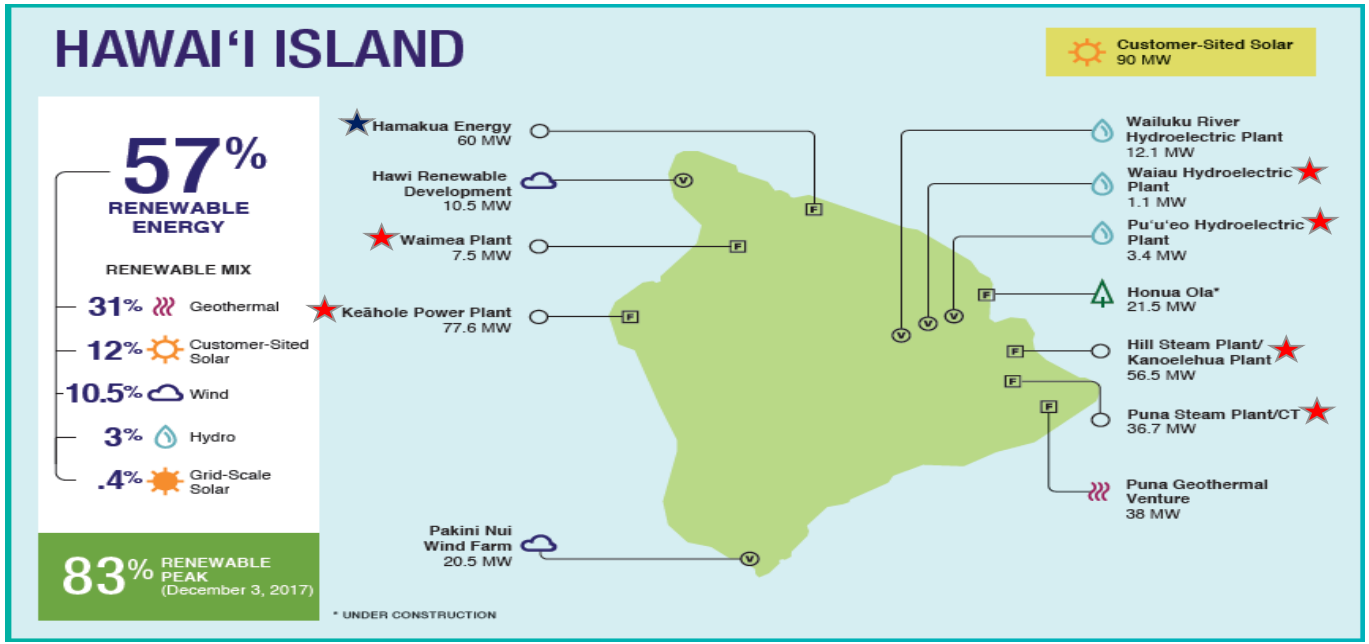
Hawaiian Electric Companies' Integrated Grid Planning

Lisa Giang, P.E.
Director, Advanced Planning Division
ESIG Fall Technical Workshop
October 3, 2018

Hawaiian Electric
Maui Electric
Hawai'i Electric Light

Where Our Power Comes From



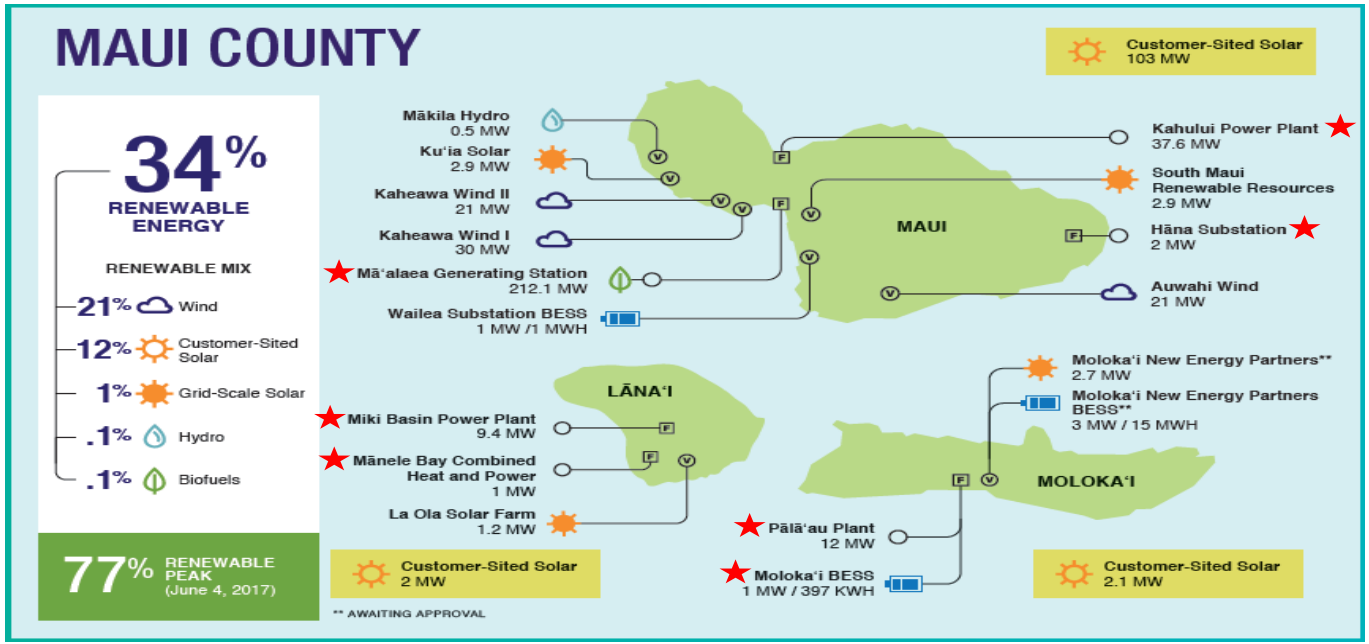
This map shows the generating facilities in our service area and the maximum potential power in megawatts (MW) they can produce.

