Regulations Driving Hawaii’s Energy Transmission

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No Transmission – No Transition! 21st Century T&D Systems for Net Zero
ACEF 2023 Deep Dive Workshop
ADB Headquarters, Philippines
Hawaii’s Early Energy Transformation Policies

INITIAL DRIVERS

- HCEI Agreement
- Act 155 Portfolio Standards (RPS & EEPS)

• HCEI Agreement
USDOE-State of Hawaii-Hawaiian Electric Company

2008

- Act 155 revised RPS to 25% by 2020, 30% by 2030; created EEPS (4300 GWh reduction by 2030); allowed EPC contracting, public building benchmarking

2009

- Act 73 Created $1.05 “Barrel Tax” for HCEI

2010

• Decoupling Docket
Utility is able to recoup losses due to efficiency measures even if sales decline

• Act 10 Clarifies RPS includes RE delivered to utility from customer sited grid connected systems

2011

- Act 89, Act 168 Clarifies EV incentives, i.e., exemptions from parking fees and high occupancy vehicle lane restrictions

- Act 97, Act 193 Permits geothermal resource development on state lands; exempts geothermal exploration from EA/EIS requirements

2012

- Revised RPS by adding a 70% by 2040; and 100% by 2045 to the State’s RPS requirements

Regulatory Proceedings

- HECO Feed-in Tariff (opened in 2008)
- HECO Rule 14H (opened in 2010)
- Implementation of Reliability Standards (opened in 2011)
- Integrated Resource Planning (opened in 2012)
- Integrated Grid Planning (opened in 2018)
Renewable Energy Tax Incentives

Tax credits:

- A dollar-for-dollar reduction in the amount of income tax you would otherwise owe
- Kind of like an IRS gift card

Federal
- Renewable Electricity Production Tax Credit (PTC)
- Energy Investment Tax Credit (ITC)
- Residential Energy Credit
- Modified Accelerated Cost-Recovery System (MACRS)

State (State of Hawaii)
- Renewable Energy Technologies Income Tax Credit (RETITC)

Local
- City and County of Honolulu - Real Property Tax Exemption for Alternative Energy Improvements
Integrated Grid Planning Process
In December 2006, the PUC approved in its Decision and Order No. 23121 (Docket No. 03-0372) the Framework for Competitive Bidding as the required mechanism for acquiring or building new generation capacity in Hawaii.

Competitive bidding facilitates wholesale market competition, enhances the potential for higher efficiency and lower costs, and provides a level playing field on which all generation options can compete.

Applies to electric utilities under the PUC’s jurisdiction.

Available at https://dms.puc.hawaii.gov/dms/DocumentViewer?pid=A1001001A09F09B75438C99058
# Approved By Regulators

<table>
<thead>
<tr>
<th>Name</th>
<th>Island</th>
<th>Developer</th>
<th>Tech</th>
<th>Size</th>
<th>Estimated Completion</th>
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<tbody>
<tr>
<td>AES Kuihelani</td>
<td>Maui (Central Maui)</td>
<td>AES Corporation</td>
<td>Solar + BESS</td>
<td>60 MW, 240 MWh (BESS)</td>
<td>10/2023</td>
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<td>AES West Oahu Solar, LLC</td>
<td>Oahu (West Oahu)</td>
<td>AES Corporation</td>
<td>Solar + BESS</td>
<td>12.5 MW, 50 MWh (BESS)</td>
<td>7/2023</td>
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<td>Hale Kuawehi Solar LLC</td>
<td>Hawaii Island (Waimea)</td>
<td>Innergex Renewable Energy Inc.</td>
<td>Solar + BESS</td>
<td>30 MW, 120 MWh (BESS)</td>
<td>2024</td>
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<td>Hoohana Solar 1, LLC</td>
<td>Oahu (Kunia)</td>
<td>Hanwha Energy USA Holdings Corp (174 Power Global)</td>
<td>Solar + BESS</td>
<td>52 MW, 208 MWh (BESS)</td>
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<td>Kapolei Energy Storage</td>
<td>Oahu (Barbers Pt Harbor)</td>
<td>Plus Power LLC</td>
<td>BESS</td>
<td>185 MW, 565 MWh</td>
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<td>Kupono Solar</td>
<td>Oahu (Ewa)</td>
<td>Kupono Solar Development Company, LLC</td>
<td>Solar + BESS</td>
<td>42 MW, 168 MWh (BESS)</td>
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<td>Mountain View Solar</td>
<td>Oahu (Waianae)</td>
<td>AES Corporation</td>
<td>Solar + BESS</td>
<td>7 MW, 35 MWh (BESS)</td>
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<td>Paepahu Solar LLC</td>
<td>Maui (Wailea)</td>
<td>Innergex Renewable Energy Inc.</td>
<td>Solar + BESS</td>
<td>15 MW, 60 MWh (BESS)</td>
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<td>Puna Geothermal Venture</td>
<td>Hawaii Island (Puna)</td>
<td>Ormat Technologies Inc.</td>
<td>Geothermal</td>
<td>46 MW</td>
<td>2026</td>
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<td>Waiawa Phase 2 Solar</td>
<td>Oahu (Waiawa)</td>
<td>AES Corporation</td>
<td>Solar + BESS</td>
<td>30 MW, 240 MWh (BESS)</td>
<td>2024</td>
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</tbody>
</table>
IEEE Interconnection Standards

Industry Best Practices

• Technology of rotating generation (fossil fuel, hydro, biomass, geothermal) has not changed much for many years
• However, there have been many lessons learned and technology improvements in inverter-based resources (e.g., solar PV, wind, BESS)
• Updating interconnection standards (i.e., Distribution level grid codes) for distributed solar was a **first priority** as feeder penetration levels quickly outpaced the technical requirements addressed in IEEE 1547-2003
  – The IEEE 1547-2018 update incorporated many of the lessons learned from Hawaii and California operating experience
• Penetration levels of inverter-based resources were also growing quickly on bulk power systems. Existing performance requirements at the transmission level were proving to be inadequate as well.
  – A new standard, IEEE 2800-2022, was recently released to standardize interconnection requirements for inverter-based resources connected to the bulk transmission grid.
Progress Toward A Clean Energy Future
Hawaiian Electric Companies

Hawaii RPS Goals
- 2015 - 15%
- 2020 - 30%
- 2030 - 40%
- 2040 - 70%
- 2045 - 100%

Renewable Portfolio Standard Progress (% of Generation)

2020 RPS Target Met

Loss of Geothermal Production (May 2018)

Source: Hawaiian Electric Sustainability Report 2022-2023
Mr. Matsuura joined the Hawai‘i Natural Energy Institute (HNEI), University of Hawai‘i at Mānoa, in 2013 as its Senior Smart Grid Program Manager. He is a founding member of HNEI’s GridSTART (Grid System Technologies Advanced Research Team), a team of professionals focused on energy transition enabling policy and regulation, advanced grid architectures, grid modernization technologies, and novel methods to achieve the reliable grid integration of RE resources, power system optimization and energy resilience goals.

Prior to joining HNEI, he was with the Hawaiian Electric Company for 21 years. His career at Hawaiian Electric included positions of leadership in the areas of transmission and distribution (T&D) engineering, T&D standards and technical services, system operation, transmission planning, smart grid planning, and system integration. Marc is a licensed professional electrical engineer in Hawaii. He holds a B.S. in Electrical Engineering and an M.B.A. from the University of Hawai‘i at Mānoa.