# The Hawaiian Electric Companies

## Next Steps for Procurement of Grid-Scale Energy Resources

February 7, 2019

Hawaiian Electric
Maui Electric
Hawai'i Electric Light

# Agenda

- Status of Stage 2 RFP for Variable Renewable Dispatchable Generation
- System Needs by Island
- Comparison and Tradeoffs of Different Procurement Approaches
- Proposed Procurement Plan by Island
  - Target launching RFPs in May/June

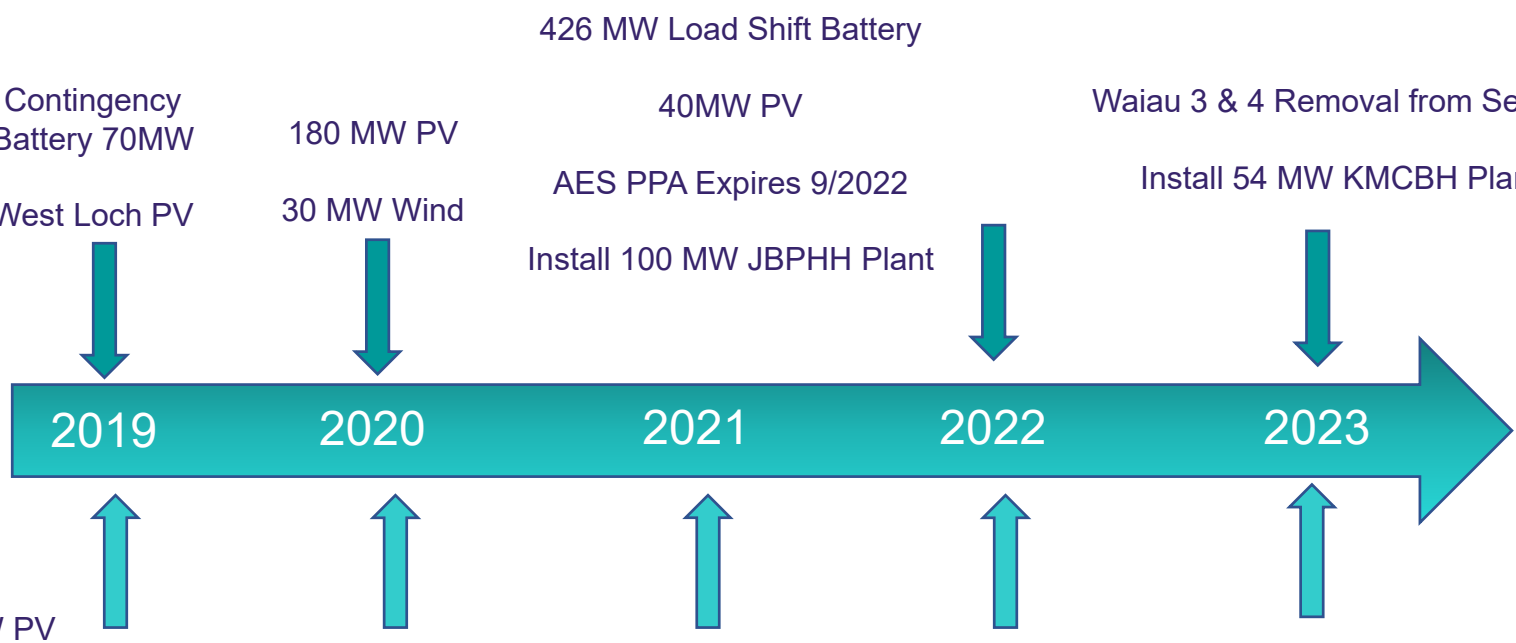
# Status of Stage 2 RFP for Variable Renewable Dispatchable Generation

# Stage 2 Variable RFP: draft to be issued in 1 month

- RFP
  - Updates are in progress
  - Incorporating lessons learned from Stage 1
- Model PV + Storage PPA
  - Updates are in progress
  - Changes to include takeaways from Stage 1 project negotiations
  - Pursue grid charging options
- Draft Documents to be shared for market input in 1 month

