WELCOME AND OPENING REMARKS
Housekeeping

- Restrooms – Code: 3698
- Emergency exits
- Parking validation
- Confidentiality
Recap of Previous Meeting

**PURPOSE**

- Confirm priorities for severe threats by island
- Develop details of customer/sector capabilities and needs

**PROCESS OVERVIEW**

1. Raise awareness
2. Define resilience
3. Define priorities
4. Identify potential impacts
5. Identify/assess options
6. Put it all together

**BREAKOUT SESSIONS**

Ascertaining customer/sector needs and capabilities to perform essential functions post Category 4 hurricane that causes major outages on all islands

1. Seven days
2. Three weeks and beyond

**LESSONS LEARNED**

- Fuel resupply is a critical issue for all sectors
- Ports and roadway access are critical to fuel resupply
- Interdependencies among sectors
Recap of Previous Meeting

Sample Threat Ranking for Maui

MeetingSift Results for Island of Maui
Total Points Based on Votes for Each Rank

- Hurricane
- Tsunami
- Wild fire
- High winds
- Flooding
- Cyber attack
- Fuel supply
- Demand (system issues and threats)
- Lightning
- Earthquake
- Physical attack
- Landslide
- Resources (eclipse/strike)
- Greenhouse Gas Emissions
- Volcanic activity

Ranked 1st, Ranked 2nd, Ranked 3rd, Ranked 4th, Ranked 5th

9/19/2019
Recap of Previous Meeting

Major Points from Breakout Discussions

Challenges

• Communications including cell service may be out
  ➢ Radio and satellite critical
• Port closures critical to fuel and other supplies
• How to handle fatalities?
• Road accessibility key to comm, cargo and fuel transport

Beyond 7 days – severe degradation of services across most sectors without fuel resupply
OVERVIEW AND PLAN FOR THE DAY
IGP RWG Process Overview

Today

1. Raise awareness
2. Define resilience
3. Define priorities
4. Identify/map potential impacts
5. Identify/assess/discuss options
6. Put it all together
# Meeting Objectives

<table>
<thead>
<tr>
<th>1</th>
<th>Preliminary understanding of power system strengths and vulnerabilities to severe threats</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Consolidate severe threats for integrated planning scenarios</td>
</tr>
<tr>
<td></td>
<td>• Understand grid strengths, vulnerabilities and potential mitigation strategies</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>2</th>
<th>Consensus on capabilities of critical infrastructure and customer segments under severe event scenarios</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Consensus on priority list of customers/sectors</td>
</tr>
<tr>
<td></td>
<td>• Capabilities, needs and interdependencies of key sectors</td>
</tr>
<tr>
<td></td>
<td>• Potential customer/sector mitigation strategies</td>
</tr>
</tbody>
</table>
Meeting Agenda

8:55
Threat Scenarios

9:40
Utility Systems Overview

10:15
Exercise: Customer Capabilities and Needs

12:15
Next Steps and Closing Remarks

8:30
- Welcome
- Recap Prior Meeting
- Objectives and Agenda

9:30
Break

11:00
Break
Handouts

- Agenda/Chatham House Rules
- Exercise worksheets (3 count)
- Contact information
- Evaluation Form
- Meeting Schedule
THREAT SCENARIOS FOR INTEGRATED GRID PLANNING (PART 1)
Characteristics and Vulnerabilities of Existing Electricity Infrastructure – O‘ahu

Characteristics

Major Vulnerabilities
Characteristics and Vulnerabilities of Existing Electricity Infrastructure – Hawai‘i Island

Characteristics

Major Vulnerabilities
Characteristics and Vulnerabilities of Existing Electricity Infrastructure - Maui
Characteristics and Vulnerabilities of Existing Electricity Infrastructure – Moloka‘i

Characteristics

Vulnerabilities
Characteristics and Vulnerabilities of Existing Electricity Infrastructure – Lānaʻi

Characteristics

Vulnerabilities
Potential Factors Affecting Recovery Times
Some Worst Case Scenarios May Have Weeks to Months for Full Restoration

