Hawai'i Powered 🔶

Hawaiian Electric's Integrated Grid Plan

ESIG Fall Technical Workshop Session 6: Cutting Edge Practices in Integrated Planning

October 23, 2024



Hawaiian Electric today

Serving the State of Hawaii for 133 years







2045 GOAL: Net Zero Carbon Emissions



Hawai'i has the most ambitious clean energy goals in the nation.

Hawaiian Electric is committed to 100% reduction of carbon emissions by 2045.





The IGP Process

පිරිපි

~

Data Collection

Engage working groups Work with specialists (energy industry leaders, economists and

industry leaders, economists and engineers) to learn best practices and find energy solutions that can work well for Hawai'i.

Model inputs and assumptions

Develop scenarios to learn how energy needs will change based on the number of electric vehicles, energy efficiency measures, rooftop solar projects, available land and future technology costs.

Procure renewable resources and support customer-sited energy generation

Begin to procure clean energy resources across the islands and developing programs to support private and community-scale energy generation.

Engagement:

Public engagement on Maui, Oahu and Hawai'i Island. <u>See summaries of what we heard.</u>

Plan Definition

Support the Climate Change Action Plan

Align our clean energy work with the recently announced goal to reduce carbon emissions by 70% in 2030 and to reach net zero carbon emissions by 2045. Moving to 100% local, clean energy is key to meeting bold carbon-reduction goals.

Renewable energy zone and transmission planning

Gather technical and community input to understand potential renewable energy zone locations that connect clean energy facilities to customers through additional electrical lines and substations.

Analyze models

Use data and models to learn how much clean energy output is needed and from which technologies to meet expected demands over time.

Engagement:

Ø

 $\overline{\mathbb{C}}$

602

- Webpage with information, maps and survey
 Community organization briefings
- Community talk stories (smaller, informal gatherings)

Growing a Clean Energy Marketplace



Ш

Hawaiian Electric will draft an action plan outlining steps and commitments to deliver clean energy projects that will meet state goals and timelines.

Identify utility-scale projects

Select potential projects to deliver that align with our goals, timeline and commitments to communities.

Advance customer-sited energy programs

Develop programs to encourage customer-led clean energy projects, such as EV charging incentives, bonus for battery storage and communitybased renewable energy projects.

Engagement:

Seek input from stakeholders and communities on selecting utility-scale projects and developing programs for customer-led initiatives. Provide educational opportunities about what's involved in selecting projects.

Plan Refinement

actual projects and programs acquired through the marketplace.

Regulators

review Hawaiian Electric will submit selected solutions for review by the Public Utilities Commission.

Engagement:

Keep the community informed about the content and status of the action plan.

Community Engagement Ongoing throughout the process





Pathways to 100% RPS



Pathway	Overview
Base	Based on current policy and market conditions, the most likely adoption of customer technologies (private rooftop solar, energy storage, electric vehicles, and energy efficiency). Customers manage EV charging.
Low Load	High adoption of energy efficiency and private rooftop solar, but EV adoption remains slow. Electricity demand is lower than in all other pathways.
Faster customer technology adoption	High adoption of all customer technologies compared to the market forecasts and EV owners manage their charging. Electricity demand is higher than the Base but lower than the High electricity demand pathway.
High Load	Slower adoption of customer technologies; however, EV adoption accelerates because of aggressive State or federal policies, and owners charge their vehicles when the grid is most stressed (i.e., unmanaged EV charging). Electricity demand is much higher than in all other pathways.
Land- constrained	This pathway recognizes the possibility on O'ahu that insufficient land may be available to develop large-scale resources or to produce local biofuels. This pathway evaluates the impact of limited land availability for future solar, onshore wind, and biomass development. This

scenario uses the Base electricity forecast.





Modeling to Determine Grid Needs

The Preferred Plans for each island were developed as a result of the resource, transmission, and distribution analyses.



Hawai'i Powered



Integrated Grid Plan (IGP) Accepted by the Commission on March 7, 2024

The plan calls for additions of solar and wind generation, expansion of the transmission system, continued growth in DERs, and the addition of firm generation (including geothermal).

This portfolio would allow for desired fossil generation retirements and to meet 2045 decarbonization goals in a reliable and resilient fashion.

Recognizing the need for a plan that all stakeholders can achieve and concerns on implementation, land use, and community acceptance of the renewable energy targets, particularly on O'ahu, the plan proposes to use the Land-Constrained Plan for O'ahu.

PUC approval of the plan was requested to allow for faster regulatory process and execution of projects and programs.



Hawai'i Powered



[Some] Key Changes Needed to Advance Integrated Planning

Continued Engagement with Stakeholders and Community

- Agreement on appropriate capacity accreditation methods that are reliable and robust but also balance the amount of effort needed by grid planners to develop them and stakeholders to understand them
- Common understanding of assumptions and methods between stakeholders involved in the plan development and stakeholders involved in the RFPs and programs that result from the planning
- Shift from solely focusing on generation to generation + T&D

People and Processes

- Better modeling tools that can cover more parts of the planning process instead of needing to rely upon separate tools for separate process steps
- Improved communication/handoffs (and translation) across all planning and operation areas

Technology

- Continued improvement in the performance of DER and Utility-Scale inverter-based resources
- Proven technologies capable of improving operation of highly distributed, IBR-rich grid







Mahalo for your time

Any questions?

Ken Aramaki ken.aramaki@hawaiianelectric.com