- BIOFUELS
- BIOMASS
- GEOTHERMAL
- HYDRO
- CUSTOMER-SITED SOLAR
- GRID-SCALE SOLAR
- HAWAII ELECTRIC LIGHT OWNED
- HAMAKUA ENERGY (PACIFIC CURRENT) OWNED
- STORAGE
- WASTE TO ENERGY
- WIND
- COAL
- OIL
- OIL (DEACTIVATED)

Note: As of May 2018, PGV has been offline due to lava flow

Hawaiian Electric
Maui Electric
Hawai'i Electric Light

Where Our Power Comes From

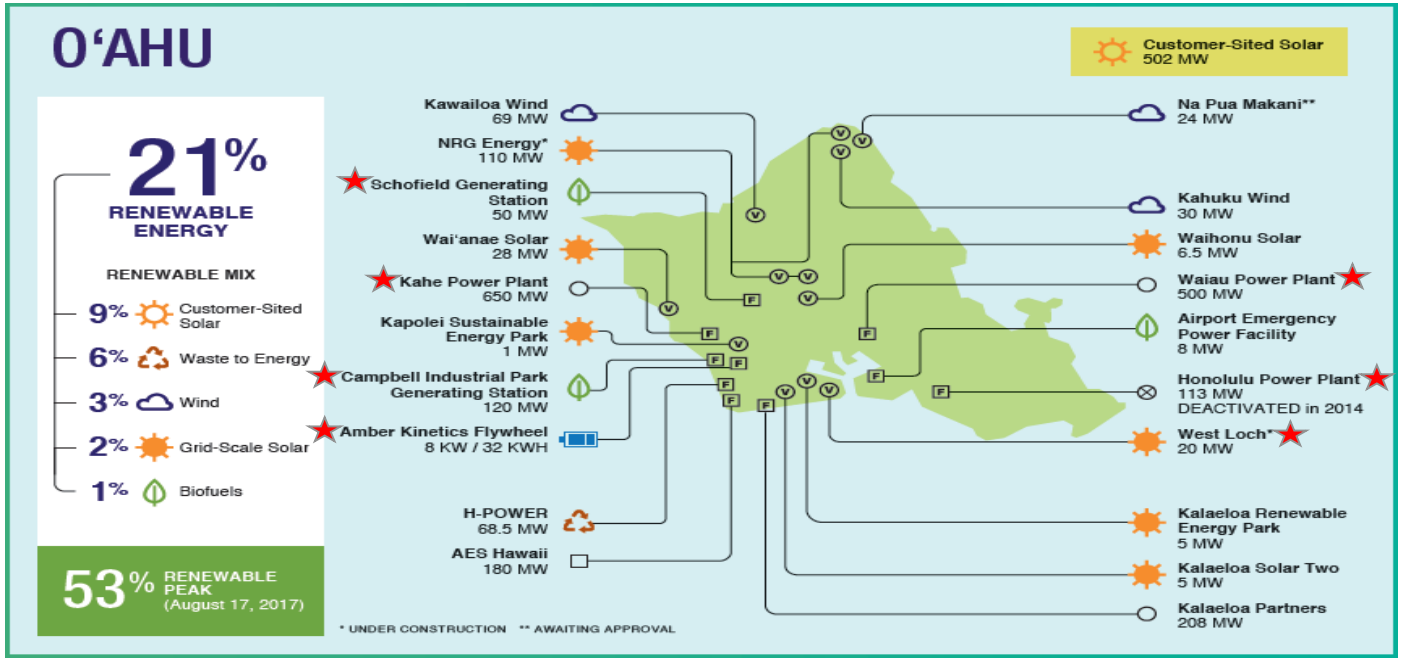


This map shows the generating facilities in our service area and the maximum potential power in megawatts (MW) they can produce

- BIOFUELS
- BIOMASS
- GEOTHERMAL
- HYDRO
- CUSTOMER-SITED SOLAR
- GRID-SCALE SOLAR
- MAUI ELECTRIC OWNED
- STORAGE
- WASTE TO ENERGY
- WIND
- COAL
- OIL
- OIL (DEACTIVATED)

Hawaiian Electric
Maui Electric
Hawai'i Electric Light

Where Our Power Comes From



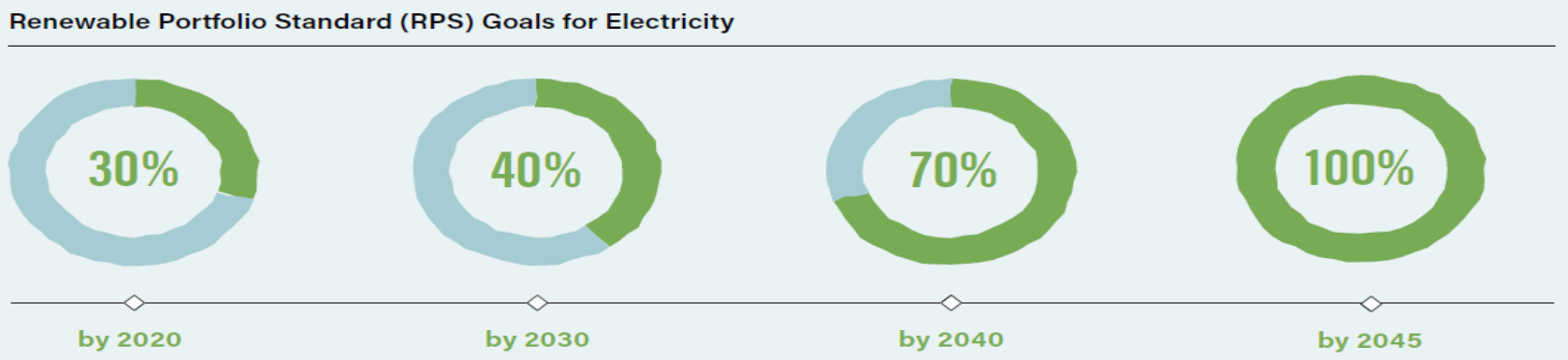
This map shows the generating facilities in our service area and the maximum potential power in megawatts (MW) they can produce.