**Generation**
- Fuel supply
- Harbor and port facilities

**Transmission**
- Spare material and supplies
- Access to difficult sites
- Availability of helicopter support
- Resources – personnel, equipment, tools

**Distribution**
- Spare material and supplies
- Access (road clearing)
- Resources – personnel, equipment and supplies
### Potential Grid Mitigation Strategies

#### Grid planning
- Transmission reinforcements, alternative paths
- Mix and location of generation
- Distributed energy resources
- Microgrids for key loads (connected to grid normally – available for self-supply in emergency)

#### System hardening
- Upgrade structures
- Underground cabling
- Increased wind withstand ratings

#### Emergency preparations
- Fuel assurance and increased storage
- Alternative port and delivery options for emergencies
- Increased amounts of critical supplies
BREAK
THREAT SCENARIOS FOR INTEGRATED GRID PLANNING (PART 2)
### Prioritization of Critical Threats

**Consolidating Scenarios for Integrated Planning**

<table>
<thead>
<tr>
<th>Threat</th>
<th>Includes</th>
<th>Oahu</th>
<th>Hawai'i</th>
<th>Maui</th>
<th>Moloka'i</th>
<th>Lana'i</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hurricane</td>
<td>Flood, Wind</td>
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<tr>
<td>Tsunami</td>
<td>Earthquake</td>
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<td>Fuel Disruption</td>
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<tr>
<td>Wild Fire</td>
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<td>Cyber Attack</td>
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<td>Physical Attack</td>
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<td>Volcano</td>
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<tr>
<td>Demand</td>
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<tr>
<td>Resources</td>
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<td>Greenhouse Gas</td>
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<td>Landslide</td>
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<tr>
<td>Lightning</td>
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</tr>
</tbody>
</table>
Prioritization of Critical Threats – O‘ahu
Results from August 29 Meeting

MeetingSift Results for Island of Oahu
Total Points Based on Votes for Each Rank

- Hurricane
- Tsunami
- Flooding
- Cyber attack
- High winds
- Fuel supply
- Earthquake
- Physical attack
- Demand (system issues and threats)
- Resources (eclipse/strike)
- Wild fire
- Greenhouse Gas Emissions
- Landslide
- Volcanic activity
- Lightning

- Ranked 1st
- Ranked 2nd
- Ranked 3rd
- Ranked 4th
- Ranked 5th
Prioritization of Critical Threats – Hawai‘i Island
Results from August 29 Meeting

MeetingSift Results for Island of Hawaii
Total Points Based on Votes for Each Rank

- Hurricane
- Volcanic activity
- Tsunami
- Earthquake
- Flooding
- High winds
- Fuel supply
- Demand (system issues and threats)
- Cyber attack
- Landslide
- Physical attack
- Wild fire
- Resources (eclipse/strike)
- Lightning
- Greenhouse Gas Emissions

Ranked 1st
Ranked 2nd
Ranked 3rd
Ranked 4th
Ranked 5th
Prioritization of Critical Threats – Maui
Results from August 29 Meeting
Prioritization of Critical Threats – Moloka‘i
Results from August 29 Meeting

MeetingSift Results for Island of Molokai
Total Points Based on Votes for Each Rank

- Hurricane
- Tsunami
- Flooding
- Fuel supply
- High winds
- Wild fire

Demand (system issues and threats)
- Cyber attack
- Lightning
- Earthquake
- Physical attack
- Greenhouse Gas Emissions
- Landslide
- Resources (eclipse/strike)
- Volcanic activity

Legend:
- Ranked 1st
- Ranked 2nd
- Ranked 3rd
- Ranked 4th
- Ranked 5th
Note three threat scenarios could be common to all five islands

Remaining threat scenarios vary by island
RESILIENCE EXERCISE: CUSTOMER/SECTOR CAPABILITIES AND NEEDS

