



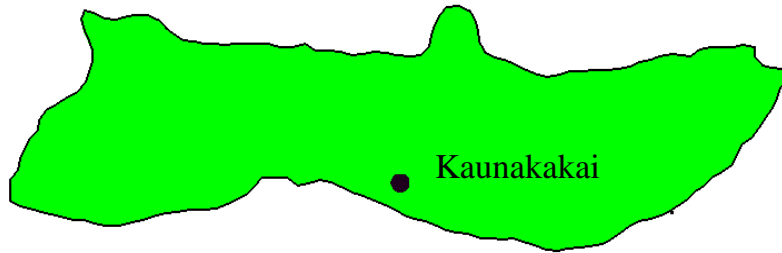
**Hawaiian Electric
Maui Electric
Hawai'i Electric Light**

100% Renewable Energy - Moloka'i

October 17, 2018

Moloka'i

Moloka'i



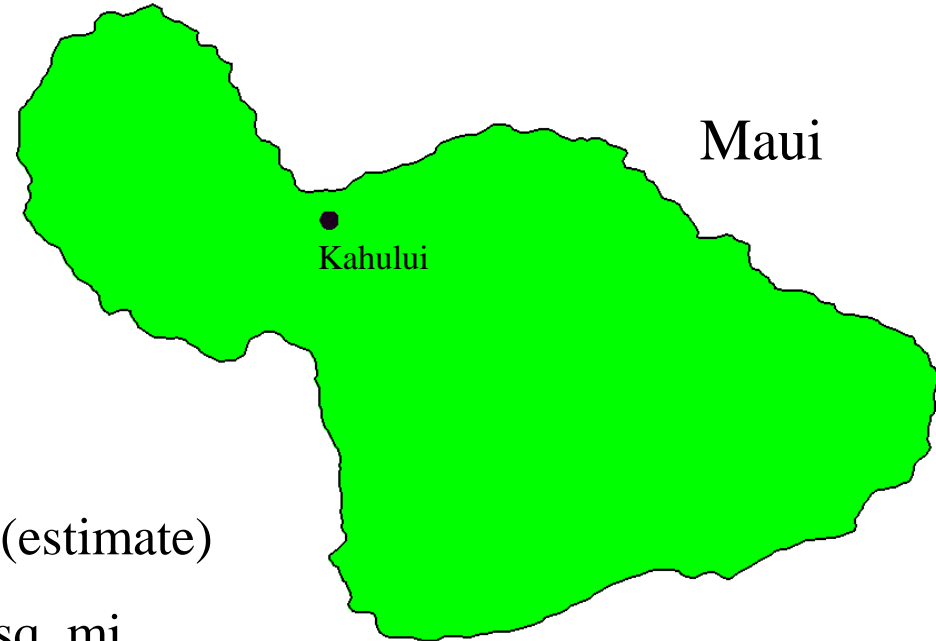
Maui Electric Company

Service Area

Lāna'i



Maui



Maui County 2015 Population: 164,637 (estimate)

Service Area for Maui Electric: 1,159.2 sq. mi.