- BIOFUELS
- BIOMASS
- GEOTHERMAL
- HYDRO
- CUSTOMER-SITED SOLAR
- GRID-SCALE SOLAR
- HAWAIIAN ELECTRIC OWNED
- STORAGE
- WASTE TO ENERGY
- WIND
- COAL
- OIL
- OIL (DEACTIVATED)

Hawaiian Electric
Maui Electric
Hawai'i Electric Light

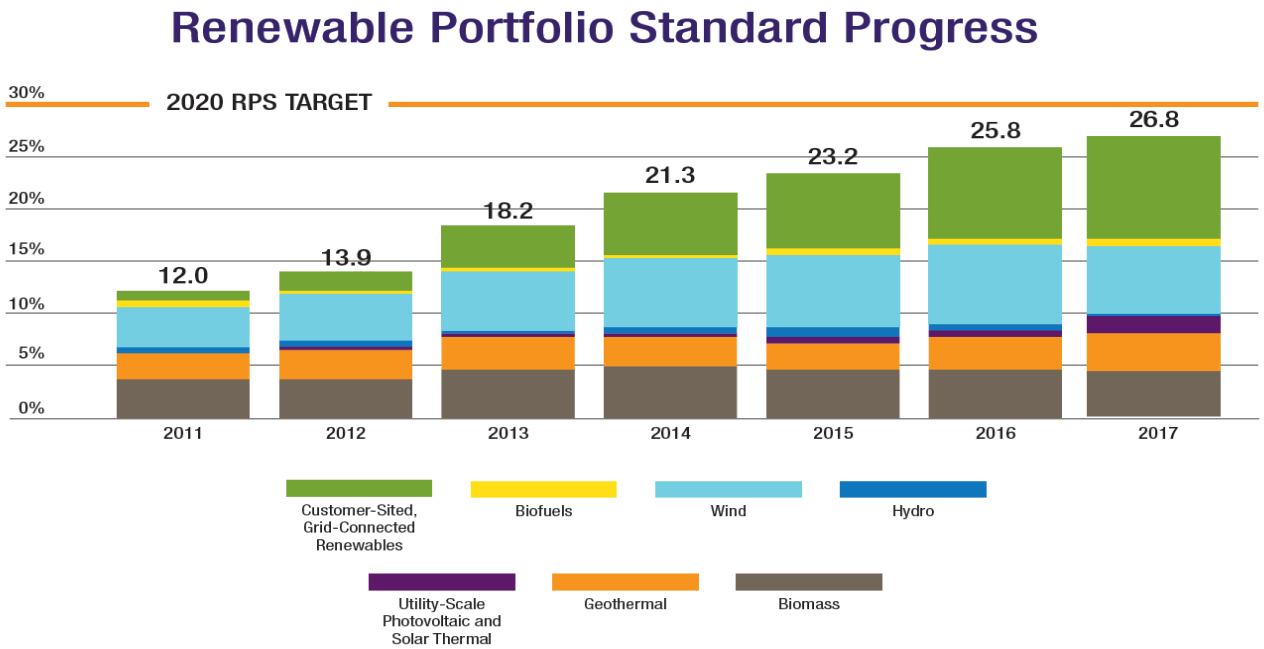
Renewable Energy Goals

On June, 8 2015, Gov. David Ige signed Act 97 into law, giving Hawai‘i the most ambitious clean energy goals in the country – requiring 100 percent of electricity sales to come from renewable resources by 2045.



Hawaiian Electric
Maui Electric
Hawai‘i Electric Light

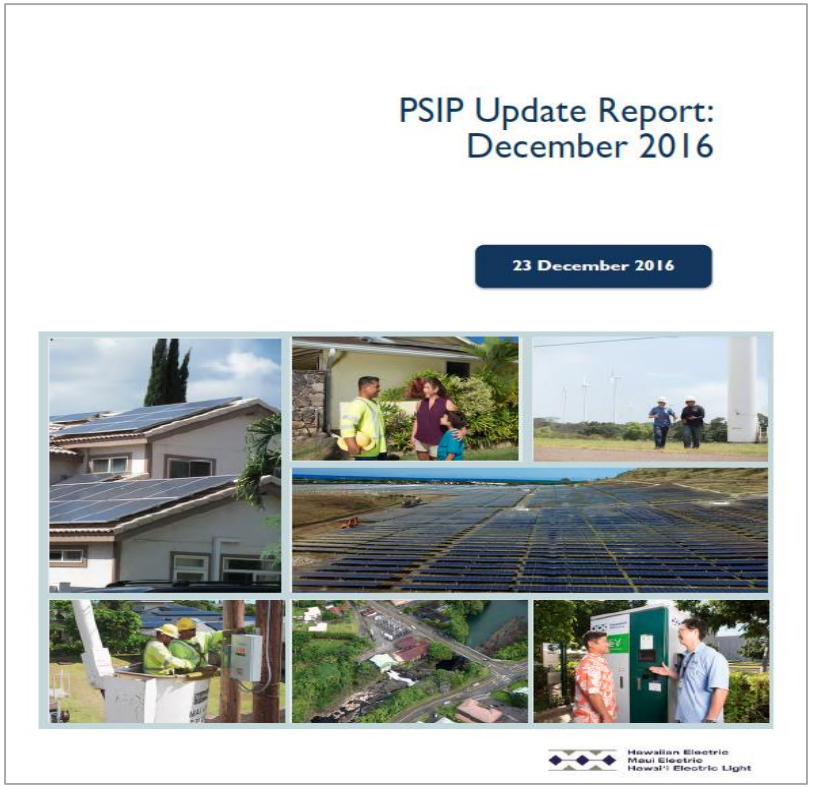
Our 2017 RPS Progress



In 2017, our Companies achieved 26.8 percent net electricity sales from renewable energy resources and are on track to meet our 2020 goal of 30%.

