Partnering with Utilities for Energy Resilience

Hosted by:

FEMP
Federal Energy Management Program

PSE
Puget Sound Energy
Each island is a separate grid
O‘ahu Distributed Solar PV Capacity Growth

Cumulative Installed Capacity (MW)

- 2005: 1 MW
- 2006: 2 MW
- 2007: 3 MW
- 2008: 8 MW
- 2009: 17 MW
- 2010: 28 MW
- 2011: 50 MW
- 2012: 119 MW
- 2013: 221 MW
- 2014: 283 MW
- 2015: 343 MW
- 2016: 400 MW
O‘ahu Demand Over Time

Customer Demand (MW)

Before Rooftop PV
O‘ahu Demand Over Time

Customer Demand (MW)

midnight  |  6am  |  noon  |  6pm  |  midnight
100       | 200   | 300    | 400   | 500
O‘ahu Demand Over Time

Customer Demand (MW)

midnight  6am  noon  6pm  midnight
O‘ahu Demand Over Time
O‘ahu Demand Over Time

Customer Demand (MW)
Oʻahu Demand Over Time

Customer Demand (MW)

midnight  6am  noon  6pm  midnight

100  200  300  400  500  600  700  800  900  1000  1100  1200
O‘ahu Demand Over Time

Customer Demand (MW)

midnight 6am noon 6pm midnight
Oʻahu Demand Over Time

Customer Demand (MW)

midnight 6am noon 6pm midnight
O‘ahu Demand Over Time

Customer Demand (MW)

midnight, 6am, noon, 6pm, midnight
O‘ahu Demand Over Time

Customer Demand (MW)

midnight  6am  noon  6pm  midnight
Oʻahu Demand Over Time

Customer Demand (MW)

midnight 6am noon 6pm midnight
Oʻahu Demand Over Time

Customer Demand (MW)

midnight
6am
noon
6pm
midnight
Oʻahu Demand Over Time

Customer Demand (MW)
O‘ahu Demand Over Time

Customer Demand (MW)

midnight 6am noon 6pm midnight
O‘ahu Demand Over Time

Customer Demand (MW)

midnight 6am noon 6pm midnight
O‘ahu Demand Over Time

Customer Demand (MW)

- midnight
- 6am
- noon
- 6pm
- midnight
Oʻahu Demand Over Time

Customer Demand (MW)

midnight 6am noon 6pm midnight
O‘ahu Demand Over Time

Customer Demand (MW)
O‘ahu Demand Over Time

Customer Demand (MW)

Today: RPS @ 22%
O‘ahu Capacity by Generation Type

- Slow Start (4-6 hours)
- Fast Start (10-30 minutes)
- Quick Start (<10 minutes)
- PV
- Wind

Peak Demand Range

Capacity (MW)

Predicted Growth by 2020

O'ahu Capacity by Generation Type

Capacity (MW)

Slow Start (4-6 hours)
Fast Start (10-30 minutes)
Quick Start (<10 minutes)
PV
Wind

Predicted Growth by 2020
O‘ahu Future Load Curve?
Partnership Opportunities

• Grid Enabled **Resilience**

• **Utility designed solutions** for multiple stakeholders
  – Grid/DOD Installation Resilience
  – Grid/DOD Renewable integration
  – Contingency Response - Enable First Responders

• Local Government/Regulators **Key stakeholders**
Schofield Generating Station

• 50 MW of multi-fuel capable, flexible, quick-starting reciprocating engine

• Micro-grid capability enhances resilience

• Contributes to RPS by:
  • Using biofuel
  • Enabling integration of as-available generation (wind/PV)

Resilient and Renewable
How Does the Army Microgrid Work?

Normal, Grid-tied Operations

Grid-tied Flexible Generation

GRID

Wahiawa Sub

GRID

Kunia
Schofield Barracks
WAAF
Schofield
How Does the Army Microgrid Work?

Contingency Operations: Microgrid

GRID

Kunia
Schofield Barracks
Wheeler
Schofield

32 MW Peak Load

50 MW

Island-wide Blackstart Capability
West Loch Annex PV: Navy-Owned Site

Interconnection Point for 20MW_{AC} PV System

46kV Sub-Transmission

Set realistic expectations early

Worked with Navy upfront to determine size of project that could interconnect to existing grid
Questions?

Kahe Gen Station – West Side Oahu