SunShot
U.S. Department of Energy

SHINES Kickoff Meeting 2016

SEAMS for SHINES

Integrating System to Edge-of-Network Architecture & Management for SHINES Technologies on High Penetration Grids

Hawaiian Electric
Maui Electric
Hawai'i Electric Light

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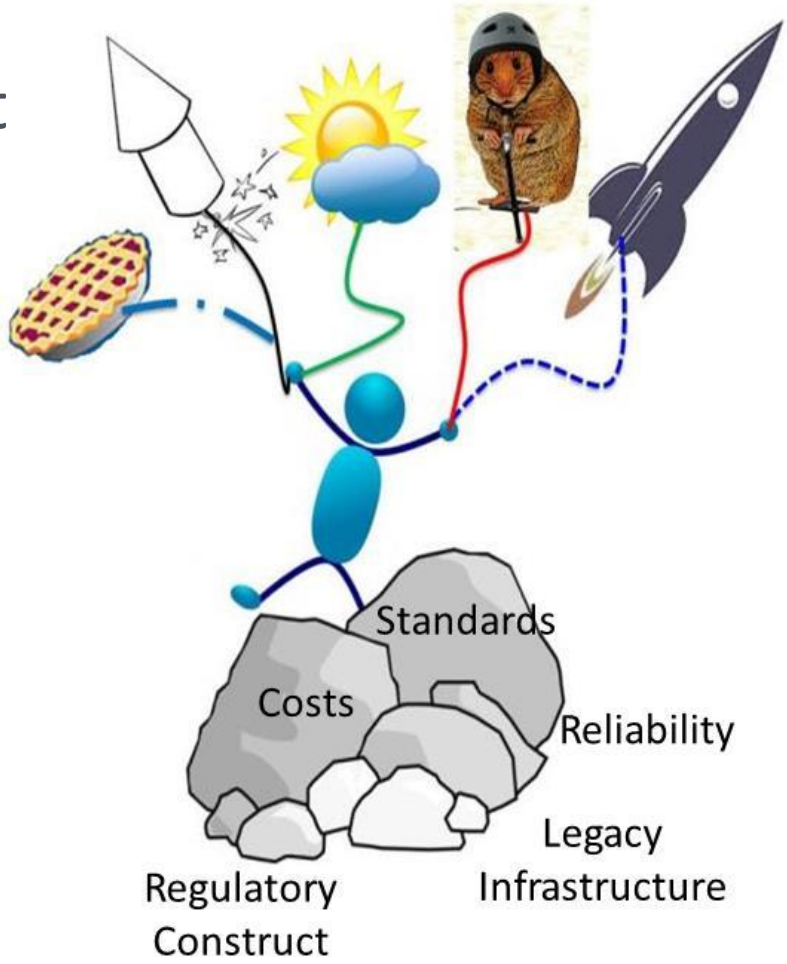
Director, Renewable Energy Planning
Hawaiian Electric Company
May 18, 2016, Washington DC

energy.gov/sunshot

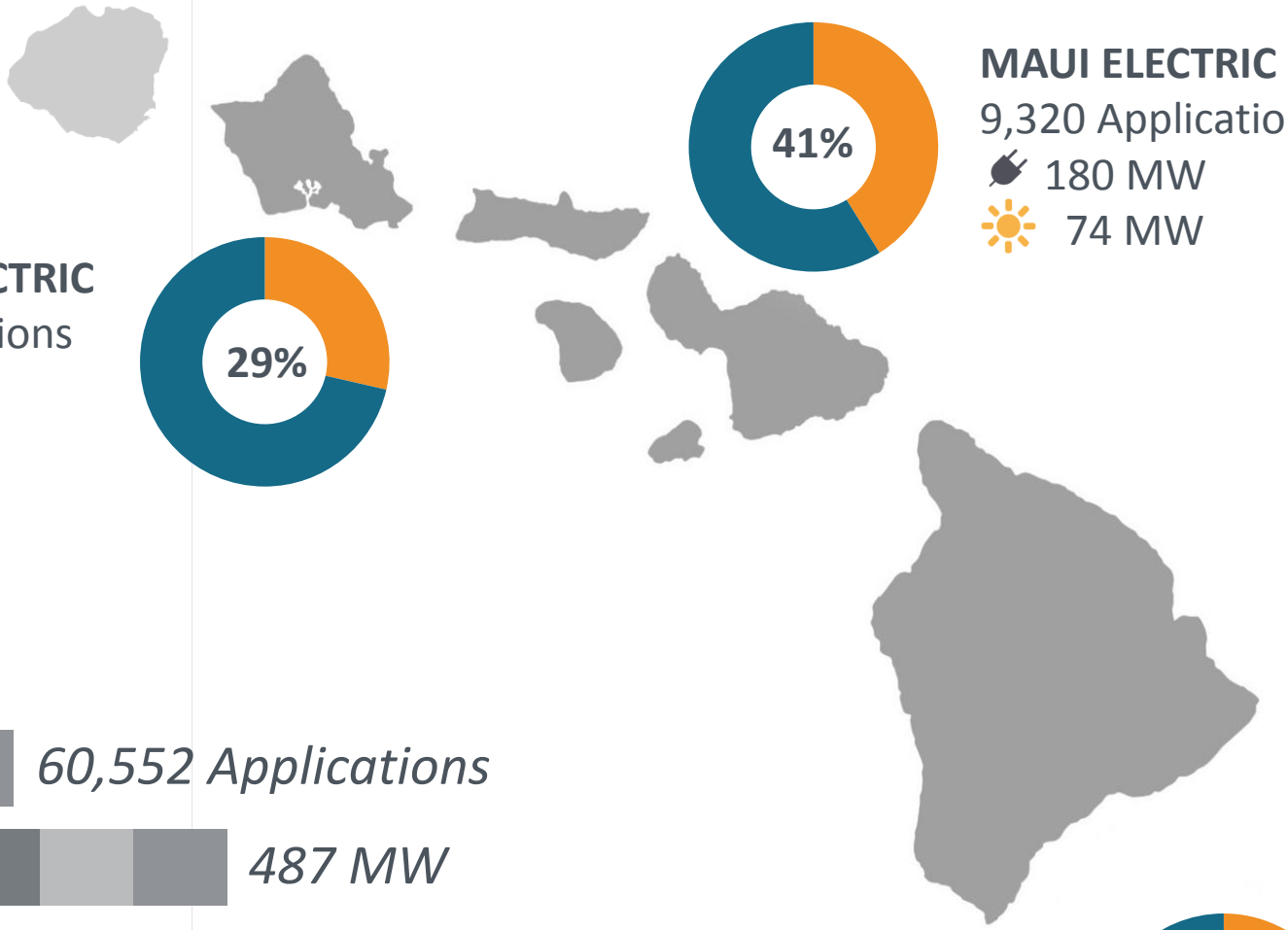
Renewable Energy Planning

Sharing Perspectives

- What are some of the biggest renewable integration challenges facing us today?
- How are we closing the gap?
- Ideas on how to mitigate, manage and solve?
- If you could wish for a solution, what would it look like?