# System Needs By Island

# O‘ahu – December 2016 Plan

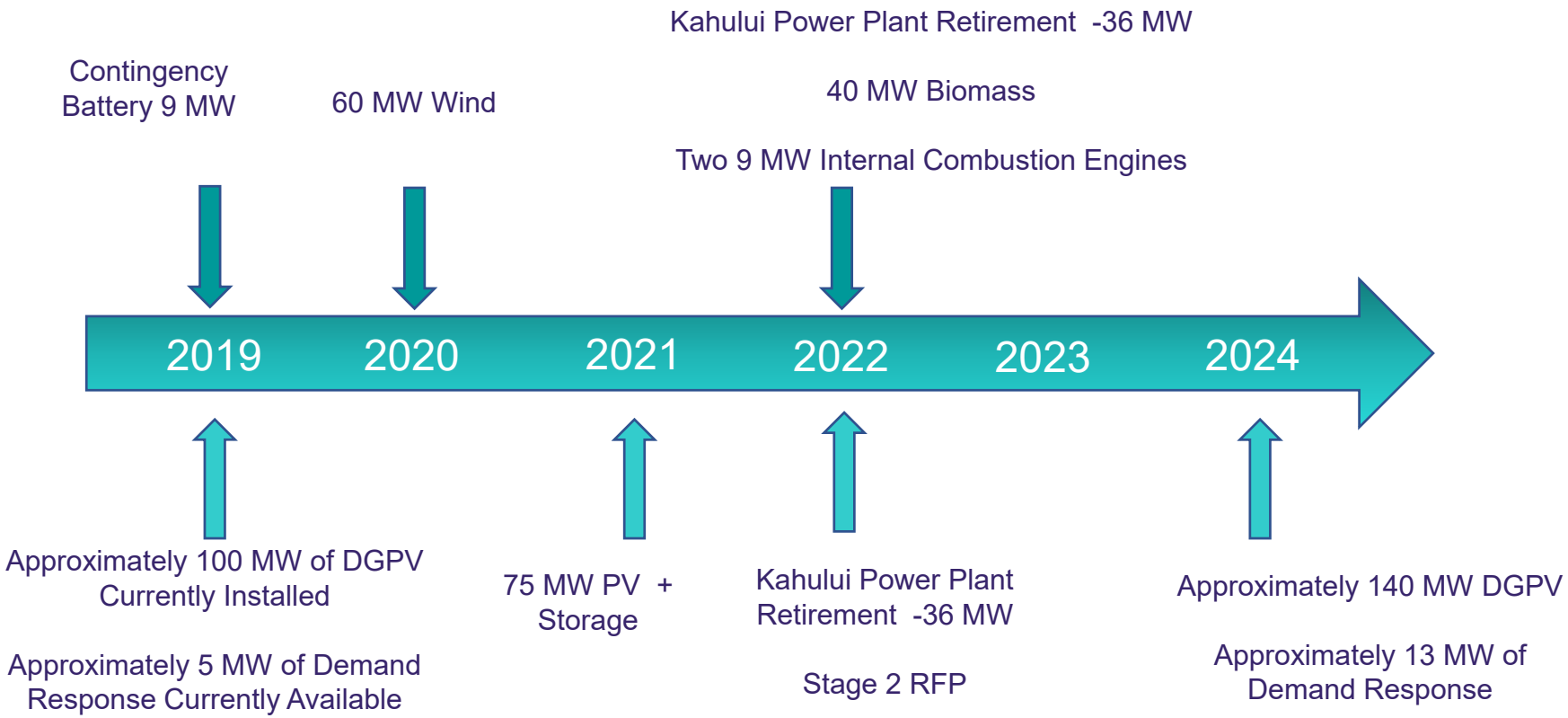



# Current Changes to O‘ahu Resource Plan

# O‘ahu Needs

- Continue to execute the PSIP to acquire renewable energy. Acquire the 160,000 annual MWh that was not acquired in Stage 1 in order to meet the 2022 PSIP target.
  - Renewables and Renewables + Storage can meet need.
- AES purchased power contract expires in September 2022. AES, a coal-fired unit, is the largest generator on the Hawaiian Electric system at 180 MW and 16% of our system peak. The energy MWh and capacity MW supplied by AES must be replaced in order to meet customer energy requirements.
  - Part will come from Stage 1 RFP projects, but more is needed
- The PSIP called for 426 MW load shifting storage in 2022 to increase system hosting capacity and economically facilitate integration of renewable energy on the O‘ahu system.
  - Standalone storage, Renewables + Storage that can be grid charged, and Renewables + Storage can meet the need. Estimated need is about 200 MW and 1,200 MWh per day (equiv to 438,000 MWh/year).

