



**Hawaiian
Electric**

Resilience: Climate Risk Planning for Electric Systems

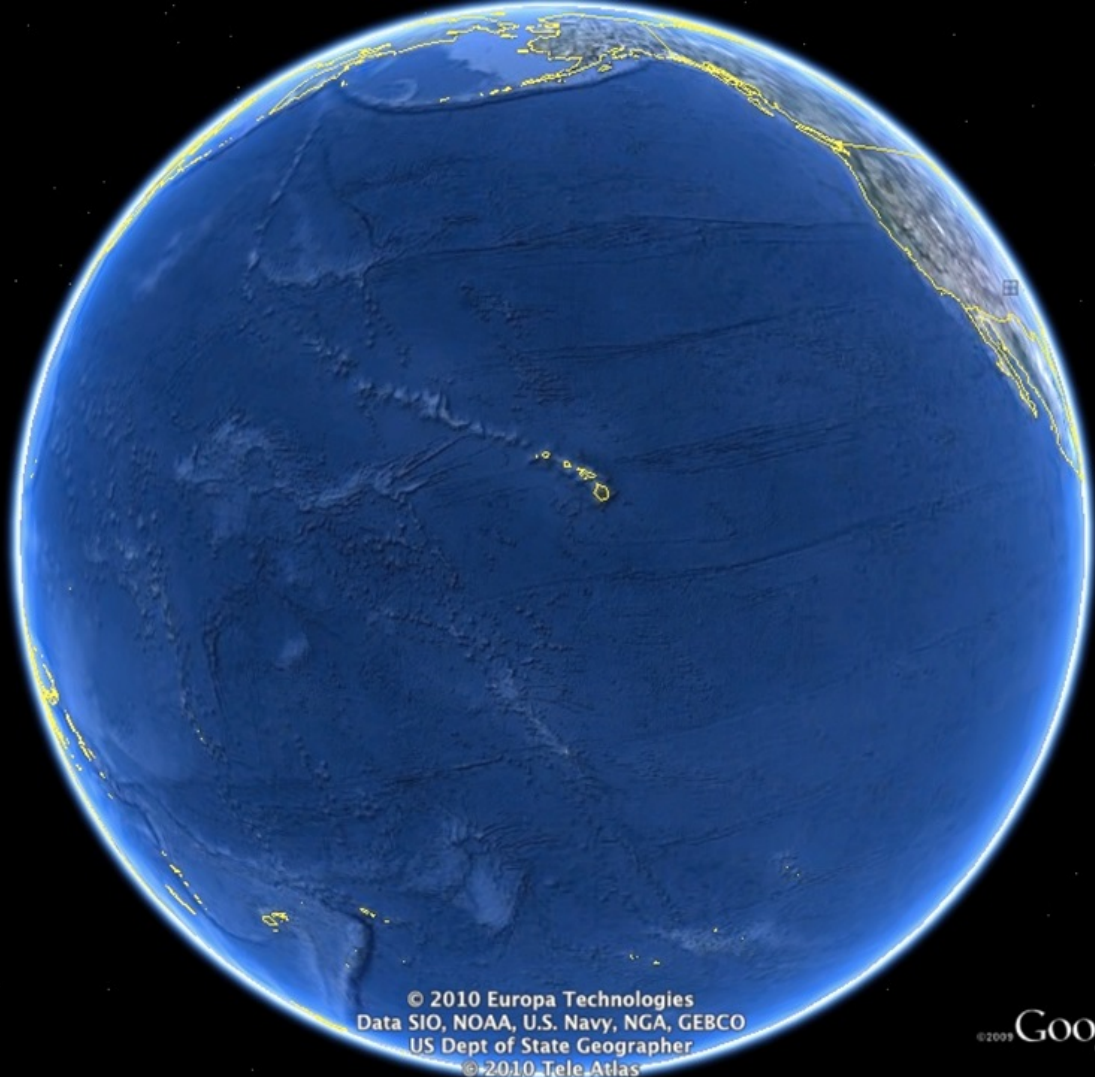
International Approaches to Climate Change
Planning and Adaptation in the Built and Natural
Environments

Colton K. Ching
Senior Vice President Planning & Technology

Some initial thoughts...