Hawaii is the first state in the US with a 100% RPS



MAUI ELECTRIC
9,320 Applications
180 MW
74 MW

HAWAIIAN ELECTRIC
41,568 Applications
1200 MW
343 MW

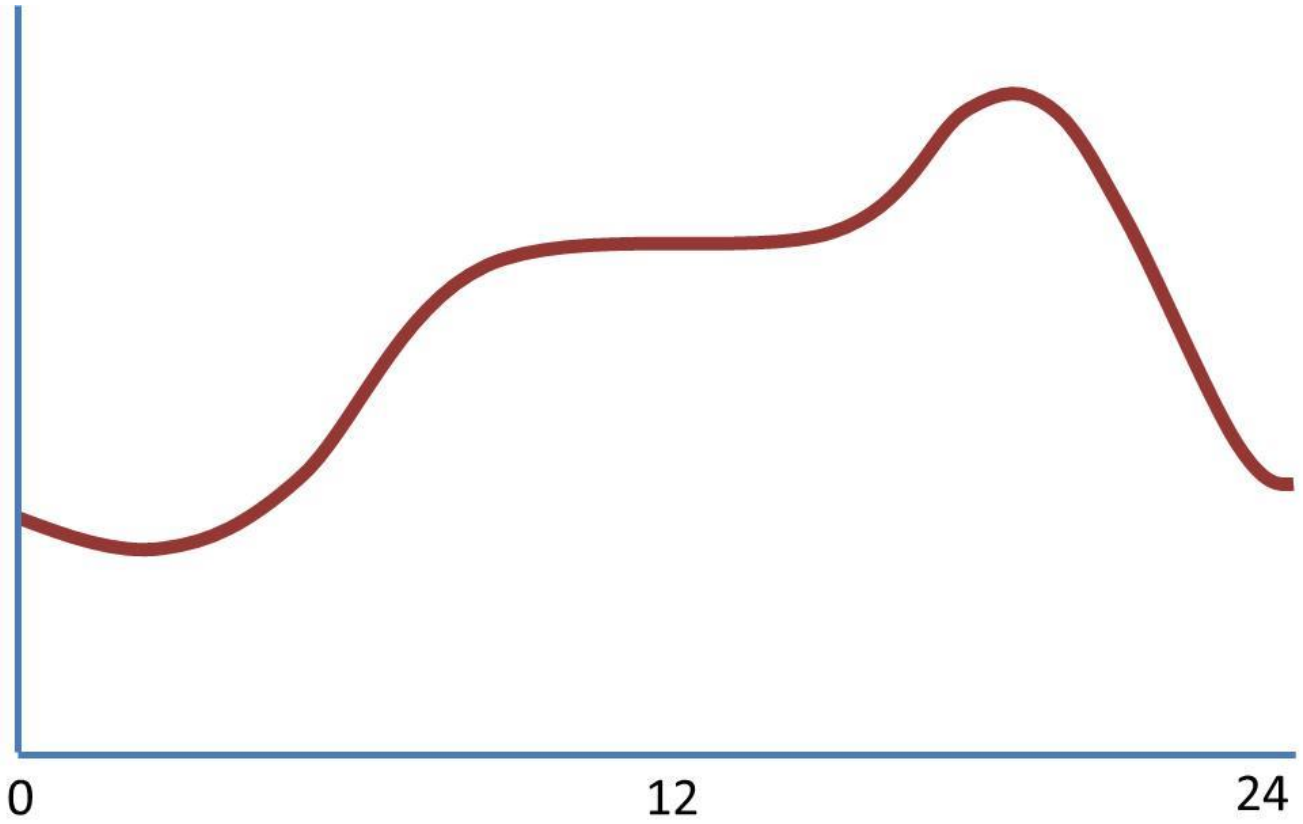
Tri-Company Totals

60,552 Applications

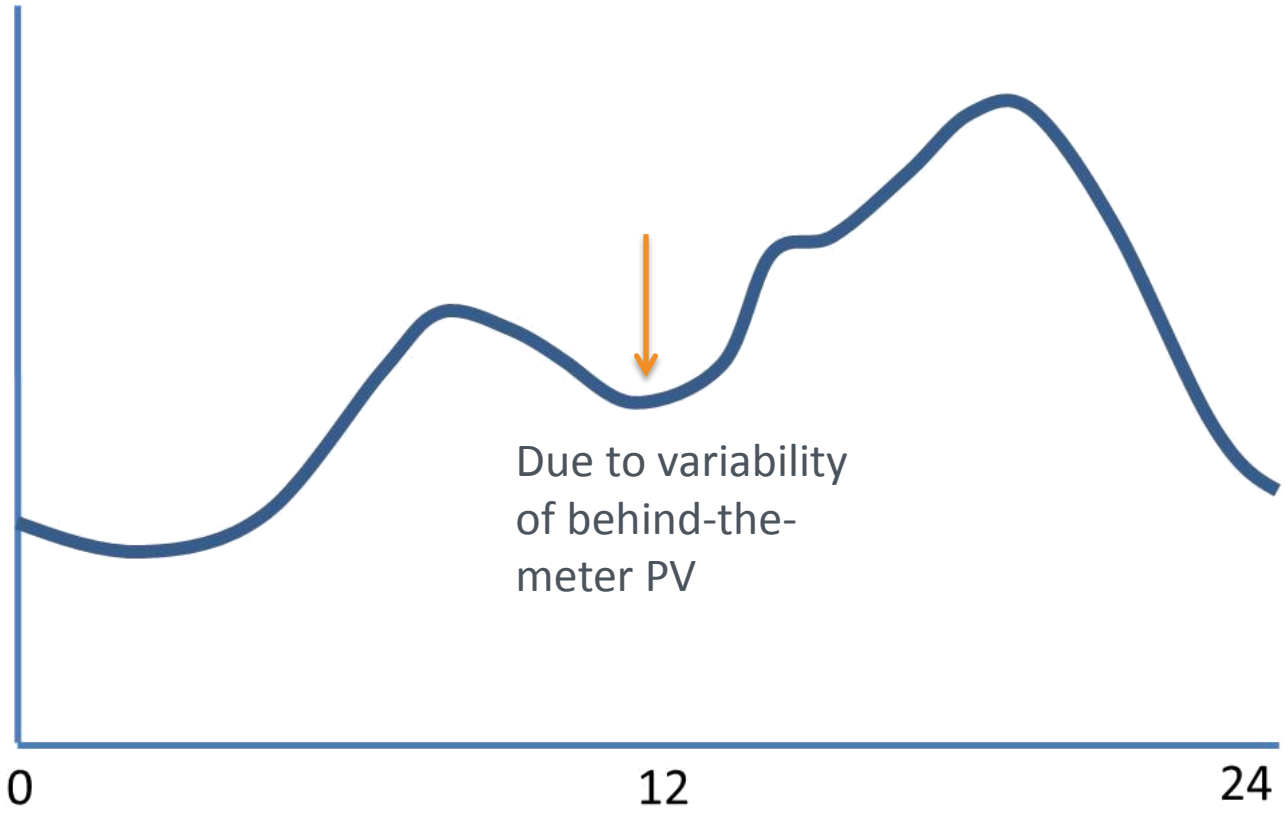
487 MW

HAWAII ELECTRIC LIGHT