# Maui – December 2016 Plan

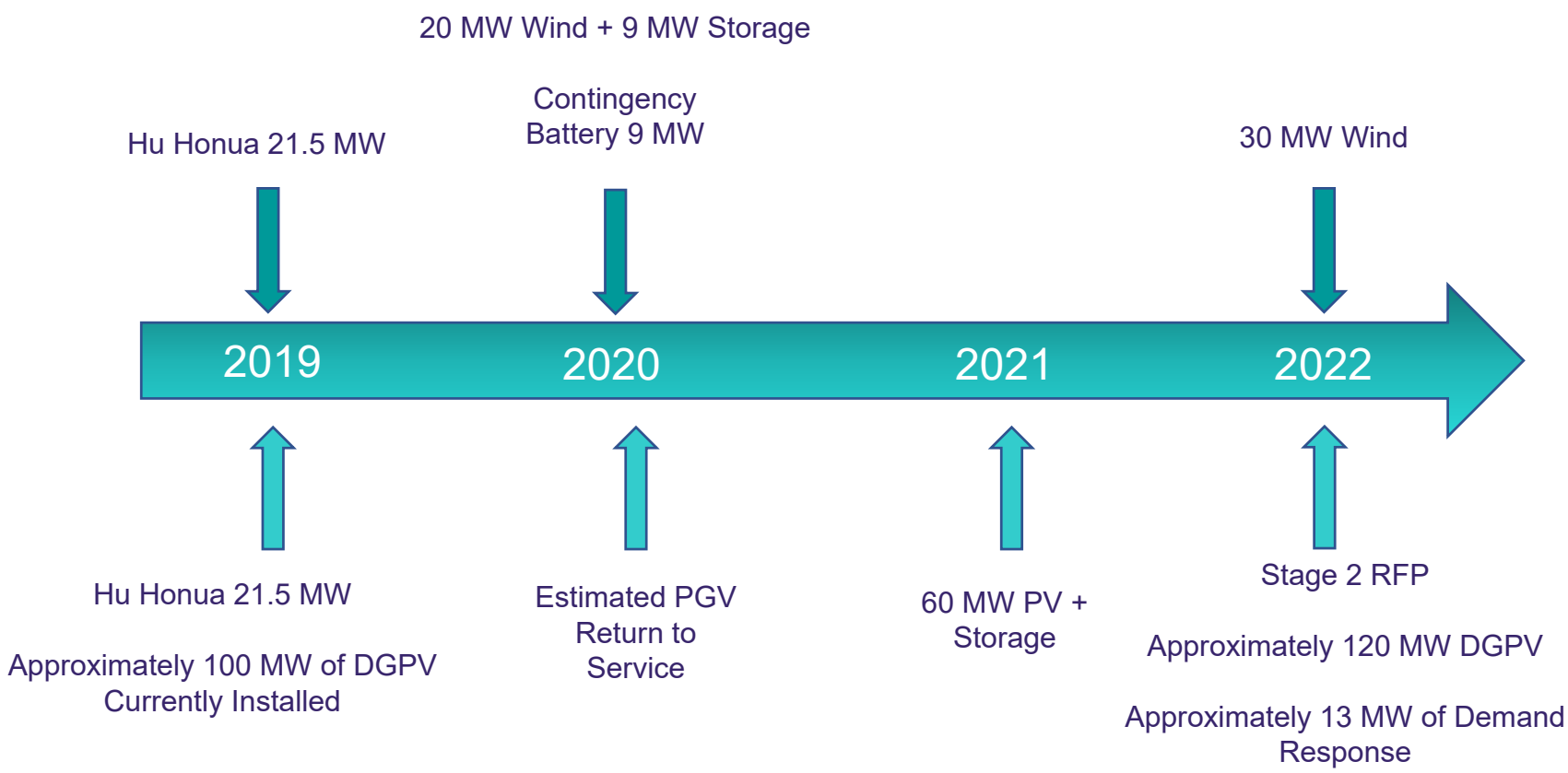



# Current Changes to Maui Resource Plan

# Maui Needs

- Continue to execute the PSIP to acquire renewable energy. Acquire the 65,000 annual MWh that was not acquired in Stage 1 in order to meet the 2022 PSIP target.
  - Renewables and Renewables + Storage can meet need.
- Kahului Power Plant retirement is expected by end of 2024. The energy MWh and capacity MW supplied by KPP must be replaced in order to meet customer energy requirements.
- The PSIP called for additions of Biomass units and internal combustion engines in 2022 to support the MWh and MW needs of the Maui system.
  - Standalone storage, Renewables + Storage that can be grid charged, and Renewables + Storage can meet the need. Estimated need is about 40 MW and 160 MWh per day (equivalent to 58,400 MWh per year).