Average Number of Maui Electric Customers for 2017: 71,049



Hawaiian Electric
Maui Electric
Hawai'i Electric Light

Moloka'i

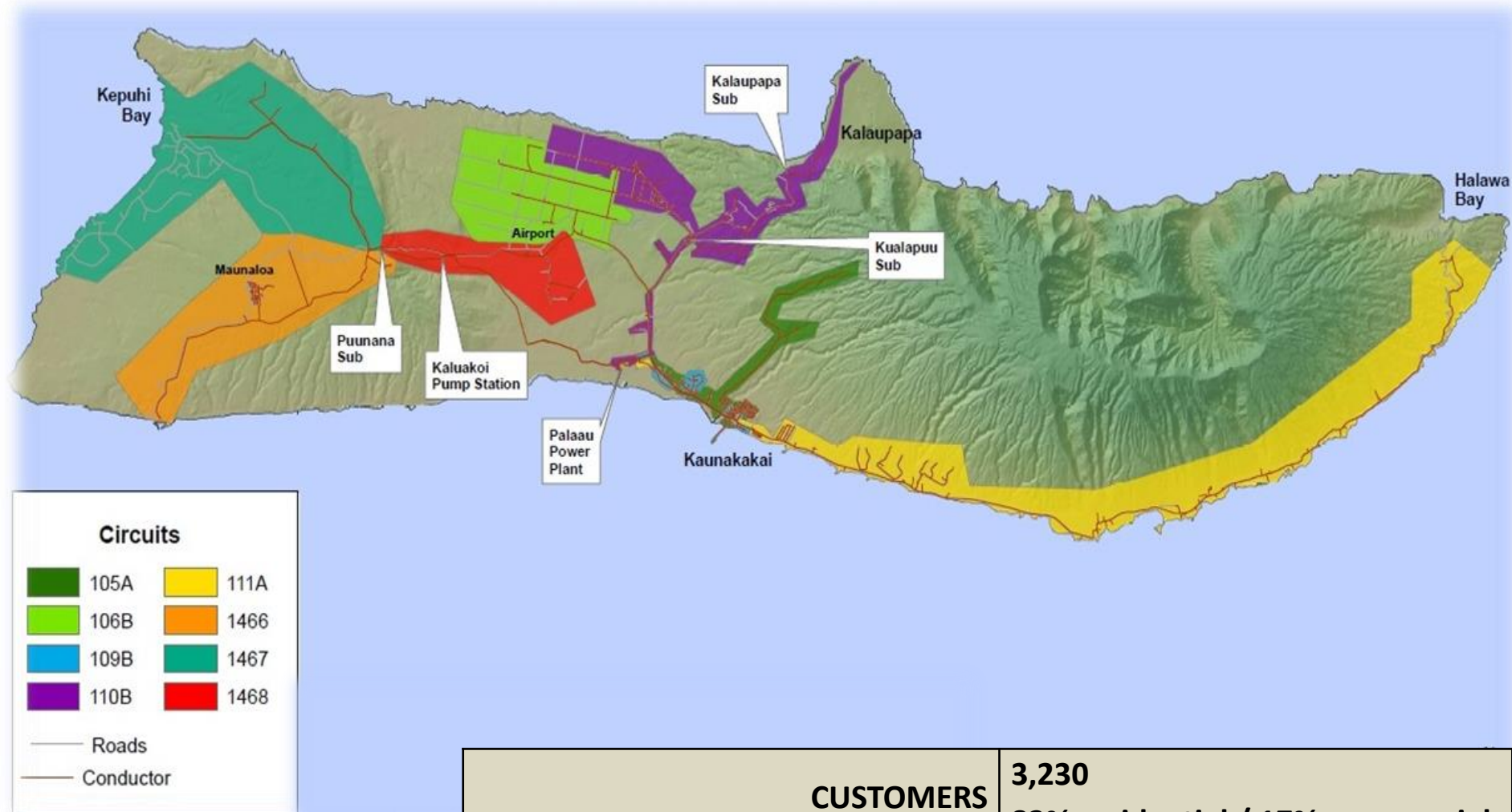


POPULATION	7,345
LAND	260 square miles
ZONING	67% agriculture



Hawaiian Electric
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Moloka'i



CUSTOMERS	3,230 83% residential / 17% commercial
LOAD	5.8 MW – 1.5 MW
DG PV INSTALLED & PREAPPROVED	2.28 MW; 424 customers
CIRCUITS & TRANSMISSION	1 - 34kV Transmission Line 8 - 12kV Distribution Circuits

Moloka'i

Maui Electric Generation on Moloka'i

- Total generating capacity = 15.2MW
- Ultra-low-sulfur diesel (ULSD)
- Isochronous control
- Minimum units online = 2