Hawaiian Electric
Maui Electric
Hawai‘i Electric Light

Power Supply Improvement Plan



- Considers multiple long-range pathways to inform development of specific near-term actions that the Hawaiian Electric Companies will take from 2017 through 2021 to accelerate the achievement of Hawaii's 100 percent Renewable Portfolio Standard (RPS) by 2045
- Accepted by the PUC in July 2017

https://www.hawaiianelectric.com/about-us/our-commitment/investing-in-the-future/integrated-grid-planning

Hawaiian Electric
Maui Electric
Hawai'i Electric Light

Renewable Energy Planning Principles

1. Renewable energy is the first option
2. The energy transformation must include everyone
3. Today's decisions must not crowd out tomorrow's breakthroughs
4. The power grid needs to be modernized
5. The lights have to stay on
6. Our plans must address climate change
7. There's no perfect choice

Attaining Hawai‘i’s 100% RPS Goal

2017-2021 Renewable Energy and Demand Response Additions

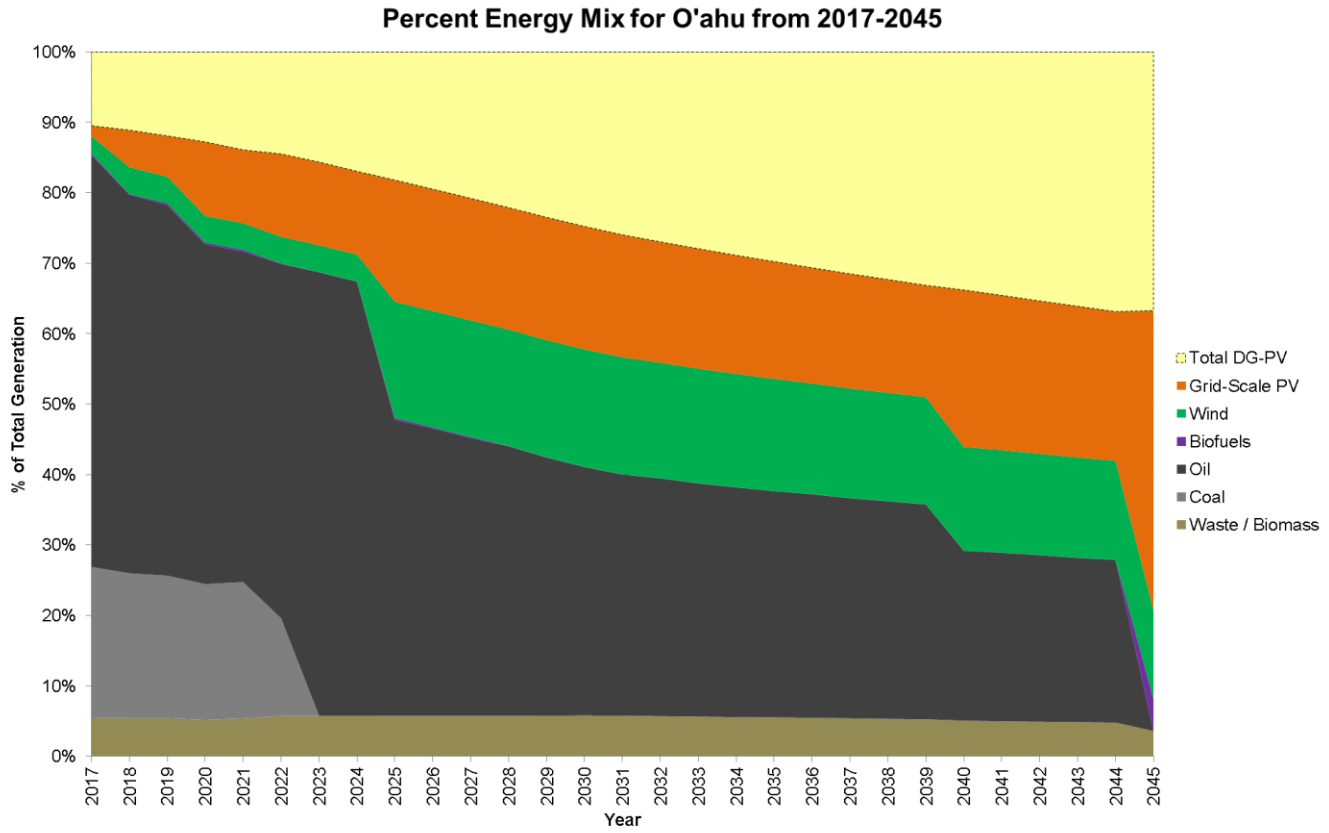
Rooftop Solar	255MW	30MW	38MW	0.7MW	1.4MW
Demand Response	89MW	11MW	15MW	0.3MW	0.3MW
Grid-Scale Wind	64MW	22MW	62MW	4MW	5MW
Grid-Scale PV	352MW	1MW	7MW		
Feed-in-Tariff	24MW	6MW	1MW		

PSIP Assumes:

- Control of future DG-PV
- Future Grid Scale projects are dispatchable

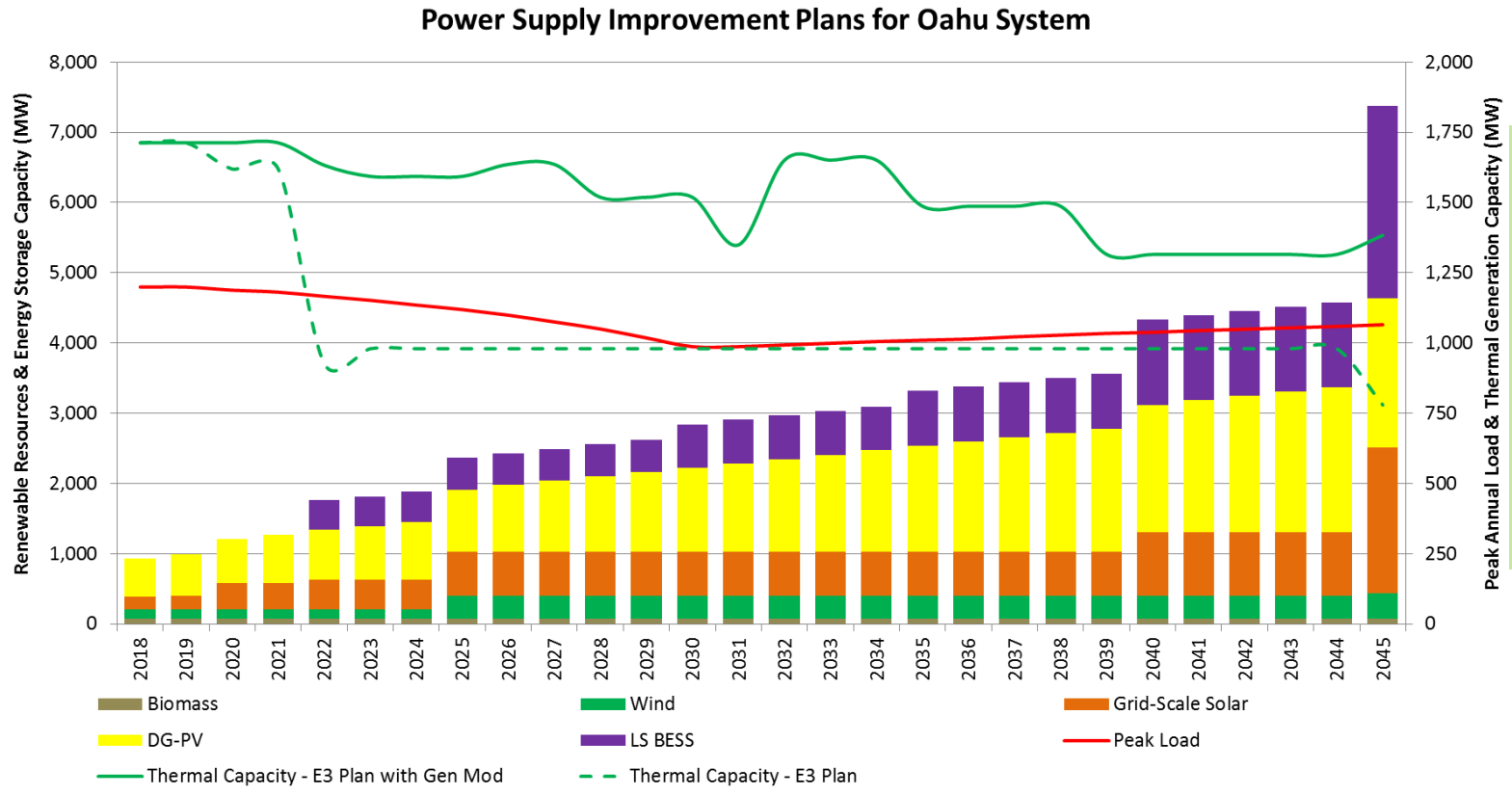
Hawaiian Electric
Maui Electric
Hawai‘i Electric Light

Attaining Hawai‘i’s 100% RPS Goal



Hawaiian Electric
Maui Electric
Hawai‘i Electric Light

Attaining Hawai‘i’s 100% RPS Goal



2045 TOTAL

2,733 MW LS BESS
2,124 MW DG-PV
2,083 MW Grid-Scale Solar
363 MW Wind
69 MW Biomass

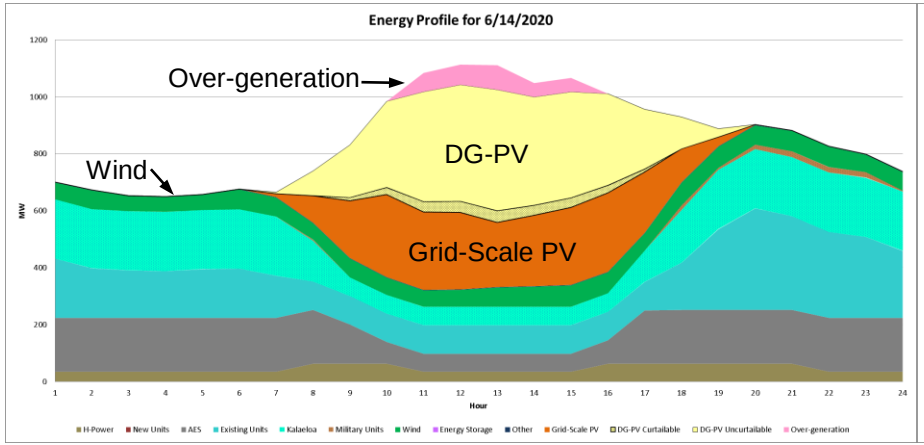
779 MW to 1,383 MW Biofueled Thermal Generation