(PART 1)
Objectives and Ground Rules for Exercise

Objectives

• Identify, in more detail, entities within each key sector
• Validate key customer/sector capabilities and needs following a severe event and extended loss of power, including fuel supply challenges
• Identify sector interdependencies
• Provide stakeholder inputs to RWG report on key customer sector grid resilience needs under various threat scenarios
• Identify potential mitigation strategies by sector

Ground Rules

• Offer as much input and ideas as possible; be inclusive
• If you feel information is missing, state assumptions and provide inputs based on those assumptions
• Focus is on role of the grid and power supply, not overall recovery from the emergency
BREAKOUT SESSION 1
## Criteria for Identifying Customers/Sectors

<table>
<thead>
<tr>
<th>Tier 1</th>
<th>Tier 2</th>
<th>Tier 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Essential for national security and/or public safety and health</td>
<td>Important for national security, public safety and health, and other essential services</td>
<td>Remaining customers</td>
</tr>
<tr>
<td>Essential for power system restoration</td>
<td>Supports power system restoration</td>
<td></td>
</tr>
<tr>
<td>Power should be restored within minutes up to several hours (by utility or backup resource)</td>
<td>Power should be restored within hours up to several days (by utility or backup resource)</td>
<td></td>
</tr>
</tbody>
</table>
Suggested Priorities for Customers/Sectors

Tier 1
• Military
• Telecommunications
• Hospitals and critical healthcare
• Water and wastewater
• Emergency management and first responders

Tier 2
• Transportation
• Hospitality
• Banking and finance

Tier 3
• Remaining customers
Summary of Backup Power and Fuel Capabilities

Interpreted from Breakout Notes August 29

- Telecom Switching Centers
- Large Hotels
- Military
- Airports and Harbors
- Hospitals
- Wastewater
- EMAs
- Telecom Remote Sites
- Other Healthcare
- Water
Even the most capable sectors are limited to 1 week or less without refueling
Key Customers by Sector

Handouts

• See handouts distributed by your facilitator

Key customers

• Specific facilities or locations that are mission critical within each Tier 1 and Tier 2 sector

Capabilities

• Back-up power abilities including ability to resupply fuel
Breakout Session 1 Questions

Please Answer Across Threats and Islands

1. Are proposed criteria for identifying critical customers/sectors acceptable?

2. Is your sector in the correct tier? If not, explain.

3. Is proposed list of key customers accurate for your sector? Any changes or additions?

4. Are the backup power capabilities and fuel resupply challenges accurate for your sector? Any changes or additions?
BREAK
RESILIENCE EXERCISE: CUSTOMER/SECTOR CAPABILITIES AND NEEDS

(PART 2)
REPORT ON BREAKOUT SESSION 1
Sector Interdependencies

**Electricity**
- All sectors need power restored as soon as possible

**Telecommunications**
- All sectors need cell, landline, and data communications as soon as possible

**Transportation**
- Road access is critical to most other sectors
- Airports and ports critical for fuel and supplies for recovery

**Water and wastewater**
- All sectors require water and wastewater support

**Banking and finance**
- Required to pay employees and critical supplies

**Emergency management, hospital, hospitality**
- All sectors need housing facilities and healthcare
Breakout Session 2 Question

Please Answer Across Threats and Islands

Is the list of sector interdependencies valid?
What additional details would you provide?
REPORT ON BREAKOUT SESSION 2
In addition to backup power supply and refueling provisions, what other customer/sector mitigation strategies are recommended for your sector to improve resilience from the priority threats and power outages?
REPORT ON BREAKOUT SESSION 3
NEXT STEPS AND CLOSING REMARKS
Next Steps

- Meeting presentation and summary will be emailed to you and made available on the IGP website
  

- Evaluation form
IGP RWG Process Overview (Update)

October 28 Meeting Focus
- Mapping of threats, vulnerabilities, key customer needs and capabilities as compared to grid.
- Review of planning criteria and scenarios.

July 22
Raise awareness

Define resilience

Define priorities

Identify/map potential impacts

Identify/assess/discuss options

Put it all together

Today

November 20 December 16

October 28
Mahalo!