# Hawai‘i – December 2016 Plan With Hu Honua




# Current Changes to Hawai‘i Resource Plan

# Hawai‘i Island Needs

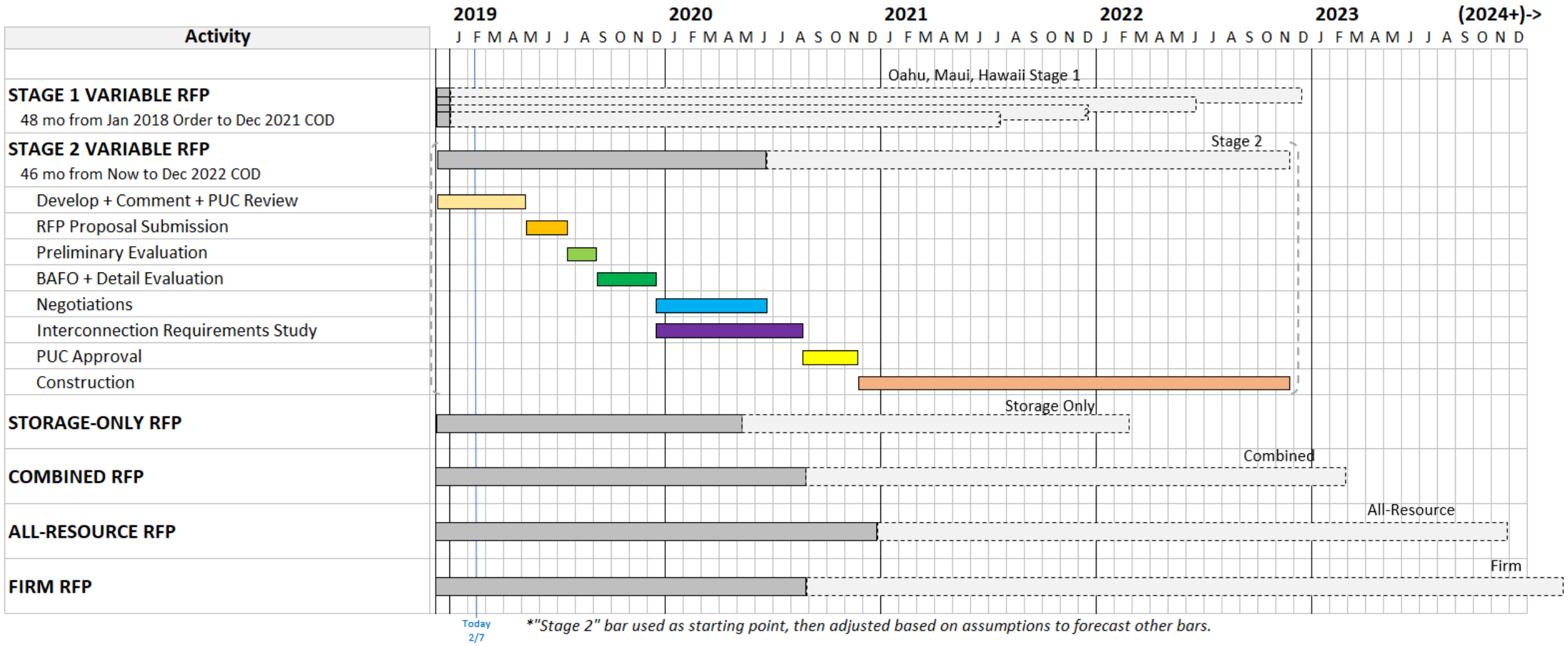
- Continue to execute the PSIP to acquire renewable energy. Acquire the 70,000 MWh that was not acquired in Stage 1 in order to meet the 2022 PSIP target.
  - Renewables or Renewables + Storage can meet need.
- PSIP assumes that PGV is online and Hu Honua comes online in 2019. May need to consider alternative scenarios in the near future.