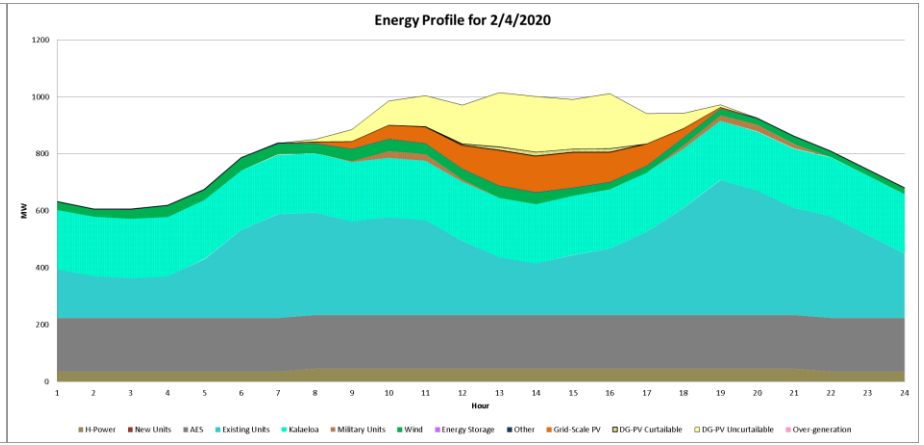
1,065 MW Peak

Hawaiian Electric
Maui Electric
Hawai‘i Electric Light

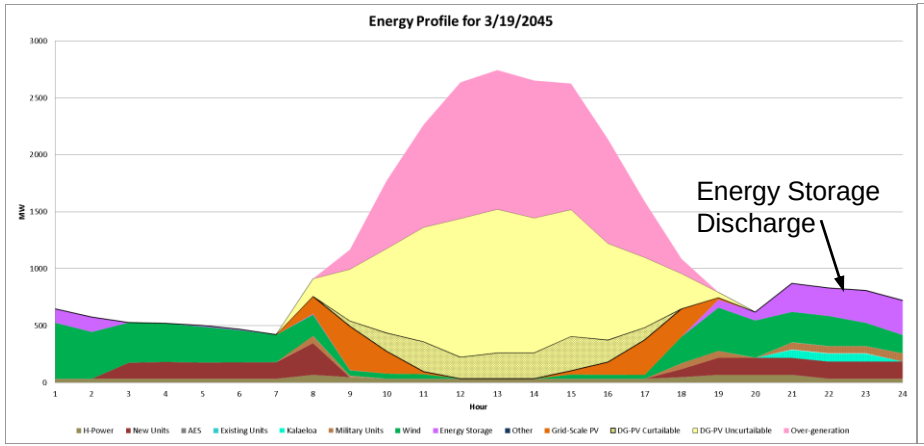
Example Daily Profiles

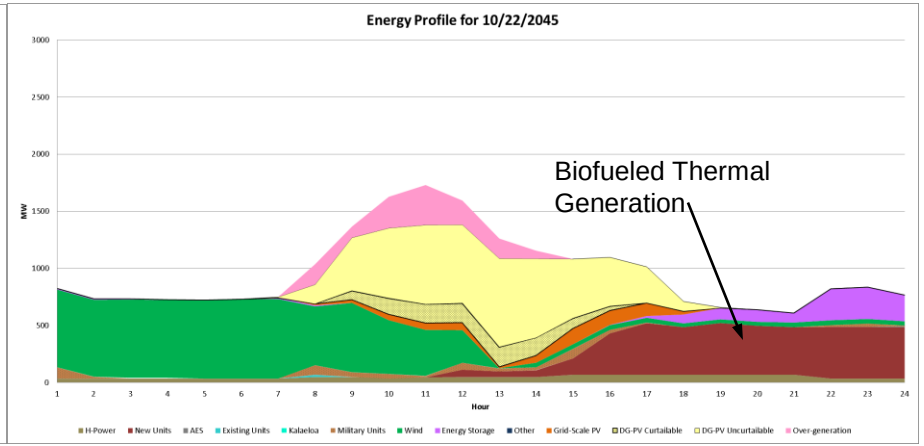
2020





2045

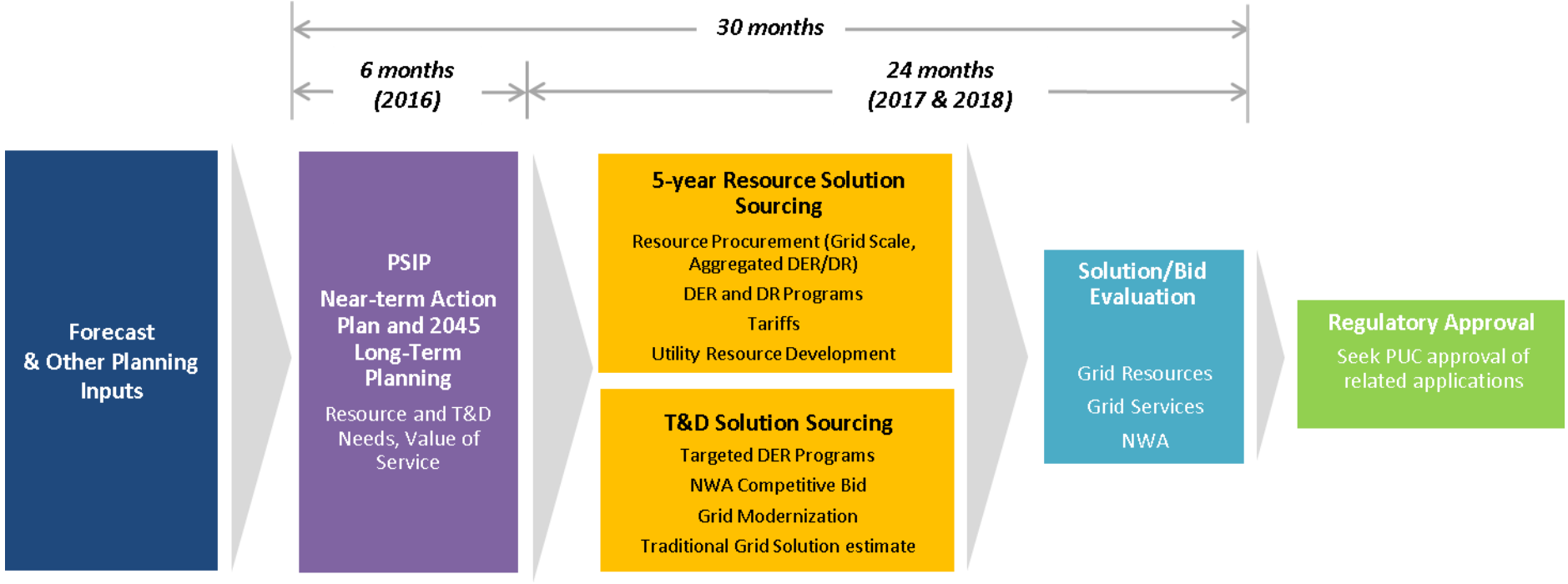




Hawaiian Electric
Maui Electric
Hawai'i Electric Light

Hawaiian Electric's Power Supply Improvement Report, Appendix K
https://www.hawaiianelectric.com/Documents/about_us/our_vision/dkt_2014_0183_20161223_companies_PSIP_update_report_3_of_4.pdf