9,664 Applications
180 MW
70 MW

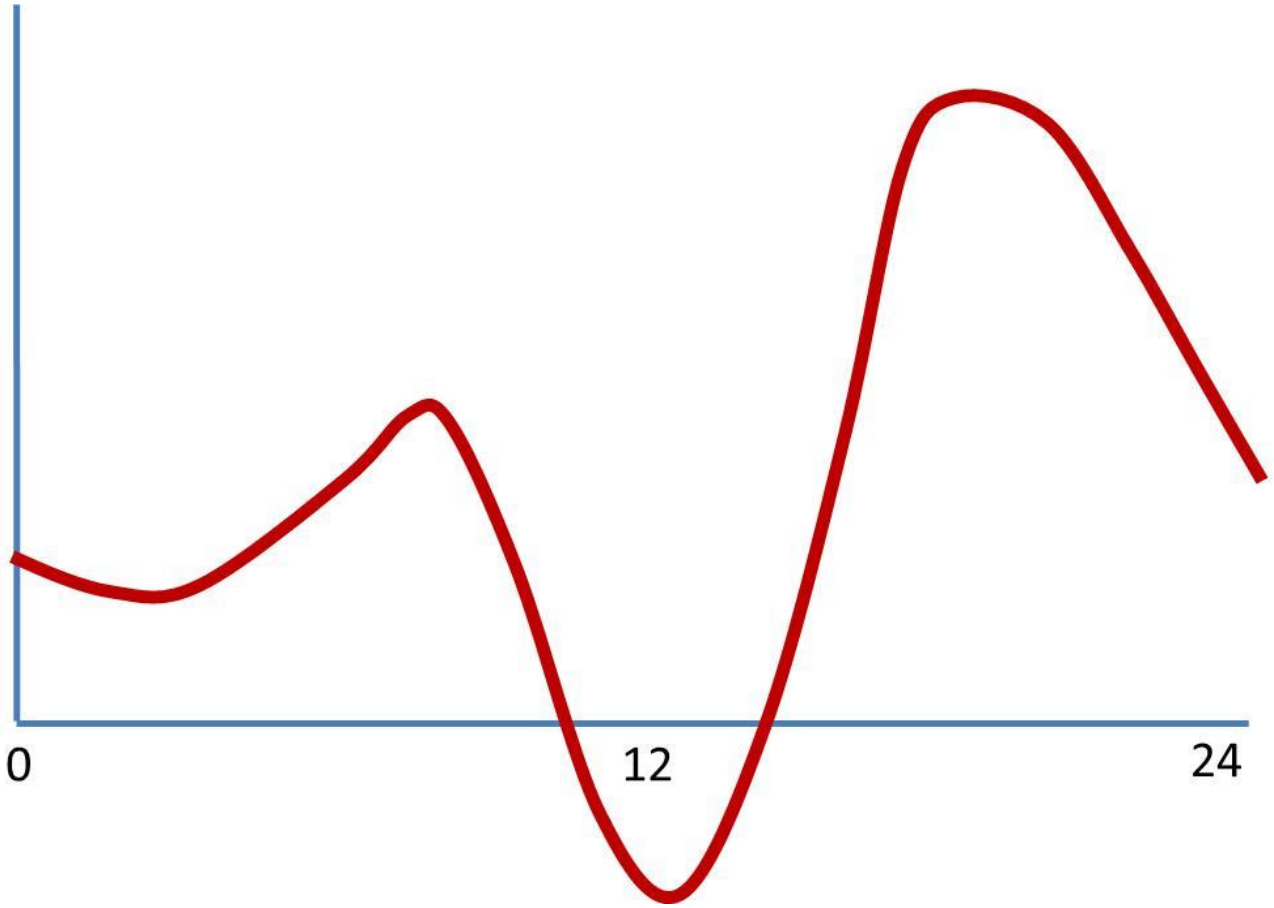
Our Current Condition



Our Current Condition

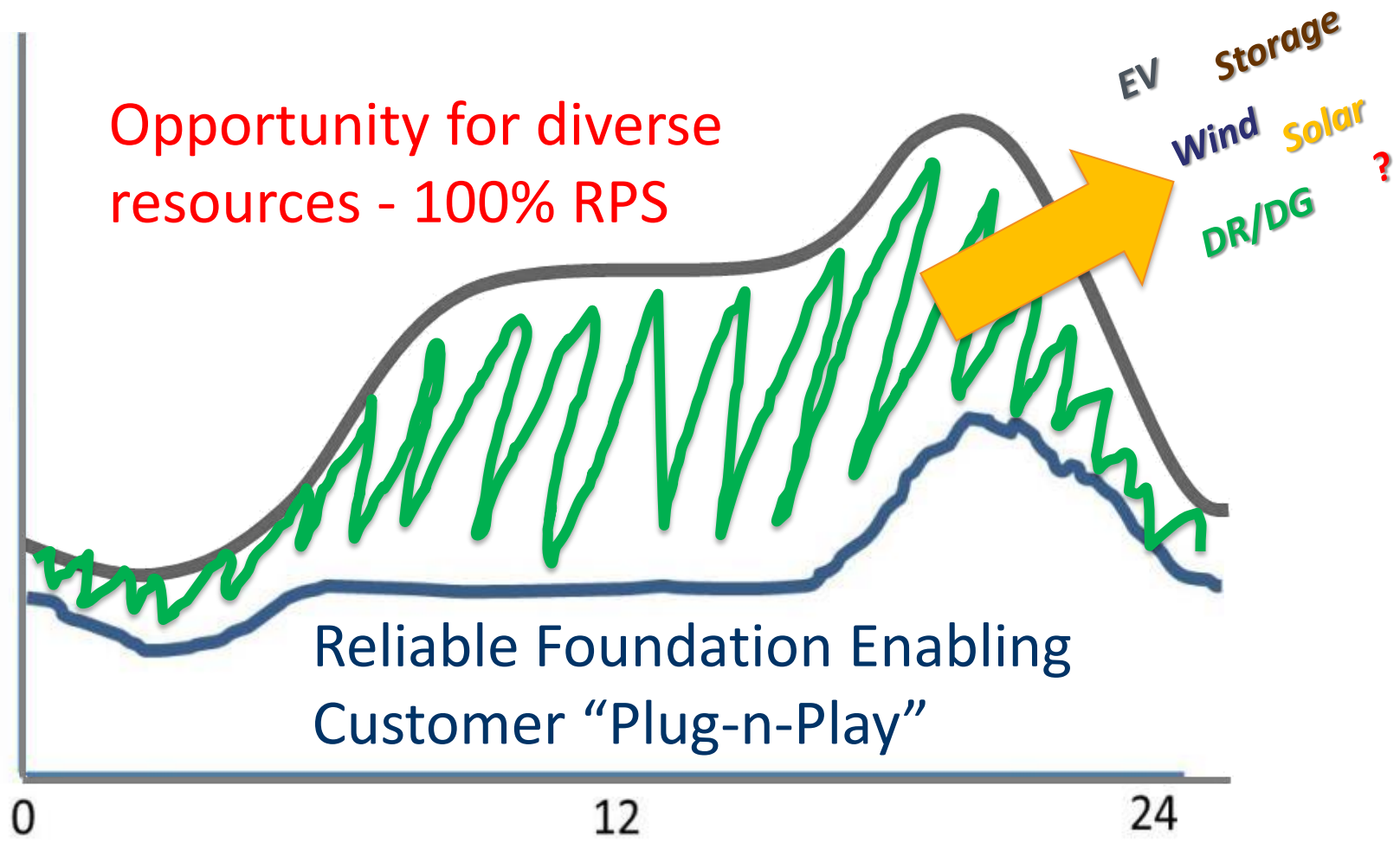


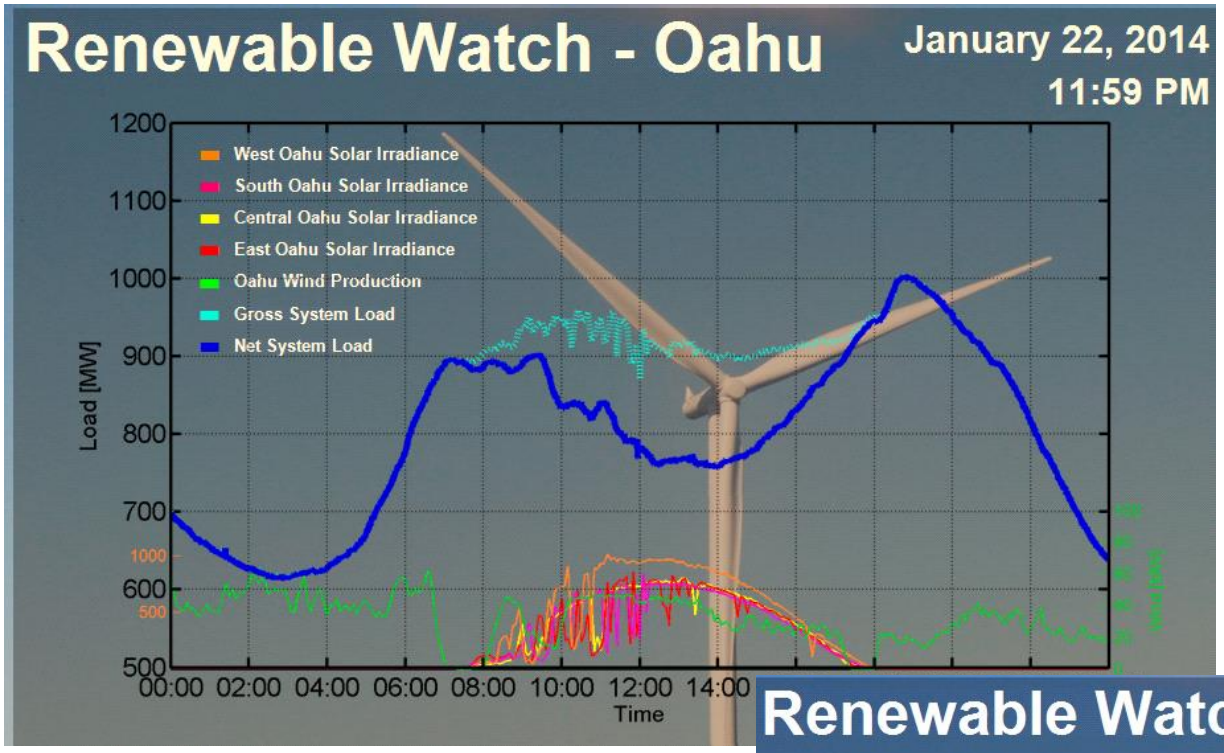
Our Current Condition



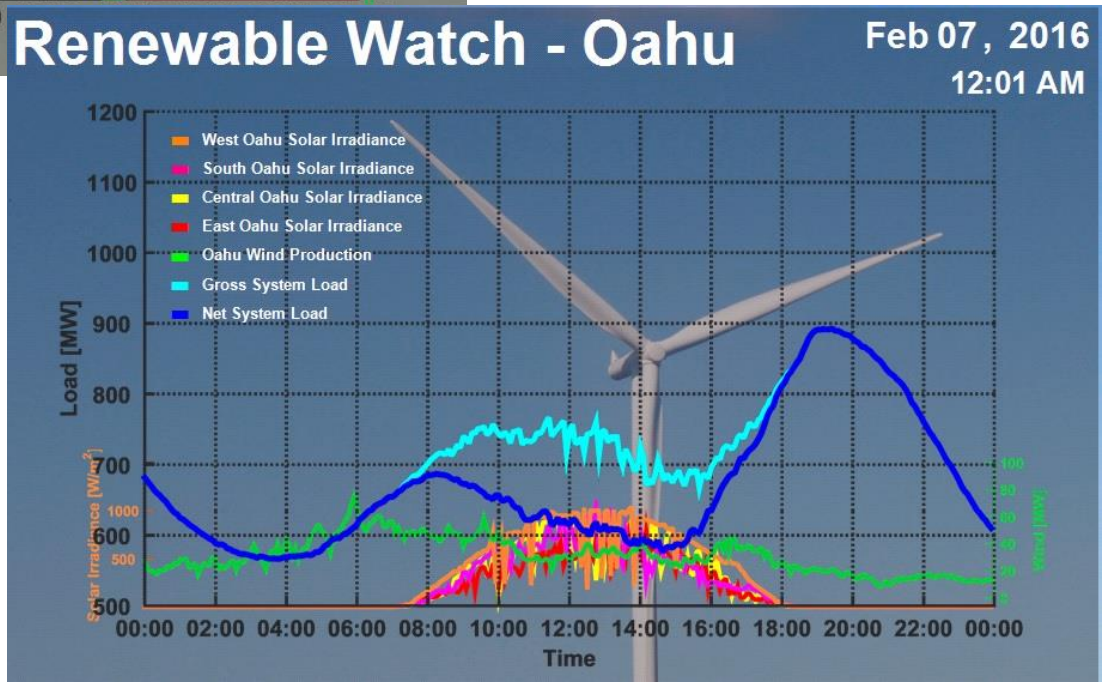
What's Our New Desired State?