# Comparison and Tradeoffs of Different Procurement Approaches

# Procurement Approaches Considered

- Stage 2 of Variable, similar to Stage 1 (with and without grid charging options)
- Storage-only (grid charged)
- Combined single RFP for variable generation MWH and energy storage MW need
- All-Resource (variable generation, energy storage, firm, aggregators, and other technologies)
- Firm RFP

# Some Options Do Not Meet Timing Constraints

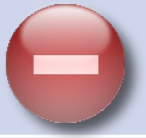
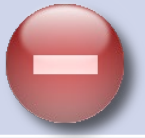
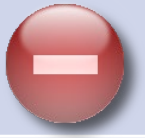



*"Stage 2" bar used as starting point, then adjusted based on assumptions to forecast other bars.

# Assessment of Options – O‘ahu

| | Stage 2 (similar to Stage 1) | Stand-alone storage | Firm | Parallel (Stage 2, Stand-alone storage) | Combined (Stage 2, Stand-alone storage) | All resource (similar to IGP) |
|---|---|---|---|---|---|---|
| Meets all resource needs | ⊖ | ⊖ | ⊖ | ✓ | ✓ | ✓ |
| Meets timing needs | ✓ | ✓ | ⊖ | ✓ | ⊖ | ⊖ |
| Execution risk (complexity) | ✓ | ✓ | ✓ | ✓ | = | ⊖ |
| Consideration of all market options | ⊖ | ⊖ | ⊖ | = | = | ✓ |
| Simplicity of competitive rankings | ✓ | ✓ | ✓ | ✓ | = | ⊖ |

# Assessment of Options - Maui

| | Stage 2 (similar to Stage 1) | Stand-alone storage | Firm | Parallel (Stage 2, Stand-alone storage) | Combined (Stage 2, Stand-alone storage) | All resource (similar to IGP) |
|---|---|---|---|---|---|---|
| Meets all resource needs |  |  |  |  |  |  |
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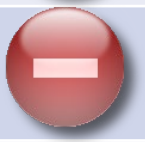
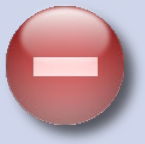
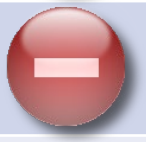
| Execution risk (complexity) |  |  |  |  |  |  |
| Consideration of all market options |  |  |  |  |  |  |
| Simplicity of competitive rankings |  |  |  |  |  |  |

# Assessment of Options – Hawai‘i Island

| | Stage 2 (similar to Stage 1) | Stand-alone storage | Firm | Parallel (Stage 2, Stand-alone storage) | Combined (Stage 2, Stand-alone storage) | All resource (similar to IGP) |
|---|---|---|---|---|---|---|
| Meets all resource needs |  | N/A | N/A | N/A | N/A |  |
| Meets timing needs |  | N/A | N/A | N/A | N/A |  |
| Execution risk (complexity) |  | N/A | N/A | N/A | N/A |  |
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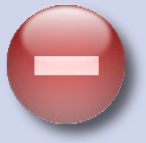
| Simplicity of competitive rankings |  | N/A | N/A | N/A | N/A |  |