- ◆ Climate change focus in Hawaii has been on **mitigation** with renewable and greenhouse gas policies and laws
- ◆ **Adaptation** to climate change, including resilience, is an emerging area of focus by customers, communities, lawmakers, and regulators
- ◆ Electrification, increased reliance on technology, work from home, and other emerging trends will raise the expectation on the how reliable and resilient the grid should be
- ◆ Accounting for and planning with climate change is a part of our broader “integrated” planning for the grid





© 2010 Europa Technologies
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
US Dept of State Geographer
© 2010 Tele Atlas

©2009 Google

Hawaiian Electric's grid is made up of 5 separate and independent electrical systems

Island of O'ahu
Customers: 305,000



Islands of Maui, Moloka'i, and Lāna'i
Customers: 71,700



Island of Hawai'i
Customers: 54,000



Primary threat scenarios identified through in-depth stakeholder engagement



Threat Scenarios



Hurricane



Tsunami/Earthquake



Physical/Cyber Attack



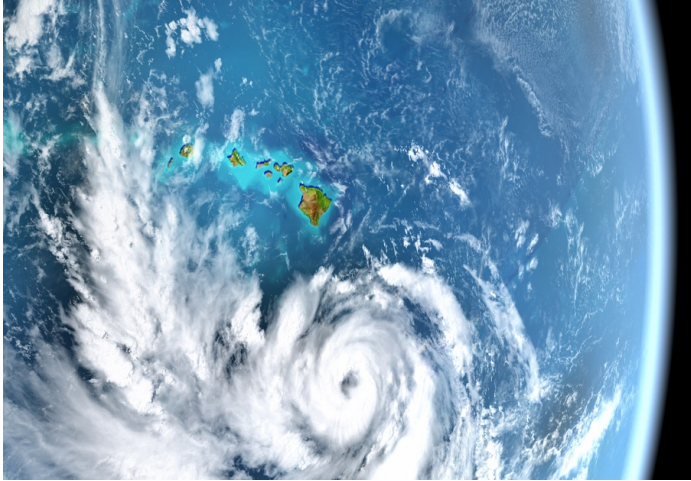
Wildfire



Volcano



Working to address ongoing climate risks



- ◆ Sea Level Rise / Climate Change
 - Working with State and County Agencies to align with the overall state adaptation plans
- ◆ Increasing Storm Severity
 - Using tools to inform resilience plans based upon future impacts