PSIP System Planning & Solution Sourcing Processes



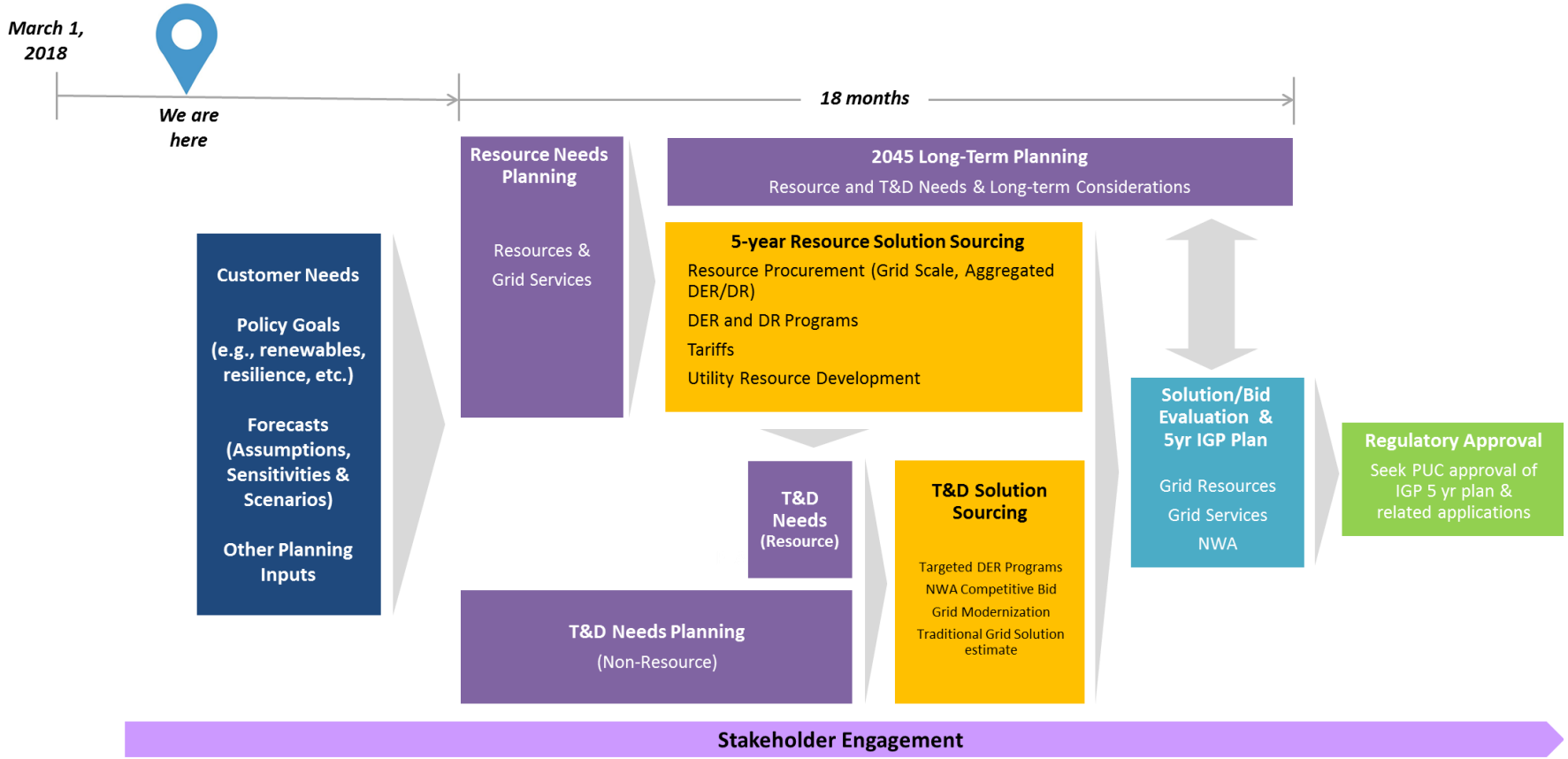
Reference: Integrated Grid Planning Report, Figure 1, page 10

What is Integrated Grid Planning (IGP)?

- Integrated Grid Planning
  - Integrates planning analysis for resources, transmission and distribution to ensure the net requirements for the system are transparently identified & optimized
  - Integrates market-sourced alternatives into the analysis instead of relying on theoretical price/cost assumptions
  - Integrates stakeholders' input and feedback into the overall process
- Results in better value for customers
- Creates greater market opportunities for developers & aggregators

https://www.hawaiianelectric.com/Documents/about_us/our_commitment/20180301_IGP_final_report.pdf