Orchestrating Reliable Foundation for Alternatives





Reality



Source:
https://www.hawaiianelectric.com/clean-energy-hawaii/integration-tools-and-resources/renewable-watch

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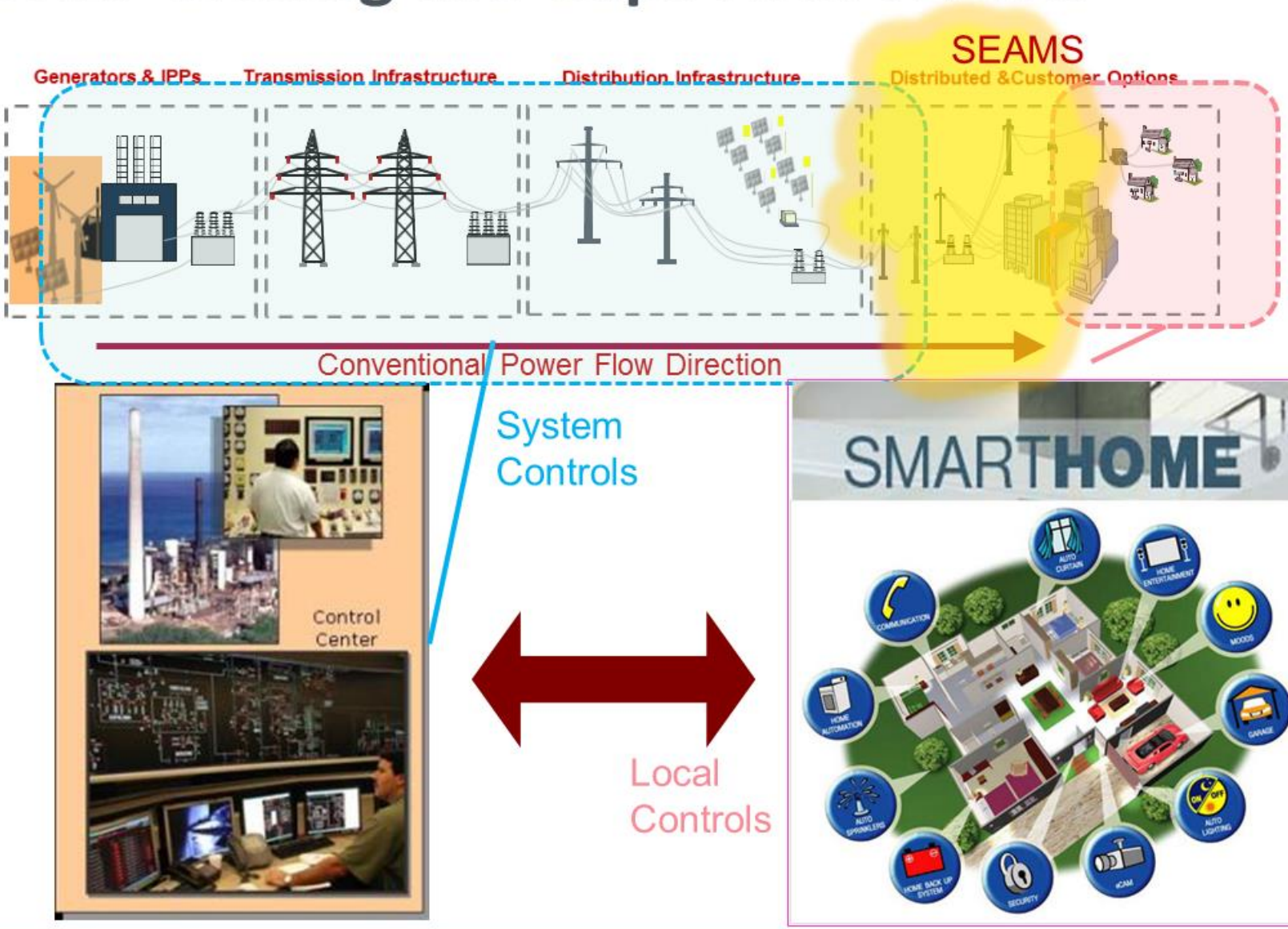
Hawai'i Electric Light