# Proposed Procurement Plan by Island

# Proposed RFPs

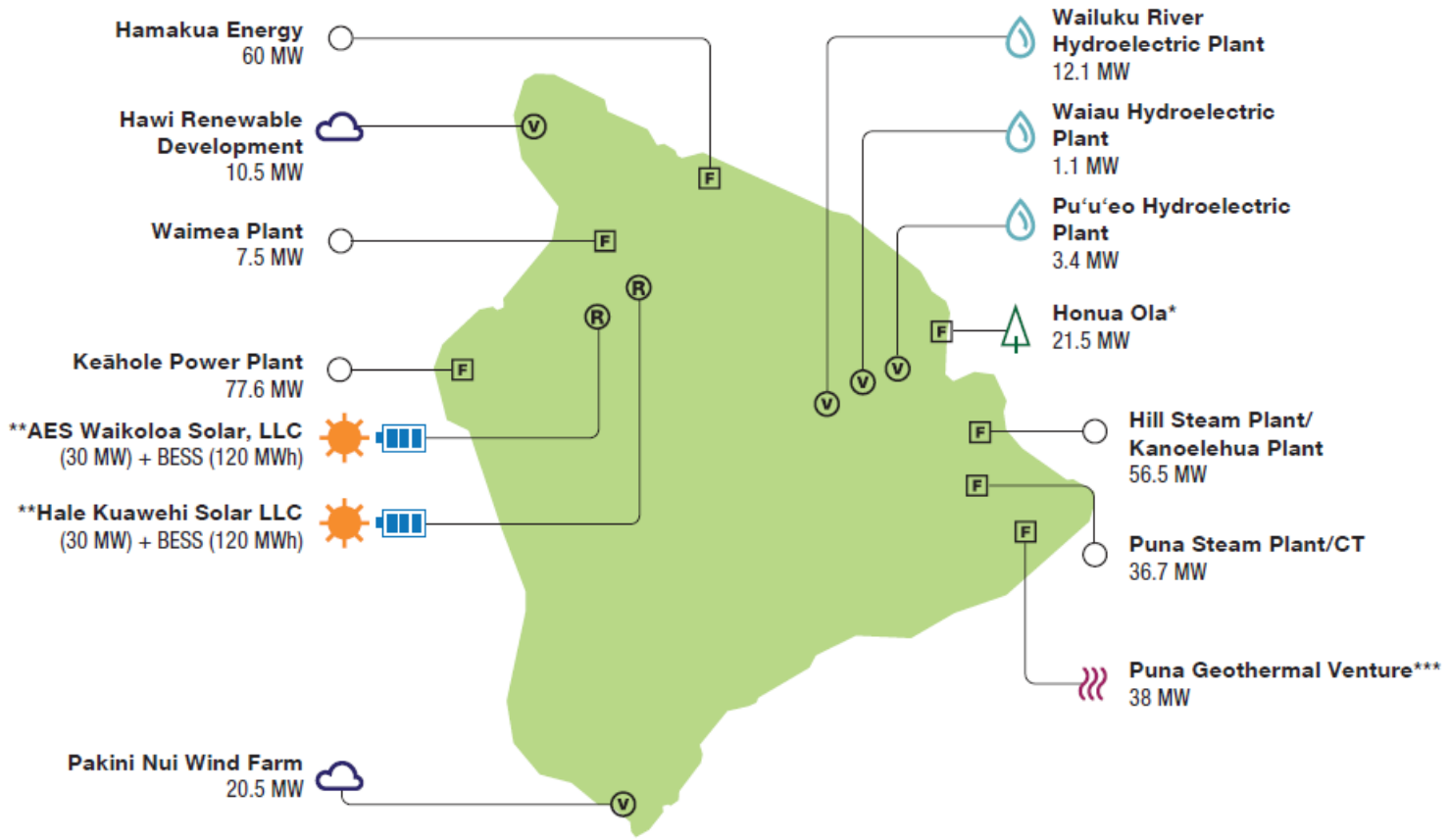
| | Hawai‘i Island Stage 2 | O‘ahu Stage 2 | O‘ahu Storage Only | Maui Combined |
|---|---|---|---|---|
| Need | • ~70,000 annual MWh of renewables | • ~160,000 annual MWh of renewables | • ~200 MW capacity with ~1,200 MWh per day (equivalent to 438,000 MWh/year) | • ~65,000 annual MWh of renewables<br>• ~40 MW capacity with ~160 MWh per day (equivalent to 58,400 MWh per year) |
| Technologies | • Variable renewables<br>• Variable renewables paired with storage | • Variable renewables<br>• Variable renewables paired with storage | • Stand-alone storage | • Variable renewables<br>• Variable renewables paired with storage<br>• Stand-alone storage<br>Bids can include any combination of MW and MWh resource needs |
| Grid Charging of BESS | Options:<br>• None<br>• Available for grid charging 100% after bidder determined date | Options:<br>• None<br>• Available for grid charging 100% after bidder determined date | 100% grid charging | Options for paired systems:<br>• None<br>• Available for grid charging up to 25%<br>• Available for grid charging 100% after bidder determined date |
| GCOD | December 2022 (preferred in evaluation) | December 2022 (preferred in evaluation) | March 2022 (required) | April 2023 (required) |
| RFP Launch | May 2019 | May 2019 | May 2019 | May 2019 |