Incorporating cutting-edge tools to shape and prioritize resilience efforts



Climate Science
Forecasting Model



Damage Prediction
Modeling



Priorities and criteria informed by stakeholder engagement



Resilience Working Group



Strengthening Ko'olaupoko




Integrated Grid Planning
Open Houses





🔍 Search

 Year of Flood

Year

2050 ▼

⚠ Hazard Type

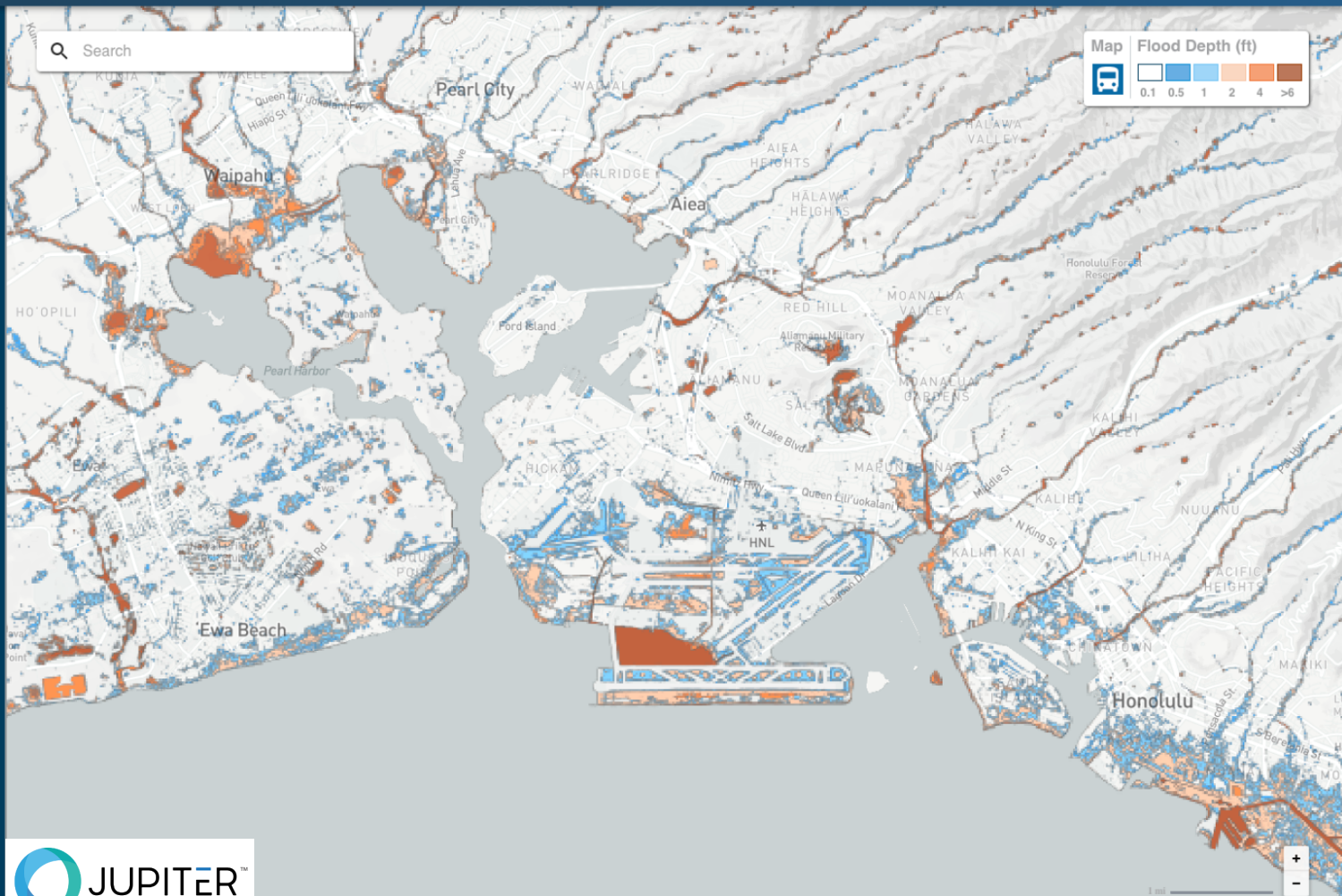
- ☐ Precipitation ⓘ
- ☐ Coastal Flooding ⓘ
- ☐ Seasonal High Tide ⓘ
- ☒ Combined ⓘ

Sea Level Rise

- ☐ Low SLR ⓘ
- ☐ Intermediate SLR ⓘ
- ☒ High SLR ⓘ

Data Display

- ☒ **Depth of Flooding**
For an event of annual likelihood
0.2% ▼
- ☐ Number of Flood Days
- ☐ Probability of Flooding





