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Hawaii Packs Punch with Battery Storage

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INDUSTRY DEVELOPMENT

On 16 August 2011, Hawaii Natural Energy Institute announced that it had signed a contract with lithium-ion battery manufacturer Altair Nanotechnologies Inc. (Altairnano) to deliver a 1 MW energy storage system to test solar energy integration. Altairnano will employ its ALIT-ESS power management system at a substation in central Oahu, Hawaii. The project, expected online in early 2012, will be overseen by local utility Hawaiian Electric Company (HECO). The primary focus of the project is to demonstrate battery storage's ability to increase integration of solar photovoltaic (PV) into HECO's system. Hawaii has one of the most aggressive renewable portfolio standard (RPS) targets in the US, targeting 25% of generation from renewable sources by 2020 and 40% by 2025.

EER INSIGHTS

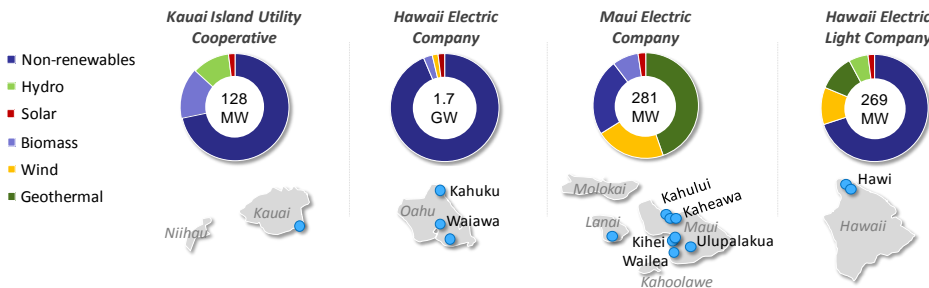
Renewable ambitions make storage imperative in Hawaii. Energy storage is becoming required to manage growing wind and solar additions in Hawaii, as power prices around US\$0.28/kWh drives utilities to meet aggressive renewables targets. A lack of interconnection between Hawaiian islands means any imbalance between customer demand and generation can result in system instability. Battery technology is emerging as the leading option for managing intermittency issues as compressed air energy storage and pumped-hydro are limited by land costs and siting issues. Four battery projects equivalent to 17.6 MW are currently operating, with 10 additional projects equivalent to at least 24.6 MW slated to be online by 2013.

Utilities step into storage for distributed PV, but put onus on developers for large-scale projects.

Different ownership models are being employed for distributed PV and large-scale renewable storage in Hawaii. Hawaii's PV deployment to date has been via distributed, net metered systems, leaving utilities responsible for managing intermittency issues. In response, utilities including KIUC, HECO, and MECO plan to own and operate battery systems supplied by Xtreme Power, Altairnano, and others. They are leveraging state and federal stimulus funds as they roll-out these demonstration projects. At the same time, utility-scale wind and solar developers are being forced to deploy larger battery systems to comply with reliability provisions in their power purchase agreements (PPAs). First Wind's 30 MW Kahuku and 51 MW Kaheawa projects are tapping a combined 26.5 MW (31 MWh) of battery storage to meet PPA reliability requirements. Similarly, Sempra Energy plans to deploy an up to 15 MW (10 MWh) battery system to support development of its 21 MW wind farm in Maui.

Island nations at storage forefront. With small power systems and high power prices, island states and nations are at the forefront of demonstrating integrated renewable-battery systems. Volatile weather conditions on islands have proven to make output from solar and wind even more intermittent, adding to the need for storage to smooth renewable generation levels. Beyond Hawaii, battery projects in the Canary Islands, Shetland Islands, and Corsica are planned. The island nation of Japan remains the global leader in grid-scale battery deployment with over 200 MW installed.

Hawaii Power Capacity Mix by Utility and Storage Projects



Project Name	Location	Capacity	Developer	Battery Supplier	Battery Technology	Service	Online
Kaheawa Wind Project	Kaheawa, Maui	1.5 MW (1 MWh)	First Wind	Xtreme Power	Dry Cell	Wind smoothing, curtailment mitigation	2009
KIUC Battery Storage Project	Kauai	1.5 MW	KIUC, HNEI	Xtreme Power	Dry Cell	PV smoothing	2011
First Wind Kahuku Project	Kahuku, Oahu	15 MW (10 MWh)	First Wind	Xtreme Power	Dry Cell	Wind smoothing, curtailment mitigation, voltage regulation	2011
Lanai La Ola Solar PV Project	Lanai	1.125 MW (0.5 MWh)	Castle & Cooke	Xtreme Power	Dry Cell	PV ramp rate control	2011
Waiiawa High PV Penetration Circuit	Waiiawa, Oahu	1 MW (250 kWh)	HECO	Altairnano	Lithium-ion	PV smoothing, voltage regulation	2011
Hawi Renewable Partners Wind Farm BESS Demonstration	Hawi, Hawaii	1 MW	Hawaii Renewable Partners	Altairnano	Lithium-ion	Wind smoothing, curtailment mitigation	2011
HREDV/Gen-X-BESS Demonstration	Hawi, Hawaii	100 kW	HREDV	Altairnano	Lithium-ion	Wind/solar integration	2012
HELCO BESS	TBD, Hawaii	100 kW (200 kWh)	HELCO	TBD	TBD	Frequency and voltage regulation	2012
Kaheawa Wind Project 2	Kaheawa, Maui	10 MW (20 MWh)	First Wind	Xtreme Power	Dry Cell	Wind smoothing, curtailment mitigation, frequency regulation	2012
HNU Energy BESS Demonstration	Kihēi, Maui	1 MW	HREDV	International Battery	Lithium-ion	PV smoothing	2012
MRESS (Maui Renewable)	Kahului, Maui	TBD	MECO	TBD	TBD	Curtailment reduction	2012
Auwahi Wind Project	Ulupalakua, Maui	TBD	Sempra	TBD	TBD	Wind smoothing	2012
DOE RDSI Maui Smart Grid Project	Wailea, Maui	1 MW (1 MWh)	MECO	A123	Lithium-ion	PV integration	2013
Hawaii-Japan Smart Grid Project	Kihēi, Maui	TBD	TBD	TBD	TBD	Electric vehicle charging, community storage	2014

Source: Hawaii Clean Energy Initiative, HECO, IHS Emerging Energy Research