# Mahalo!

# Appendix

Supplemental Materials

# HAWAIʻI ISLAND




*UNDER CONSTRUCTION; PUC APPROVAL ON APPEAL

**AWAITING PUC APPROVAL

***OFFLINE SINCE MAY 2018 DUE TO VOLCANIC ACTIVITY IN LOWER PUNA

## Generating Facilities

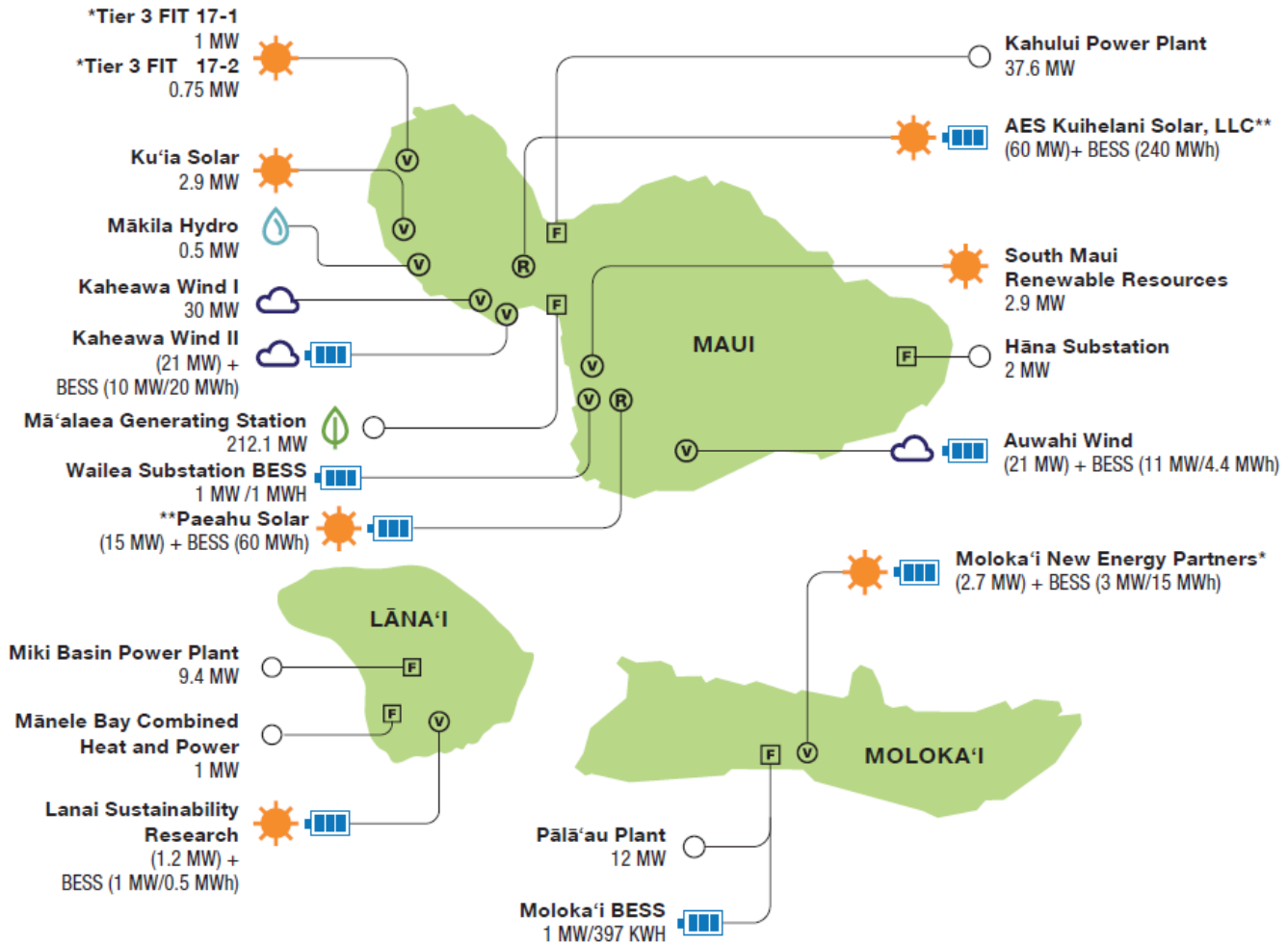
These maps show existing and planned generating facilities in our service area and the maximum potential power in megawatts (MW) they can produce.