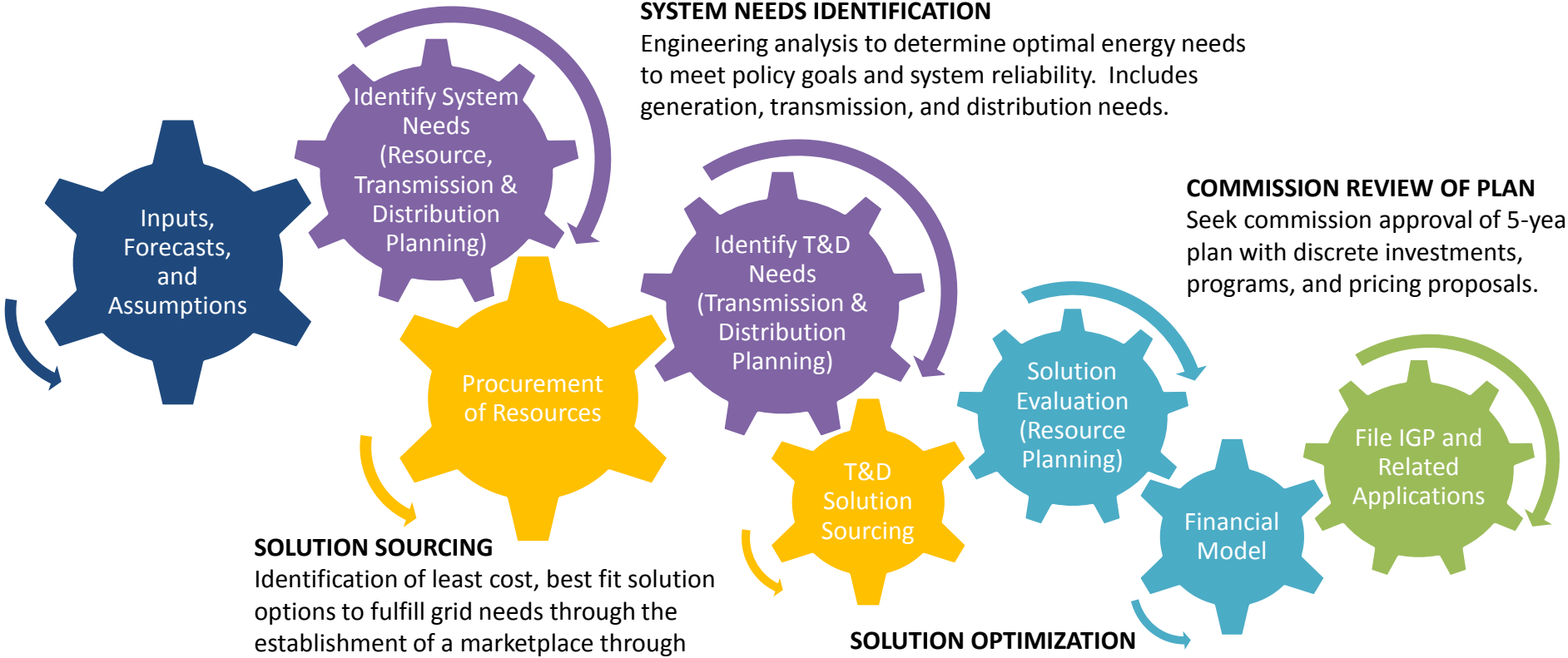
IGP Process



Hawaiian Electric
Maui Electric
Hawai'i Electric Light

Reference: Integrated Grid Planning Report, Figure 3, page 14

IGP & Solution Sourcing Process



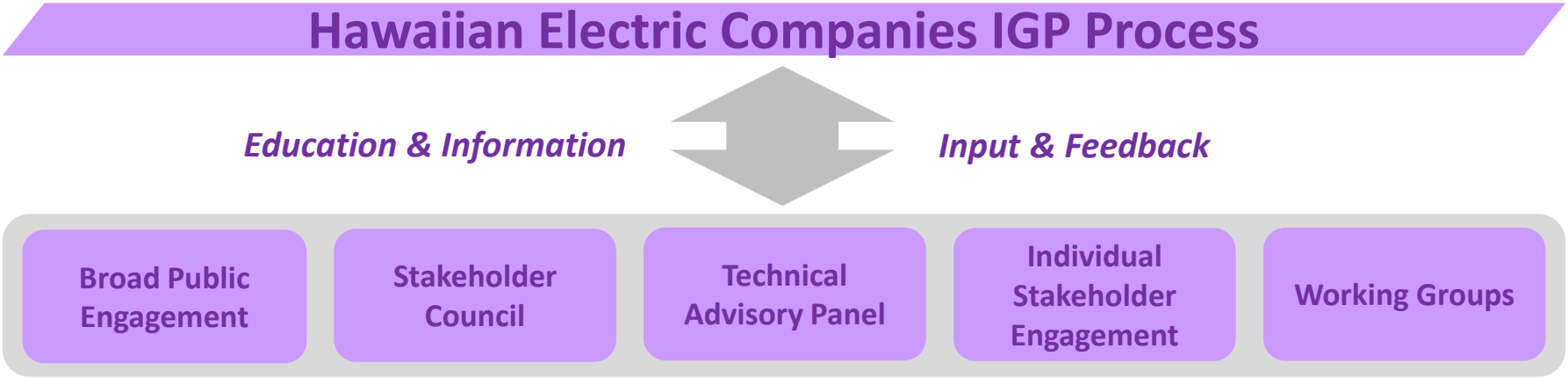
SYSTEM NEEDS IDENTIFICATION
Engineering analysis to determine optimal energy needs to meet policy goals and system reliability. Includes generation, transmission, and distribution needs.

COMMISSION REVIEW OF PLAN
Seek commission approval of 5-year plan with discrete investments, programs, and pricing proposals.

SOLUTION SOURCING
Identification of least cost, best fit solution options to fulfill grid needs through the establishment of a marketplace through procurements, pricing, and programs.

SOLUTION OPTIMIZATION
Evaluation and optimization of resource and transmission and distribution solutions acquired through marketplace. Includes an optimized 5-year grid plan.

Stakeholder Engagement Model



Reference: Integrated Grid Planning Report, Figure 4, page 16

Docket No. 2018-0165 Integrated Grid Planning

- Hawaiian Electric Companies shall convene a public workshop by October 1, 2018 (Order No. 35569, page 25)
  - Scheduled for September 25, 2018
- Public comments may be filed until October 15, 2018 (Order No. 35569, pages 25-26)
- On or before December 14, 2018, the Hawaiian Electric Companies shall file an IGP Workplan providing additional details about the activities, timelines, and outcomes of the major components of the IGP process. (Order No. 35569, pages 27-28)

https://www.hawaiianelectric.com/Documents/about_us/investing_in_the_future/dkt_2018_0165_20180712_PUC_order_35569_opening_dkt.pdf


Thank you!
Local & Organic Produce
Gourmet Products
Kumu Farms
OPEN
Monday thru Saturday
9 TO 4
Hawaiian Electric
Maui Electric
Hawai'i Electric Light