GOAL: Closing the Gaps with SEAMS



Seamless integration of “Seams” infrastructure (Communication, Monitoring, Data Analysis) “SEEING & MANAGING” DG and variable energy resources (DVER)

$$$$$ 4.9M

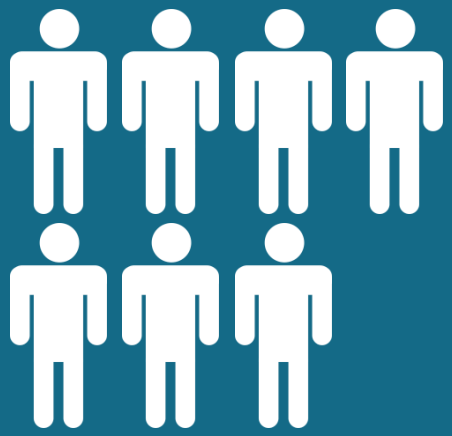
MARCH 01

36 month effort

SEAMS for SHINES

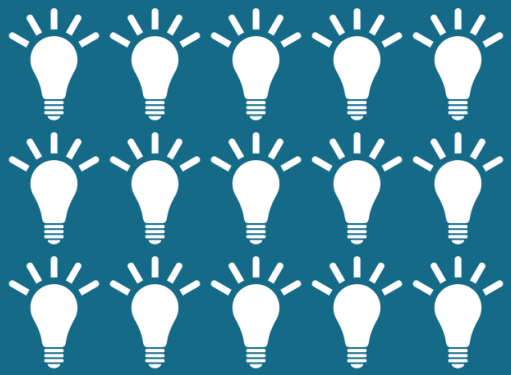
Integrating
System to Edge-of-Network Architecture and Management for SHINES
Technologies on High Penetration Grids

Sustainable and Holistic Integration of Energy Storage and Solar PV



Core Team

GE/Alstom, Siemens,
In2lytics,
AWS Truepower,
DNV GL,
Stem, Apparent,
Gridco, and others



UBAT

Utility &
Balancing Authority
Advisory Team

http://www.energy.gov/eere/sunshot/project-profile-hawaiian-electric-company-shines

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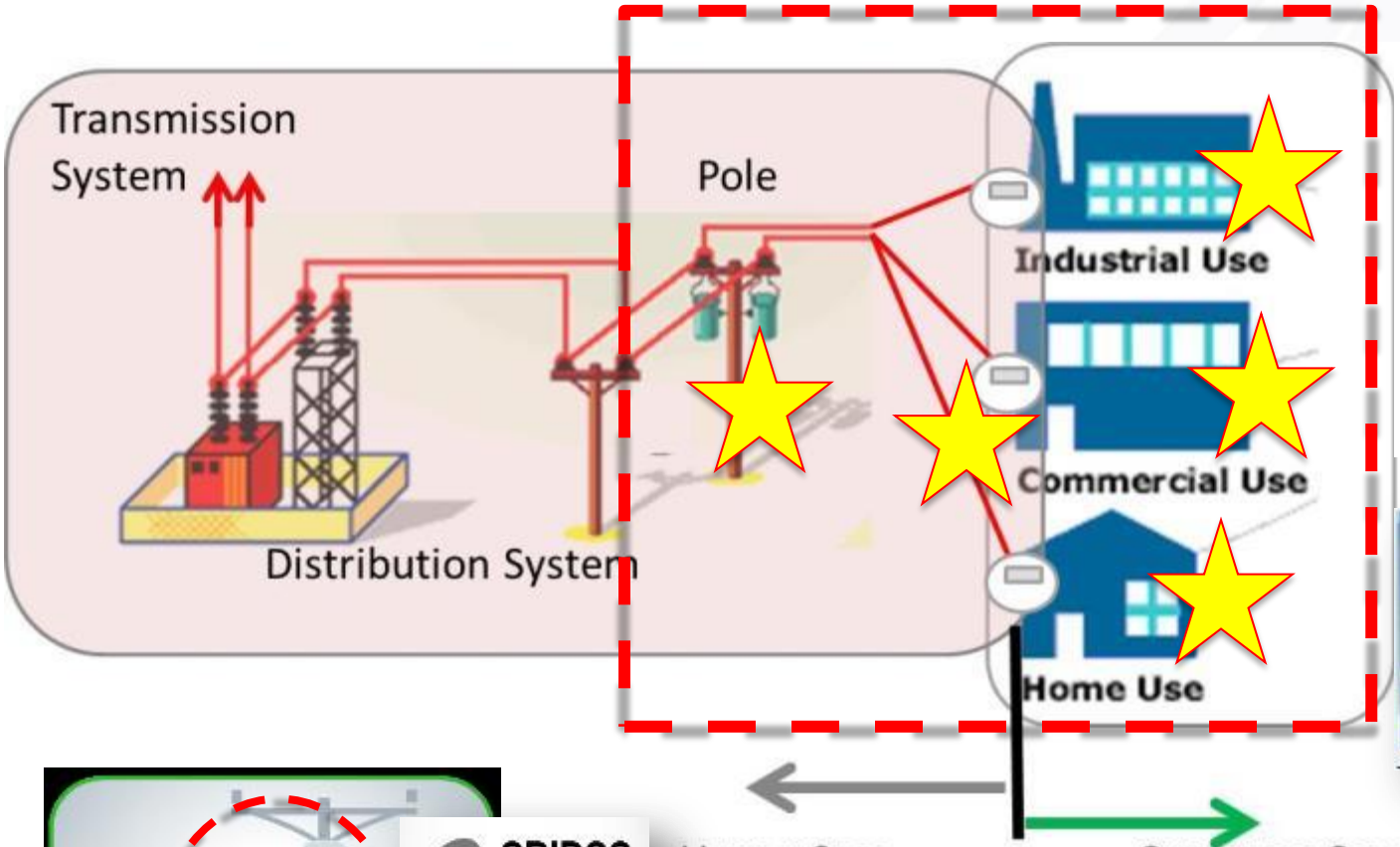
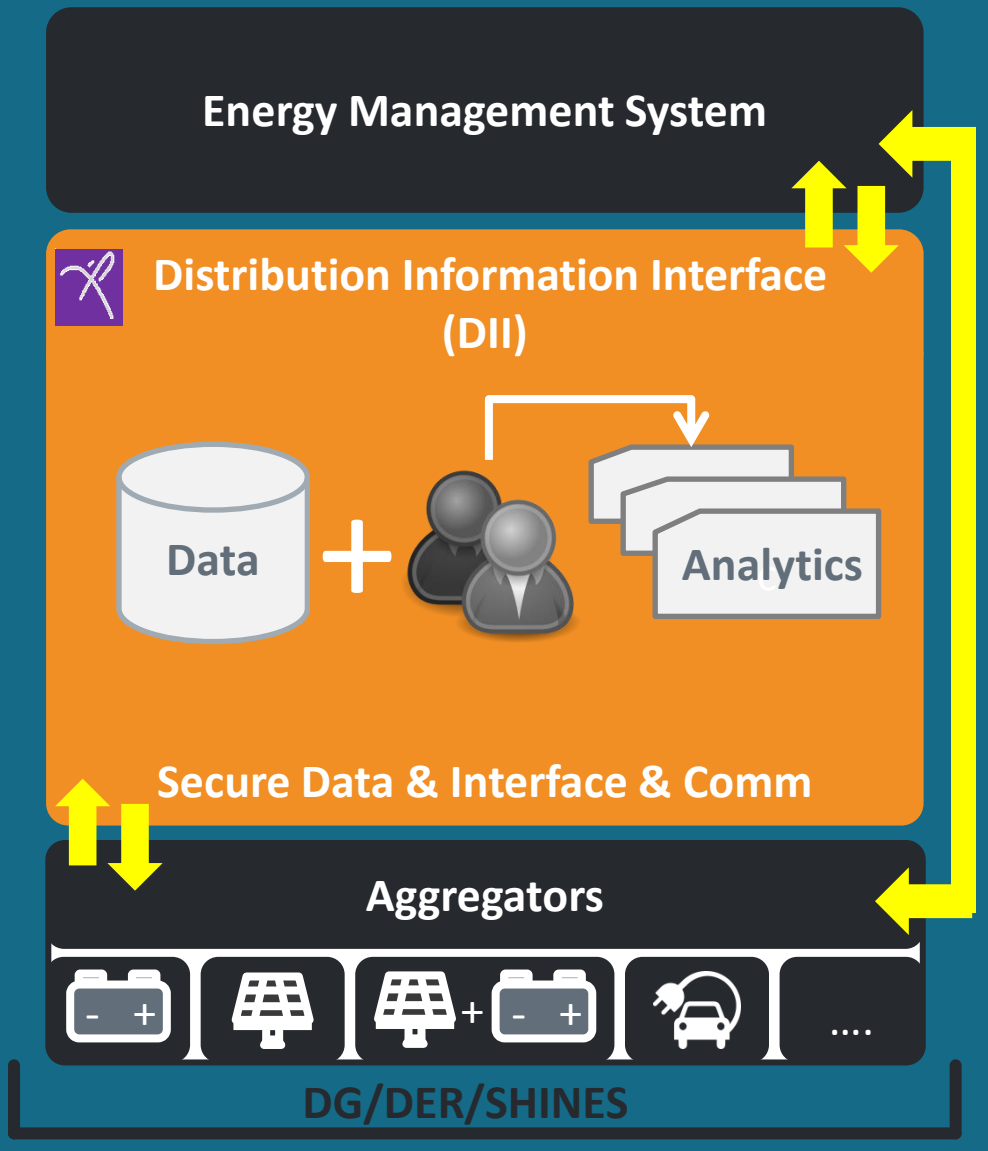
Approach: *Leverage Smart Technologies & Intelligence to Jumpstart Desired Edge-of-Network Capabilities*



