

Resilience Working Group (RWG) Meeting Notes

October 28, 2019

8:30am – 12:00 pm

American Bank Savings Tower, 8th Floor, Training Room 2

Attendees

Name	Organization	In Person	WebEx
Chris Yunker	Hawai'i State Department of Business, Economic Development and Tourism, Energy Office	X	
Thomas Travis	Hawai'i State Department of Defense, Hawai'i Emergency Management Agency	X	
Gary Yokoyama	Hawai'i State Department of Transportation, Airports Division	X	
Lori Kahikina	City and County of Honolulu, Department of Environmental Services	X	
Chris Crabtree	Healthcare Association of Hawaii	X	
Kevin Ihu	Honolulu Board of Water Supply	X	
Alexander de Roode	County of Maui, Energy Commissioner		X
Keith Okamoto	County of Hawaii, Department of Water Supply	X	
Casey Ann Hiraiwa	United States Army	X	
Sonny Rasay	United States Marine Corps	X	
John Bravender	United States Department of Commerce, National Oceanic and Atmospheric Administration	X	
Lt. Col. Paul Agena	Hawai'i National Guard	X	
Aaron Lau	Hawai'i National Guard	X	
Jonathan Choi	Par Hawai'i	X	
Francis Alueta	Hawaiian Telcom	X	
Corey Shaffer	Verizon Wireless	X	
Henry Curtis	Life of the Land	X	
Murray Clay	Ulupono Initiative	X	
Will Rolston	Energy Island		X

Hawaiian Electric Companies Attendees

Karina Abenoja

Edine Clemente

Mahina Martin

Hawaiian Electric Companies Attendees

Ken Aramaki	Kaanoi Clemente	Todd Mayeshiro
Marc Asano	Brandi Crabbe	Mathew McNeff (WebEx)
Keith Asato	Alan Hirayama (WebEx)	Rick Pinkerton
Riley Ceria	Christy Kaneshiro	Donna Stinefelt
Colton Ching	Christopher Lau	Lena Young
Stewart Chong		

Meeting Facilitators

Gerry Cauley	Linda Colburn	Nicole Brodie
Gary Vicinus		

Presentation Highlights

Opening Remarks (Colton Ching) (8:52PM)

- Recap of last meeting:
 - We established the types of threat scenarios we want to consider as we assess our islands' resiliency. We also reviewed critical customer lists and determined sector interdependencies. We learned that our critical customers have one week or less of emergency fuel and energy generation.
 - Lessons Learned: Grid resilience varies by island and critical customers typically have 1 week or less of fuel and there are many sector interdependencies.

Overview & Plan for the Day (Stewart Chong)

- Meeting Objectives:
 - Understand the threat impact to grid and customers
 - Develop inputs to Integrated Grid Plan

Review of Public Mandates and System Plans Affecting Resilience (Gary)

Resilience Concepts for Renewables, Storage & Microgrids

Energy generation used to only move in one direction from utility to customers.

Generation is increasingly decentralized. Customers now generate power and sell it to the grid. Load is not increasing the way it used to. Changing technology means that building new plants doesn't make sense the way it used to. A decentralized approach allows for load generation closer to where it's going to be used.

For resiliency, we need separable generation from the grid and it needs to be fairly local.

Renewable energy cannot be the answer to providing generation when power is needed. Diesel or gas is required to feed the renewable generation.

Regional mini grids are currently being explored by the utility as possibilities.

Power Supply Improvement Plans (Marc)

- Marc provided a review by island of the grid services and capacity that are going to be added over the next few years.
- Maui and Oahu are working on retiring a coal plant on Oahu and a fossil fuel generator on Maui. The utility will need to add storage capacity to help replace the loss of those units.
- As we increase renewables on all the islands, we want to be sure we observe and obtain resiliency targets.
- Locations of the new projects are up to developers as they work with the community and landowners.

Resilience Benefits

- What are some factors that we need to consider to make our island more resilient as we move toward 100% renewable energy.
 - Q: *Would it be possible for everyone to have PV and have some degree of storage? Why is there a waiting list for people to get PV?* Right now there's a waiting list because of the complications around interconnection to the grid.
 - Our transmission and distribution system was built for a one-way energy flow, but now power is moving two ways with more distributed generation. Hawaii has 20 times the national average of renewable energy (mostly solar). In the middle of the day, half of our circuits flow in the opposite direction of what they were designed for. We've had to develop new technologies to move energy in the other direction in a way that keeps the grid reliable.
 - We are working on modernizing the system including the distribution system. We have to integrate more intelligent systems within the grid and in our homes.
 - New PV systems include storage, so we can manage when energy is exported back to the grid. There will be more customer systems, including residential, to provide some level of backup power to that home and business. Larger customers will need more abilities, though.
 - One of the benefits with a more distributed system will eventually mean that blackouts/outages won't affect as large areas of the islands as they do now. The mini grids will allow for smaller pockets to come online sooner. Stage 2 of the RFPs will be asking for this capability.