- (F) **FIRM GENERATION:** Energy available on demand, which can be adjusted as needed.
- (V) **VARIABLE GENERATION:** Energy that may not always be available or controllable.
- (R) **RENEWABLE DISPATCHABLE GENERATION**

**BESS:** Battery Energy Storage System

- **BIOMASS**
- **GEOTHERMAL**
- **HYDRO**
- **GRID-SCALE SOLAR**
- **STORAGE**
- **WIND**
- **OIL**

# MAUI COUNTY

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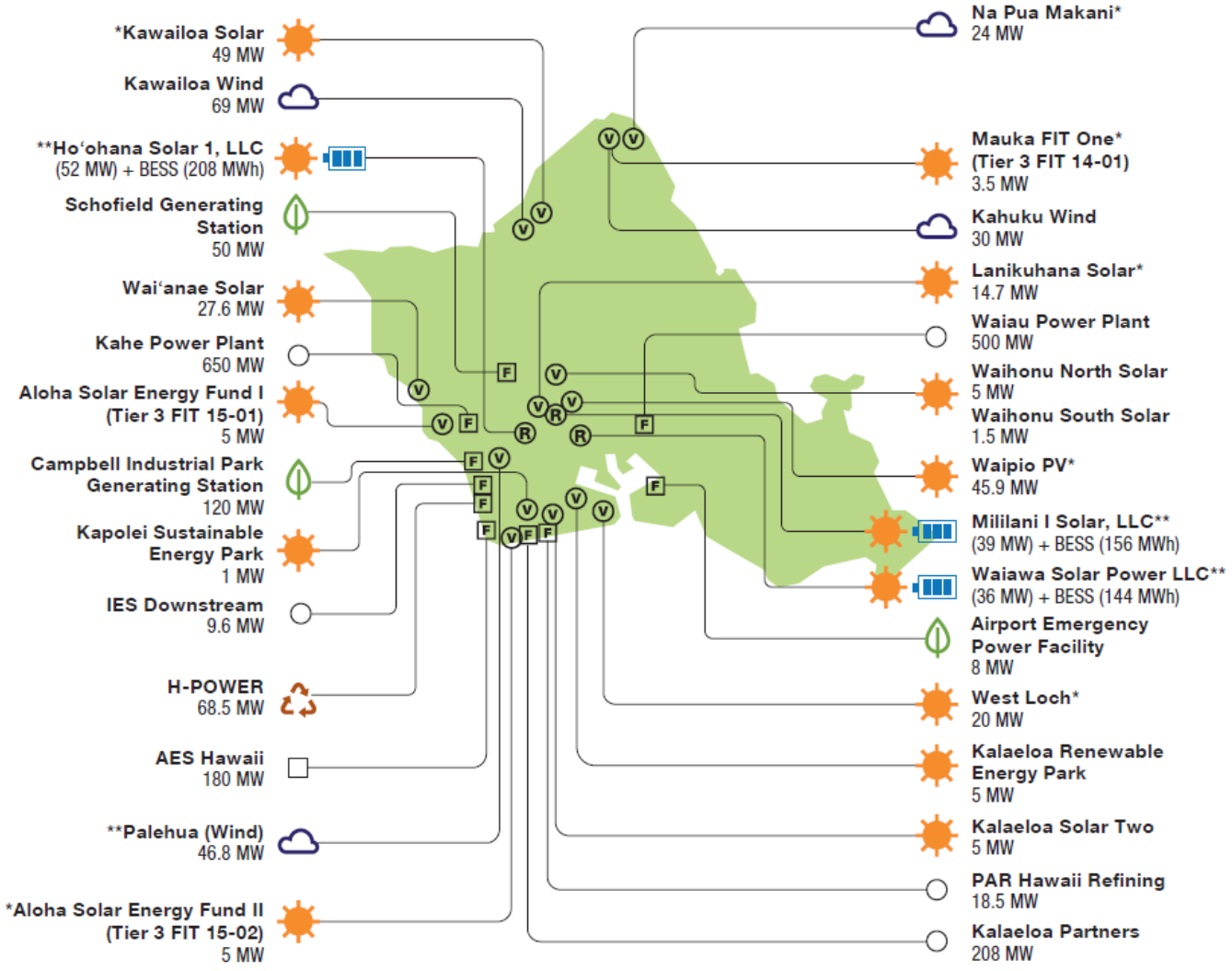
- HYDRO
- GRID-SCALE SOLAR
- STORAGE
- WIND
- OIL
- BIOFUELS

# O'AHU

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- GRID-SCALE SOLAR
- STORAGE
- WASTE TO ENERGY
- WIND
- COAL
- OIL
- BIOFUELS