GRIDCO SYSTEMS

ENERGY EXCELERATOR

peoplepower



EMS PLATFORMS

GE/Alstom

Siemens

SECURE DATA INTERFACE

In2lytics (Referentia)

RENEWABLE PRODUCTION FORECAST

AWS Truepower

SHINES TECHNOLOGIES

Stem

Apparent

Gridco

ECONOMICS EVALUATION

DNV GL

GOALS

STATUS

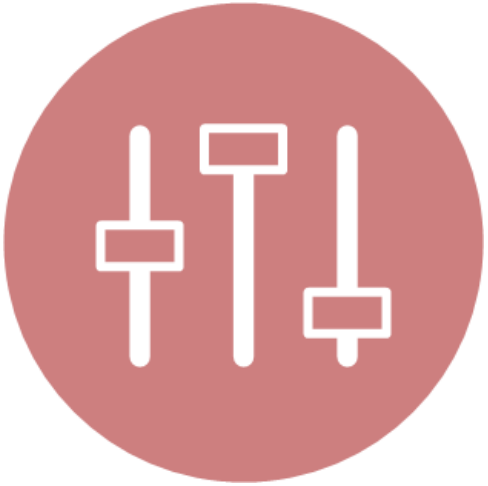
Indication if resource is active or inactive

Are you ON or OFF?

AVAILABILITY

Visibility to type of resource and amount of assured grid response (GR)

When and How can you provide?



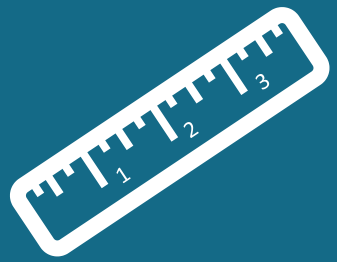
CONTROL

Controls to reliably support the grid (system, regional and local) when needed

Dispatchable?

Main Objectives

GAIN CONFIDENCE & EXPERIENCE
leveraging commercially available behind the meter intelligent VDER technologies with control

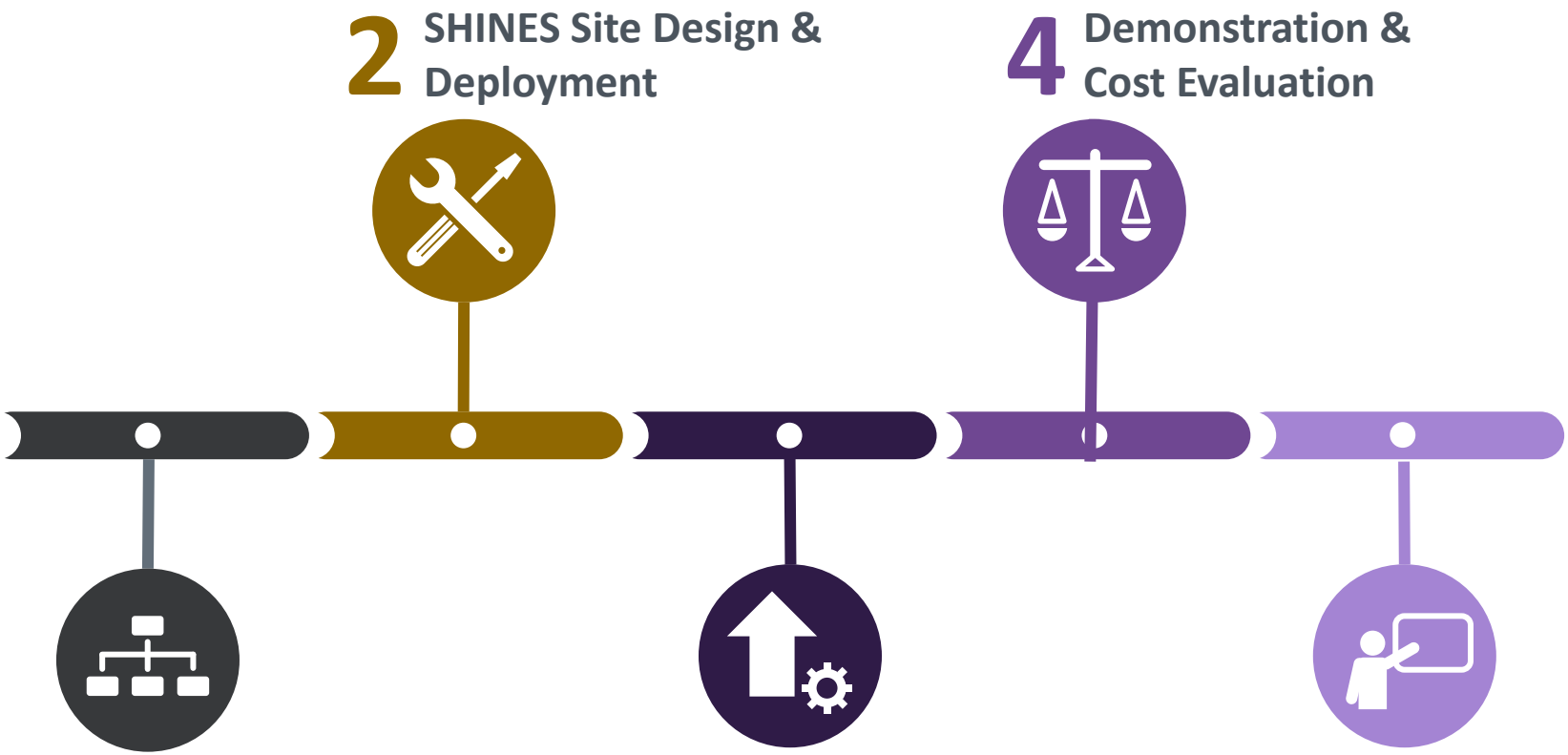


INFORM & DEVELOP CONSISTENT AND PRACTICAL STANDARDS & PROCEDURES
for grid interactive plug-n-play (CIM, communication protocols, data architecture & analytics)