- *Is providing solar to a small number of homes, especially in rural areas such as Big Island part of the plan?* Yes, we are looking at some technologies to build microgrids in rural areas.

Mapping Of Key Customers To Grid And Priority Threat Impacts (slides 19-23)

Participants were shown maps with small symbols indicating critical infrastructure on each island. The group provided feedback on the maps via MeetingSift surveys (see attached).

- Oahu shows that most of the critical customers are along the southern coast, mostly in the southeast, with energy generation being largely on the southwest coast.

Relative Impacts for Various Threat Scenarios (slides 24-28)

Participants were shown maps with impact areas for the considered threat scenarios infrastructure on each island. The group provided feedback on the maps via MeetingSift surveys.

- Oahu shows that most of the critical customers are along the southern coast, mostly in the southeast, with energy generation being largely on the southwest coast.

Meeting Sift Results

OAHU

Do you feel the mapping of key customers on O'ahu is reasonably accurate and representative?

Yes – 90% No – 10%

Additional thoughts:

- Map legend
- Add evacuation shelters
- Should add additional healthcare facilities such as dialysis and long term care facilities working with HHEM
- Shelters included?
- PUC needs to regulate reliability by load
- Were prisons and correctional facilities considered?

HAWAI'I ISLAND

Do you feel the mapping of key customers on Hawai'i is reasonably accurate and representative?

Yes – 63% No – 37%

Additional thoughts:

- State and County EOCs
- Add emergency shelters
- Same as O’ahu, make sure non hospital clinics are included
- Need add drinking water sources
- More granularity about size, capacity or other factors to highlight critical nature. Not sure that all water/wastewater facilities on map
- Are all military facilities shown (e.g. PTA, KMC)
- IF PGV put back online, then transmission lines need special attention

MAUI

Do you feel the mapping of key customers on Maui is reasonably accurate and representative?

Yes – 60% No – 40%

Additional thoughts:

- Add emergency shelters
- Airports?
- Harbor?
- Dialysis clinics, community centers, community health centers
- Identification of who is key customers and where they are needs deliberate process
- More granularity about size, capacity or other factors to highlight critical nature. Not sure that all water/wastewater facilities on map
- Work with HHEM to add critical healthcare facilities such as long term care, dialysis, etc.
- Power generation not supportive with casualties in middle area

LANA’I

Do you feel the mapping of key customers on Lana’i is reasonably accurate and representative?

Yes – 36% No – 64%

Additional thoughts:

- Clinics
- Add emergency shelters
- Airport, harbor?
- Airport

- Needs robust vetting to support cost recovery for discreet customers
- More granularity, check critical facilities including non-county water/wastewater, telecom

MOLOKA’I

Do you feel the mapping of key customers on Moloka’i is reasonably accurate and representative?

Yes – 90% No – 10%

Additional thoughts:

- Add emergency shelters
- Clinics
- Airport, harbor
- How will this process be complemented with robust vetting of types and locations of customers
- Work with HHEM to identify critical healthcare facilities such as long term care, dialysis, etc.
- Telecom? Water? Airport?
- State and County EOCs
- Community health and dialysis clinics
- Schools and universities
- Senior care facilities
- Homeless shelters
- Food banks
- Community Centers
- Jails and Prisons
- Schools and parks/gyms used as emergency shelters
- Assisted living facilities

Consolidation of Threat Scenarios (slides 31-32)

Participants were shown the previous threat scenarios proposed at the September 2019 RWG meeting. Given the challenges of considering multiple threat scenarios across 5 islands and some overlapping similarities between Maui, Moloka’i and Lana’i, RWG members were asked to consider grouping Maui County under one set of common threat scenarios.

Meeting Sift Results

The threat scnearios for IGP are good tests for Grid Resilience?

Strongly agree 35%	Agree 59%	Neutral 6%	Disagree 0%	Strongly disagree 0%
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Review of Severe and Moderate Impacts for each Threat Scenario (slides 34-38)

Participants were shown reasonable impact assumptions for each threat scenario proposed. RWG members were asked to consider grouping Maui County under one set of common threat scenarios.

Meeting Sift Results

The assumed grid impacts seem reasonable for the hurricane threat scenario described.

Strongly agree 31%	Agree 56%	Neutral 13%	Disagree 0%	Strongly disagree 0%
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Comments:

- Dont do Cat 5
- How about impact to power generation
- Impact on each grid will likely differ due to differences in terms of O/H and UG T&D facilities
- Will more time be given to the more likely scenario?
- Are wild fires a threat on the western side of the island of Hawaii?
- Road clearing assumption is missing from category 4 scenario
- As climate change models evolve based on emerging data we may need to reassess likelihood of various scenarios
- How is scenario used? Will it be you design the system to withstand and come up with price or just say how well the existing system fares?
- Not clear how Jupiter startup future climate projection fits in with this scenario
- Reasonable worst case should be used. Easy to develop overwhelming scenarios but they are not too useful
- Create a plan based on a model of the electrical infrastructure in the near future instead of today
- Recovery time for each island will vary depend on which island is impacted. Oahu may have longer outages while neighbor islands may have shorter
- Hardened transmission lines. Highlighting overhead transmission lines VERY susceptible to wind driven damage

The assumed grid impacts seem reasonable for the tsunami/earthquake threat scenario described.

