Getting to 100% Renewables

Evolving System Planning Considerations Including DER
2021 ESIG Fall Workshops
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Our Goal for the Future: 100% Renewables by 2045

2020 Recap: The Companies achieved 34.5% RPS

*RPS = Renewable Portfolio Standard
What is IGP?

Integrated Grid Planning (IGP) is an energy planning process to identify the best options for our customers to move Hawai'i toward a clean energy future.
Our planning principles

1. Renewable energy is the first option.
2. The energy transformation must include everyone.
3. Today’s decisions must not crowd out tomorrow’s breakthroughs.
4. The power grid needs to be modernized.
5. The lights have to stay on.
6. Our plans must address climate change.
7. There’s no perfect choice.
Participating in the Process

As part of the IGP process, we are collecting your input and considering all our options in planning for our renewable future. Here are the participants Hawaiian Electric is collaborating with:

**Working Groups**
Address specific topics in an advisory capacity and not as a decision-making group

**Stakeholder Council**
Represents customers broad stakeholders to review work and provide guidance and insights

**The Public**
Communication with customers

**Technical Advisory Panel**
Provides independent evaluation and feedback on the working group activities and reviews point filings
Our goals require a transformation of our electric system

Integration of resource, transmission, distribution and customer resource planning

Technical work informed by active Stakeholder engagement

No blueprint; Hawaiian Electric leads the way with work recognized by RMI, EPRI, SEPA and Utility Dive, and others as industry-leading

Long-range planning considers many factors

- Customer Affordability
- Grid Resilience
- Renewable Portfolio Standard
- System Reliability
- Environmental Carbon Impact Reduction
- Community Impacts and Land Use
- Other Policies

Inputs, Forecasts & Assumptions
The IGP process integrates generation, T&D, and customer resources, with the resource procurement.
Integrated Analytical Framework

Capacity Expansion Planning (RESOLVE)

- Timing, type, quantity of resource additions
- Adjust ERM or adjust specific resources based on size, frequency, and duration of shortfall

Resource Adequacy Analysis (PLEXOS)

- Meet reliability criteria?
  - NO
  - YES: Reliable portfolio of resource additions

Production Cost Simulations (PLEXOS)

- Grid service needs met & no flexibility violations?
  - NO
  - YES: Commitment & Dispatch Conditions

Network Stability Simulations (PSSE/PSCAD)

- Meet stability criteria?
  - NO
  - YES

Final Grid Needs Portfolio

Inputs, Assumptions, Constraints & Scenarios

Distribution Analysis (LoadSEER, Synergii)

- Meet distribution planning criteria?
  - NO
  - YES

- Add new resources, NWA, or transmission

- Adjust generator and inverter controls
- Adjust grid services & redispatch

Adapted from Hawaii Natural Energy Institute
Integration of customer technologies foundational to achieving RPS and decarbonization goals

- **Energy Efficiency**
  4,300 GWh savings by 2030
  In 2019-20, Hawaii Energy achieved 134 million kWh of EE Savings

- **Emissions Reductions**
  Used 107 million fewer gallons of oil in 2020 compared to 2008, and cut greenhouse gas emissions by 24% since 2010.

- **Private Customer Rooftop Solar and Battery Energy Storage**
  Today, 32% of single-family homes have rooftop solar

- **Electrification of Transportation**
  Installed 25 fast chargers across territories; introduced an eBus Make-Ready Infrastructure Pilot Project
Energy efficiency is critical to managing growth from EoT and other customer end uses

Oahu Achievable Potential - Cumulative Savings by End Use
(MWh, % of Total)

Source: State of Hawaii Market Potential Study 2020
Future EV adoption is uncertain

A range of scenarios is needed to assess impact to electric system

The high EV scenario assumes 100% market saturation by 2045 to achieve decarbonization goals and policies
Significant growth in peak demand expected over the next 30 years to electrify the transportation sector.

A combination of customer technology adoption futures are assessed for long-range planning.

We use a high and low load “bookend” to test robustness of long-range plans against uncertain futures.
Flexible technologies are critical to managing peak demands

*PV+BESS and EE adoption in 2050 can offset EV driven growth*

*Customer Technologies under managed EV charging can reduce the peak by 16.6%*

*Managed EV charging can potentially reduce the peak 12.6% versus unmanaged charging*
Flexible customer technologies are complementary

**Customer Technologies that increase load**

Unmanaged EV Charging

eBus

Underlying Load

Year 2050

**Managed flexible loads can shift the peak**

Managed EV Charging

eBus

Underlying Load

Year 2050

**Customer Technologies that reduce load**

DGPV+BESS

EE

Net Load

Year 2050

Continued adoption of customer solar, BESS, and EE measures can reduce the peak demand and charge EVs with clean energy
Customer technologies will play a significant role in achieving RPS and decarbonization goals

*The underlying peak hour is reduced by 16.5% with managed EV charging*

*Even under unmanaged EV charging, EE, PV, BESS key to offsetting load growth from EV*

*The right policies, programs, and rate designs are needed to realize this future*
Mahalo!

Here are the many ways to stay connected with us.

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