WESTERN

CHP
TECHNICAL ASSISTANCE
PARTNERSHIPS

POLICY PROFILE

CHP and Microgrids

A Pathway to Greater Resilience for Hawai'i's Most Important Facilities
HB2110

Policy Description

Waikiki, Hawai'i

Islands with an aging electric grid can struggle to return power to all its residents, as Puerto Rico did after Hurricane Maria. Hawai'i relies primarily on a utility company to import, process, and burn fuel in large generators to produce most of the state's electricity. Centralized electric grids are vulnerable to natural disasters and severe weather events. These vulnerabilities are magnified on islands, where isolation and transportation challenges can exacerbate relief efforts. As Hawai'i and Puerto Rico look toward the future, the most obvious path forward is a combination of technologies: microgrids powered by renewable photovoltaic (PV) solar and wind, battery storage, and combined heat and power (CHP) technologies for resilience.

CHP and Microgrids: The Perfect Match for Resilience

As Hawai'i is making good progress toward 100% renewables for electricity using PV solar, wind, and storage, one significant aspect of being operational and safe during and after a weather event is being overlooked: the thermal energy that provides hot water, heating, cooling, and refrigeration needed by critical infrastructure and local community refuge centers. Microgrids can function either entirely on their own or in coordination with the electric grid. Microgrids anchored by CHP systems can produce thermal energy (cooling, steam, and/or hot water) and electricity from one source of fuel such as synthetic natural gas or propane or renewable biogas. This process allows CHP generation systems to be up to 25% more efficient than the conventional means of getting electricity (i.e., from the grid and from gas pipeline or propane deliveries). The microgrid–CHP combination can significantly reduce greenhouse gas emissions per kilowatt-hour produced. In addition, CHP systems can deliver near-instant, on-demand power that, unlike with many renewably sourced systems, does not depend on environmental conditions to operate. These factors make CHP the perfect technology to facilitate new microgrid projects intended to strengthen island power grids and provide constant, on-demand power and thermal energy to local communities in Hawai'i.

Ideal Locations for CHP

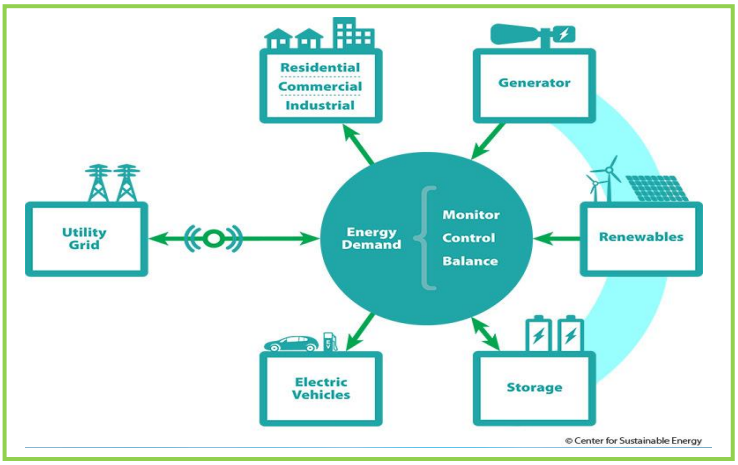
- Hotels and resorts
- Colleges and universities
- Airports
- Hospitals
- Any facility with both thermal and constant base electric load requirements

How Microgrids Increase Grid Resilience

Microgrids produce and often store their own power from sources such as the sun, wind, stored/pipeline gas, or hydro. Thus, microgrids can function independently from the grid in an island mode in the event of a grid outage. Under certain arrangements, microgrids can also export power to the grid when needed. A grid that has more generation sites is less susceptible to an outage because it can draw power from more than one source.

Ten CHP Sites Operating in Hawai'i

https://doe.icfwebservices.com/chpdb/state/HI



Representation of a modern microgrid

SOURCE: https://energycenter.org/self-generation-incentive-program/business/technologies/microgrid8/features/schofield-generating-station-highlights-value-of-reciprocating-engines.html

Hawai'i's Embrace of Microgrids: Problems and Solutions

Hawai'i lawmakers seek to secure Hawai'i's energy future and help prevent the kind of infrastructure collapse Puerto Rico experienced in 2017. To this end, they have set goals to achieve 100% renewable energy by 2045 and recently directed state regulators to create a market for microgrids. Achieving a higher penetration of renewables is not simply an environmental or economic issue in Hawai'i; it is also a survival tactic. With several self-contained electricity grids on the major inhabited islands, the state is isolated from any other power sources, leaving its grids subject to the destructive forces of hurricanes, volcanoes, tsunamis, and other natural disasters. Developing a reliable grid that depends only on the renewable electric sources in an isolated region like Hawai'i presents significant reliability obstacles and overlooks the essential thermal needs, especially for the critical infrastructure and centers of refuge after a storm. Simply stated, the electric grid might be damaged by a storm, and returning it to operational status might take days or weeks. Local microgrids with PV solar, electric storage, and CHP can operate during and after a storm. With that in mind, on July 10, 2018, Hawai'i Governor David Ige signed House Bill (HB) 2110. This bill is designed to help overcome barriers to renewable integration by creating a standard microgrid service tariff and simplifying regulations for grid interconnection. The Western CHP Technical Assistance Partnership (TAP) can help businesses, cities, and communities in Hawai'i to assess their potential for CHP with federally funded economic and technical fit analyses.

New Microgrids Tariff

HB 2110 directs the Hawai'i Public Utilities Commission to develop a microgrid tariff for the benefit and security of the islands' power systems:

- Affirms that microgrids "build energy resiliency into our (Hawai'ian) communities, thereby increasing public safety and security."
- Ensures that the microgrid services tariff will "provide fair compensation for electricity, electric grid services and other benefits provided to, or by, the electric utility, the person or entity operating the microgrid and other ratepayers."
- Ensures that the microgrid tariff, "to the extent possible, standardizes and streamlines the related interconnection processes for microgrid projects."

For More Information

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HAWAI'I STATE LEGISLATURE
https://www.capitol.hawaii.gov/

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