Strongly agree 18%	Agree 47%	Neutral 35%	Disagree 0%	Strongly disagree 0%
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Comments:

- Impact to power generation?
- Alignment with USGS probabilities
- Consider port damage impacts as well from tsunami
- Maui’s main Maalaea Generating station is in Tsunami evacuation zone
- Add damage to generation
- The power plant damage may take longer to repair...

- Specific impacts to utility after Kiholo bay earthquake of 2006 should be reviewed
- Think 6.5 low. Check most recent USGS study published last couple months
- What was category of Puerto Rico hurricane?
- Does focusing on a tsunami from the Aleutians cause us to miss risks from other directions like Asia and West Coast?

The assumed grid impacts seem reasonable for the wildfire threat scenario described.

Strongly agree 6%	Agree 59%	Neutral 35%	Disagree 0%	Strongly disagree 0%
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Comments:

- Why is there no severe scenario for Oahu?
- Because this scenario is not as complex i recommend addressing it later than first.
- Recovery will likely differ by island and facilities affected
- That severe case represents a long Island wide black out for Maui
- As long as fire risk areas have been matched with critical facilities this is fine
- Six months for severe, might be best case scenario
- Does HECO de-energize lines if fire threatens power poles as in California right now with forced blackouts?
- Would lightning strikes be assumed to be covered by wildfire scenarios? There was island-wide outage due to lightning on oahu
- Cross island lines destroyed in Maui by Central fire should be considered as second moderate

The assumed grid impacts seem reasonable for the physical / cyber attack threat scenario described.

Strongly agree 8%	Agree 50%	Neutral 33%	Disagree 0%	Strongly disagree 8%
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Comments:

- Cyber attack ETR of 8 hours could be underestimated for severe scenario
- Is there any value in exploring impacts if all transformers at a substation were taken out rather than 50% recovered in two weeks?
- Don't you keep spares of the most critical substation transformers?
- Severe cyber could takeout more equipment
- Don't think severe scenario is "severe" enough. Assumed coordinated attack and limiting to just two may not be sufficient

The assumed grid impacts seem reasonable for the volcano threat scenario described.

Strongly agree 18%	Agree 53%	Neutral 24%	Disagree 6%	Strongly disagree 0%
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Comments:

- The potential impacts of a severe eruption are understated
- Might not be severe enough; activity could last more than a month
- Moderate PGV available if you restore it
- Volcano - consider impact of flow from Mauna Loa in Hilo direction as happened in 1980's
- Couldn't lava flows cut off highways?
- Could prevent any restoration efforts for the entire period.
- Might consider moderate scenario for another large Kilauea eruption
- As in 2018, timeframe of one-month limited access maybe too short
- Include USGS HVO to check scenario realism

Incorporation of Resilience Inputs into the Hawaiian Electric Companies' Integrated Grid Planning Process (slides 41-47)

Participants were given examples of how Hawaiian Electric will evaluate resilience against the proposed threat scenarios described such as assumptions, solution options and more.

Meeting Sift Results

Rate your level of agreement with the Other Objectives.

Strongly agree 20%	Agree 67%	Neutral 13%	Disagree 0%	Strongly disagree 0%
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Comments:

- Given importance of resiliency, shouldn't be reduced to cost only
- Might need resiliency number for both grid in general and for critical facilities
- Need to include avoided costs and costs of inaction. How do we incorporate less tangible costs (e.g. economic disruptions)
- Important to prioritize critical facilities and evaluate possible shared responsibilities to share costs

Rate your level of agreement with the Assumptions.

Strongly agree 14%	Agree 71%	Neutral 14%	Disagree 0%	Strongly disagree 0%
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Comments:

- Potential partnerships with large critical customers
- Infrastructure customers for other utilities: potable water etc

Rate your level of agreement with the Solution Options.

Strongly agree 6%	Agree 76%	Neutral 18%	Disagree 0%	Strongly disagree 0%
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Comments:

- Distributed storage
- Islanding function?
- Community Acceptance could be a solution option
- Might want include utility control of customer sited resources
- Culturally appropriate, community accepted, community owned assets
- Why is only solar and wind called out separately? why not RE in general?
- Selectively Minimize overhead transmission lines. But weigh high cost.
- Does a program solution (e.g., DR) fit within technology solutions?
- Does mobile solutions (e.g., portable thermal or renewable resources, mobile storage, etc.) fit within DER?
- Any synergies with coordinating customer equipment and other energy sources (e.g., gas company) to recover sooner?
- Weight acceptable Risk. Risk Management

Next Steps and Closing Remarks (slides 48-51)

Utility staff explained that the next two meetings will cover the outline of the final report as well as a final chance in December to review and provide comments to the final report.