Group 5/Orange

Mitigation Actions	Responsible Party			Description of Mitigation Action
	U	C	O	
Managed retreat	X	X	X	<ul style="list-style-type: none"> <li>• Building facilities outside of flood zones</li> <li>• Prioritize oldest and largest facilities</li> </ul>
Concrete Utility Poles / Hardening	X			<ul style="list-style-type: none"> <li>• Loop-Feed Systems vs. Radial</li> <li>• Focus on transmission first, then distribution</li> <li>• Eliminate single points of failure first</li> <li>• Wind speed analysis</li> <li>• Currently reflected in mitigation plans</li> </ul>
DERs and Microgrids, DSM	X	X	X	<ul style="list-style-type: none"> <li>• Solar farms</li> <li>• Incentivize customer storage                             <ul style="list-style-type: none"> <li>○ Co-generation with incentives</li> </ul> </li> </ul>
Building Codes and Standards		X	X	<ul style="list-style-type: none"> <li>• Reflect catastrophic events for facilities to receive power when available</li> <li>• Design to lead standards</li> <li>• Enforcements</li> </ul>
Underground Utilities	X		X	<ul style="list-style-type: none"> <li>• Funds may be available through post-disaster recovery</li> </ul>
Preventive maintenance	X	X	X	<ul style="list-style-type: none"> <li>• Be more proactive</li> <li>• Require routine inspections</li> </ul>
System-level renewable generation and mitigation	X			<ul style="list-style-type: none"> <li>• Reduce fuel risk</li> </ul>

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## Breakout Session Results

**Question #3: What kinds of mitigating actions should be taken to address grid resilience needs? By whom?**

### Group 6/Pink

Mitigation Actions	Responsible Party			Description of Mitigation Action
	U	C	O	
Power Plant on Military Base		X		<ul style="list-style-type: none"> <li>Self Supply, IPP</li> </ul>
Grid Hardening	X			<Nothing Written>
Microgrid	X	X		<Nothing Written>
Communicator / Common frequency		X		<Nothing Written>
Replace old HECO Gens	X			<Nothing Written>
Study of critical customer standby power generation capabilities (Duration)			X	<ul style="list-style-type: none"> <li>Existing law mandate for Hospital duration</li> <li>Policy decision</li> </ul>
Auditing / Increase backup power needs			X	<Nothing Written>
Technology Advancement	X	X	X	<ul style="list-style-type: none"> <li>Other countries</li> </ul>
Barbers Point – Harbor Depth		X		<ul style="list-style-type: none"> <li>Not as deep as Honolulu, do dredging of both, not capable of large ships</li> </ul>
Hardening Cranes (Harbor)		X		<ul style="list-style-type: none"> <li>To CAT5 for newer</li> </ul>
Maintenance of Generation (Backup)				<Nothing Written>
Miscellaneous comments or questions				<ul style="list-style-type: none"> <li>Hospital back up testing offsite</li> </ul>