Parameters

Year of Flood

Year

2050 ▾

Hazard Type

☐ Precipitation ⓘ

☐ Coastal Flooding ⓘ

☐ Seasonal High Tide ⓘ

☒ Combined ⓘ

Sea Level Rise

☐ Low SLR ⓘ

☐ Intermediate SLR ⓘ

☒ High SLR ⓘ

Data Display

☒ Depth of Flooding

For an event of annual likelihood

0.2% ▾

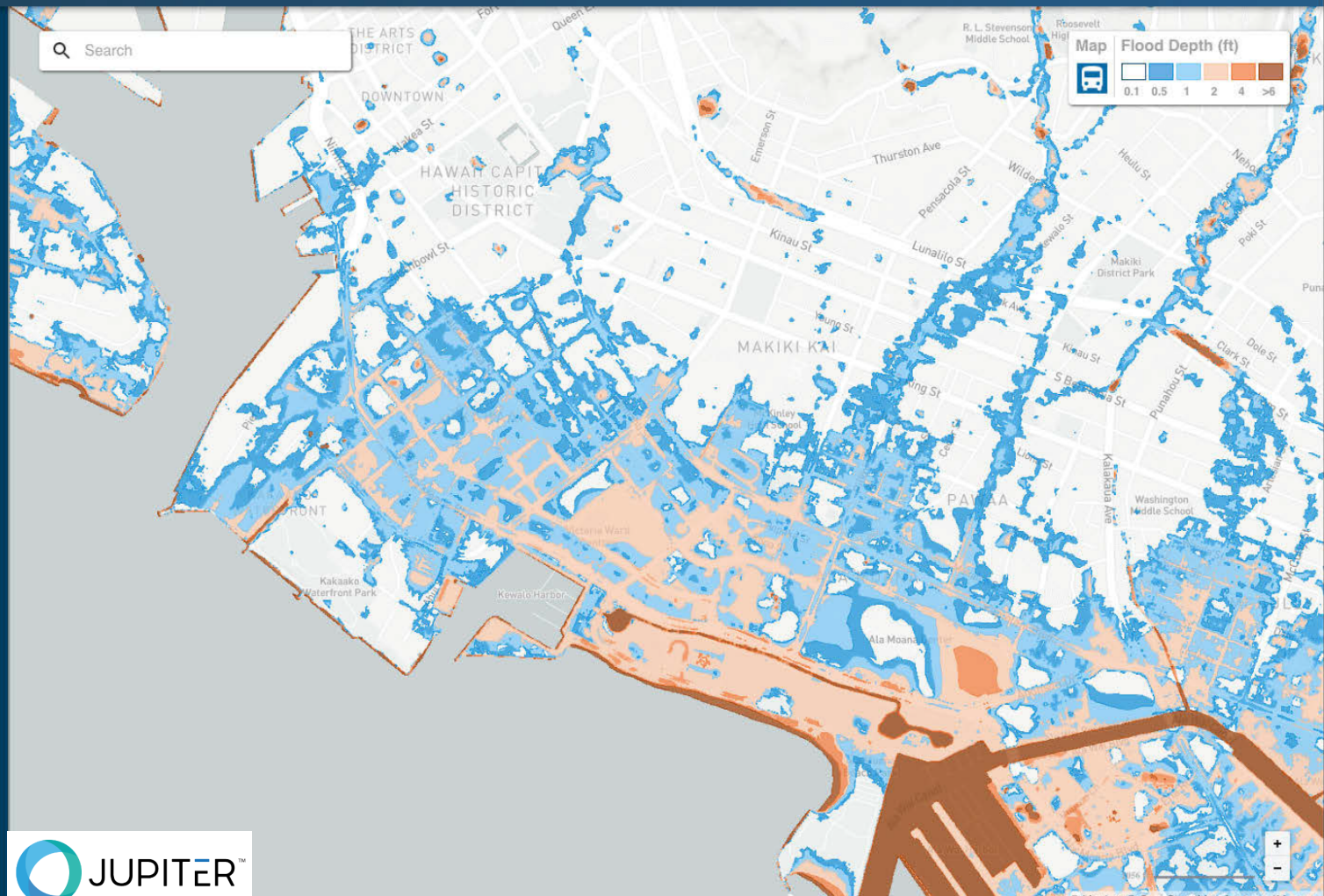
☐ Number of Flood Days

☐ Probability of Flooding

Search

Map Flood Depth (ft)

0.1 0.5 1 2 4 >6



Parameters

Year of Wind

Year

2030 ▼

Hazard Type

- ☐ Non-Trade sustained; sub-annual ⓘ
- ☐ Non-Trade gust; sub-annual ⓘ
- ☐ Trade sustained wind; sub-annual ⓘ
- ☐ Trade gust; sub-annual ⓘ
- ☐ Non-Trade sustained; extreme ⓘ
- ☐ Non-Trade gust; extreme ⓘ
- ☐ Trade sustained wind; extreme ⓘ
- ☒ Trade gust; extreme ⓘ

Emissions Scenario

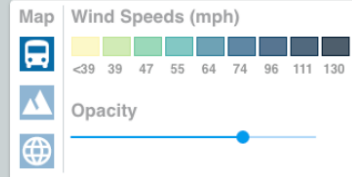
- ☐ RCP 4.5 ⓘ
- ☒ RCP 8.5 ⓘ

Data Display

- ☐ Wind Days
- ☒ Wind Speeds

Wind speeds for an annual probability of
1% ▼

Search



And some final thoughts...

- ◆ How can we further leverage climate modeling and simulation tools?
- ◆ We're all in the same canoe; there needs to be broad coordination across all infrastructure owners and government on hardening, resilience, and managed retreat
- ◆ There's an important role for policy to avoid making the threat and the adaptation challenge bigger
- ◆ Responding to climate change is a marathon that must start now





Mahalo!

Colton K. Ching
Senior Vice President Planning & Technology