EVALUATE DATA REQUIREMENTS AND INTEGRATE CONTROLS
into familiar utility operating environments

COLLABORATIVELY ENGAGE
and gain experience (utility, vendors, customers)

Project Tasks



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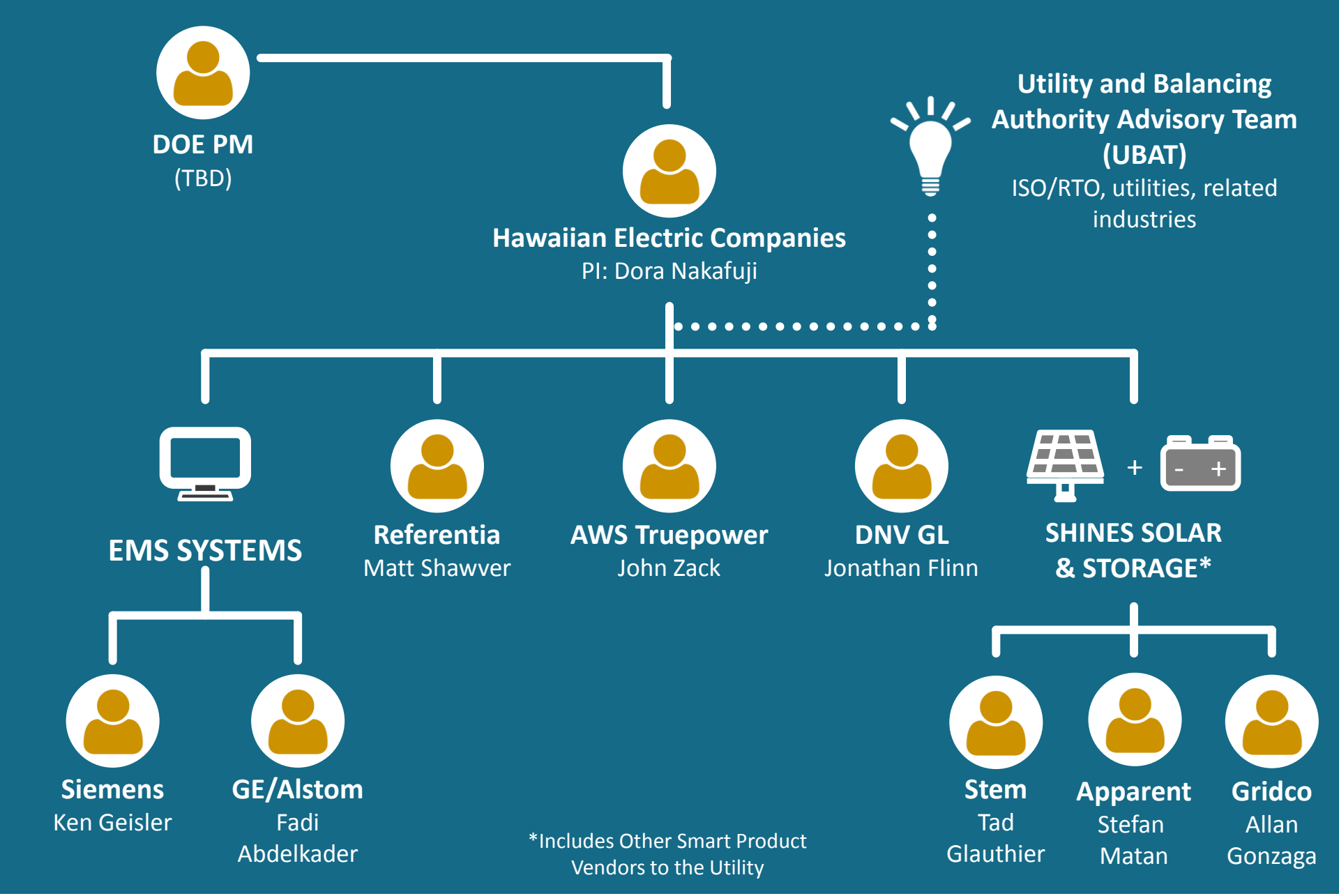

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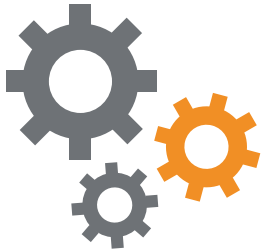
Project Team

Outcome & Benefits

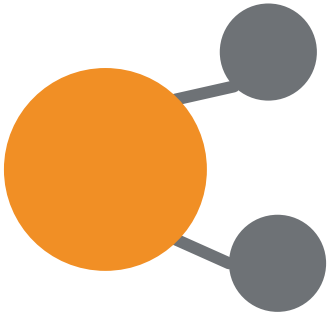
Built in review/advisory team: Utility & Balancing Authority Advisory Team (UBAT)



Workforce modernization and retooling for the future grid

Establish data logistics, transfer and analysis requirements ensuring access to the right data by the right people at the right time

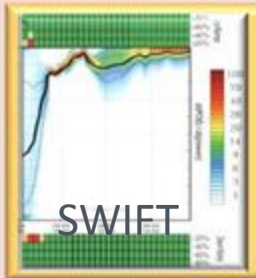
Demonstrate integrated capabilities via a platform for discovery



Leverage industry cost sharing and collaborations to close gaps linking system to edge of network

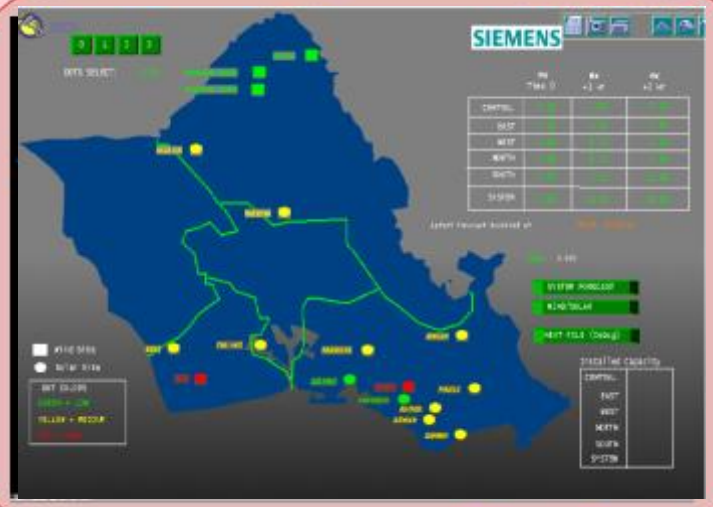
Leveraging SUNRISE Enabling DREAMS

Distributed Resource Energy Analysis & Management (DREAMS) for Grid Operations



NEW Forecasting INPUTS:

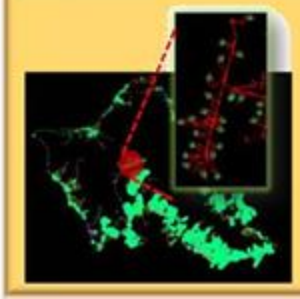
- *Real-time renewables forecasts*
- *Ramp probabilities*
- *Historical and actual trends*
- *Satellite images, weather data*



Traditional input sources

- SCADA data
- Transmission data
- Generator data
- Protection data
- Others

System Ops EMS



NEW Renewable/DG INPUTS:

- *GiS-based distribution infrastructure (models)*
- *DG locations*
- *Field monitored data*
- *Modeled results*

ENHANCED Renewable Integration Capabilities:

- Operations & Planning with visibility to DG resource impacts
- Updated state-estimator and simulation capability to evaluate actions & impacts

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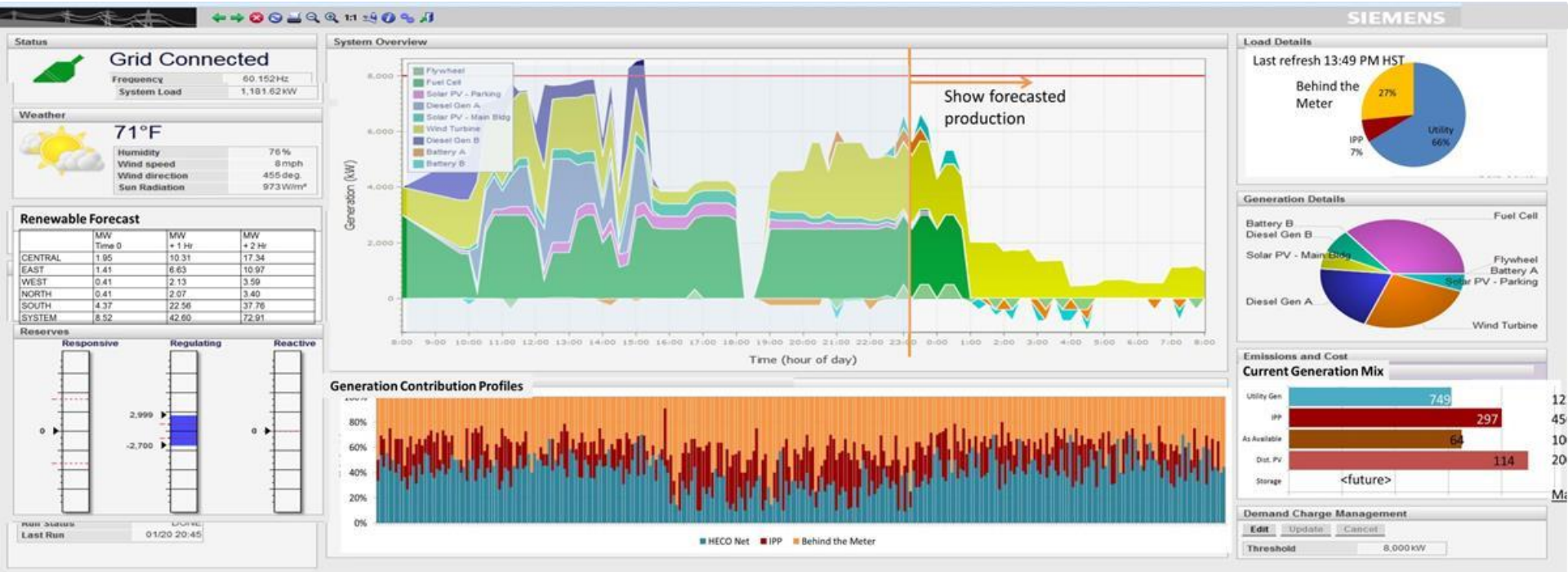
WindSENSE Utilities Industry DOE

SolarSENSE Utilities Industry DOE

GO solar CALIFORNIA

“Seeing & Managing” What’s Needed on the Grid Side



Source: Hawaiian Electric Companies

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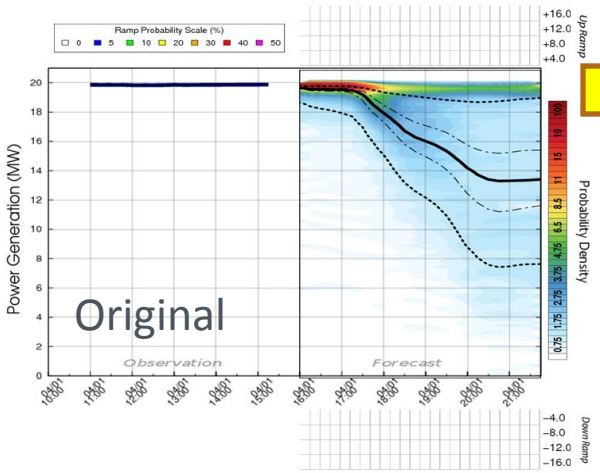
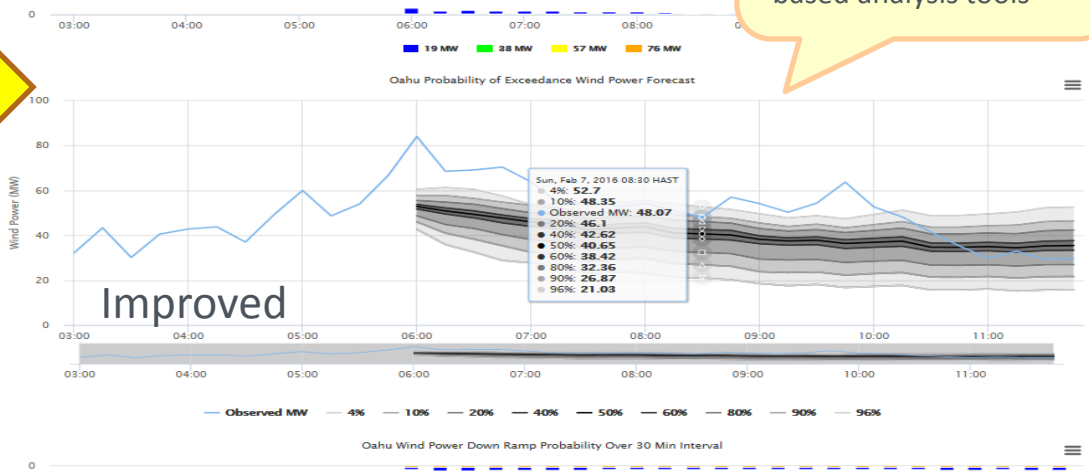
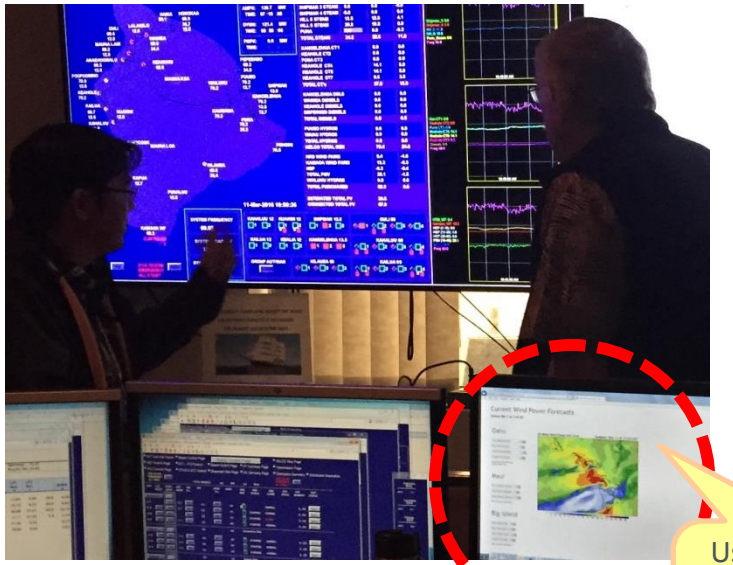
Maui Electric
Hawai‘i Electric Light

Changing for the Better

SWIFT Forecast tool: user informed display improvements & web-based analysis tools







Using & learning to use DREAMS & SWIFT tools in System Operations

Upgraded LIDAR technology & Solar monitoring supporting real-time WindNET & SolarNET

Key Takeaway

- Value of SHINES can only be realized if distributed benefits (performance metrics and interoperability targets) are economically and reliably made visible via system to edge-of-network integration (SEAMS)

Questions/Comments??

Mahalo for the Support

For more information please contact:

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Hawaiian Electric Company