Moloka'i

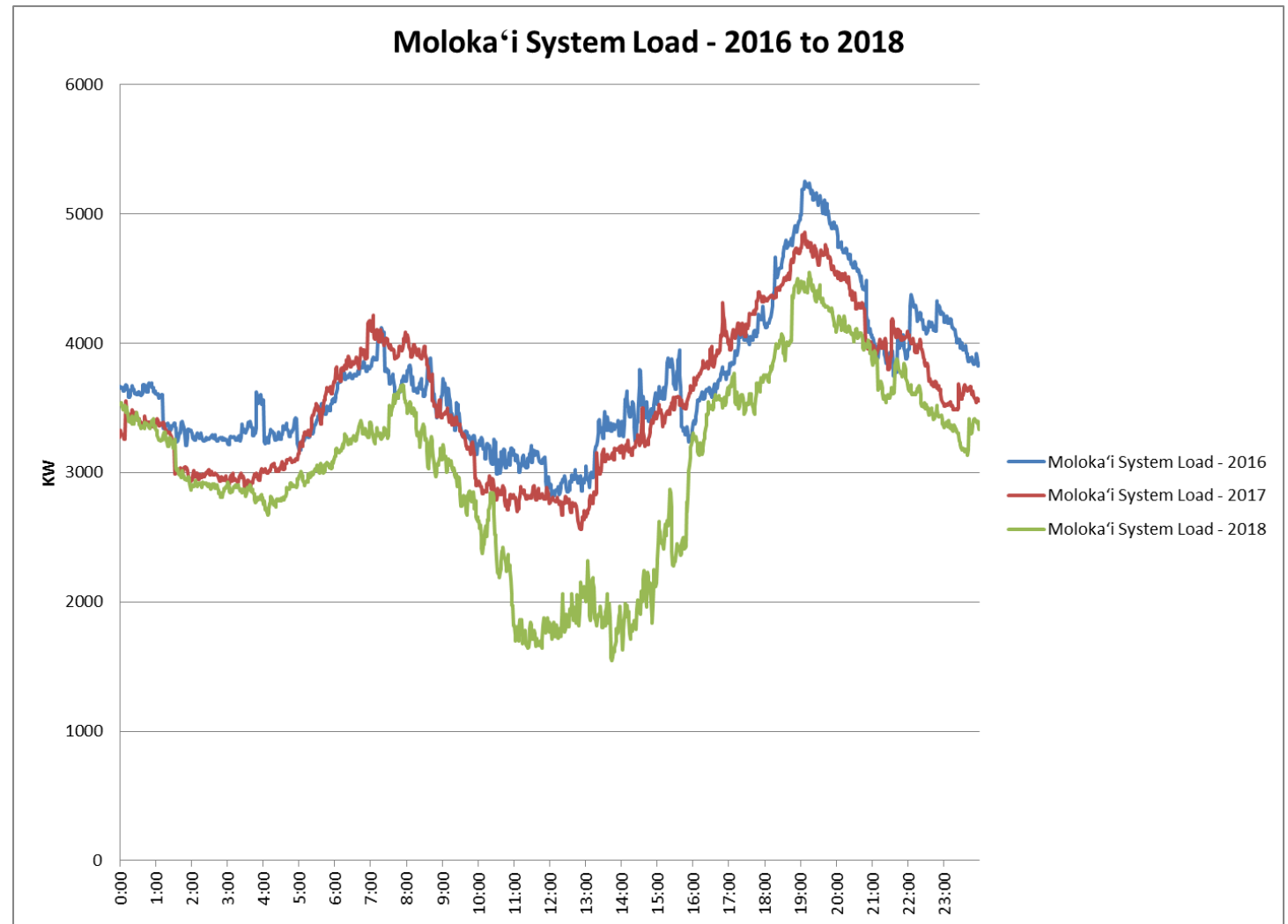
Moloka'i System Issues

- Distributed generation on Moloka'i mostly PV Systems
- No SCADA control/visibility of Distributed PV
- Protection coordination
- Voltage regulation with large water pump motor starts

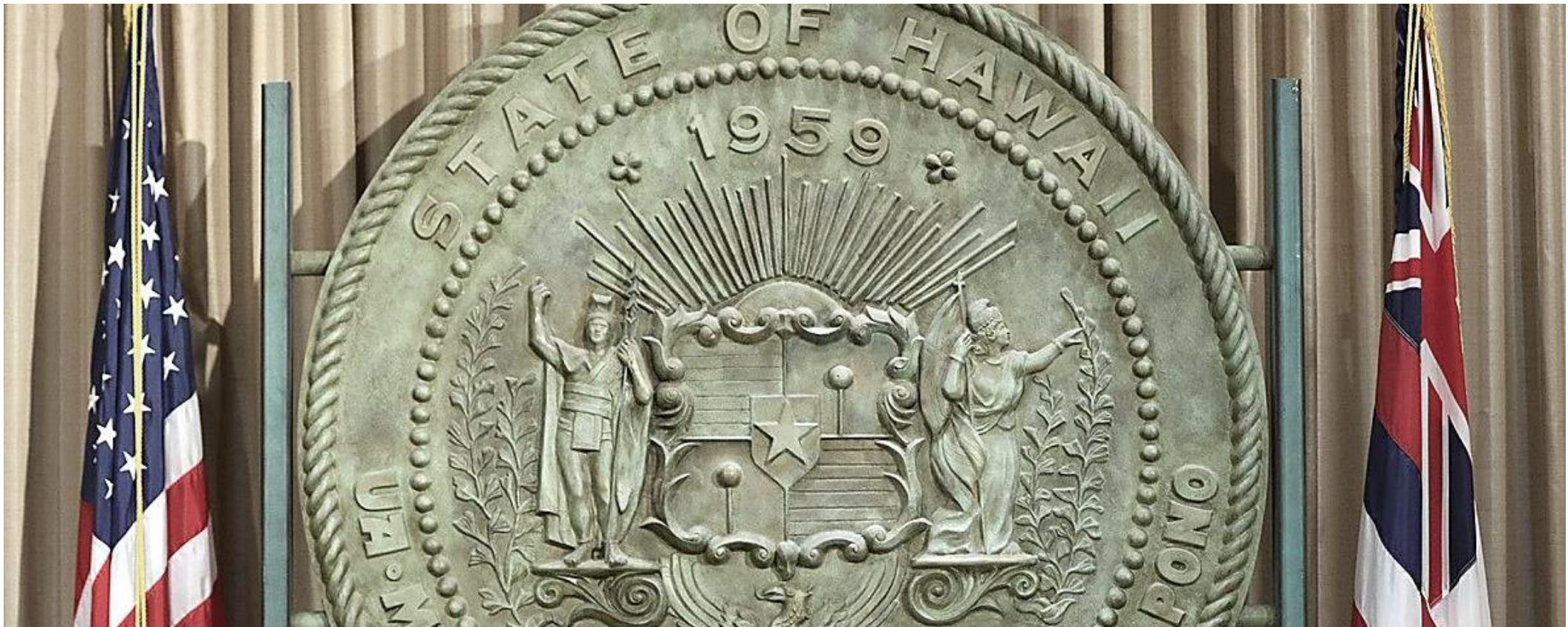


Moloka'i System Issues

Low load periods



Hawai'i's historic new law



**to reach 100% renewable energy
by 2045**



Hawaiian Electric
Maui Electric
Hawai'i Electric Light

Multi-pronged holistic approach Working simultaneously



Moloka'i

Intent of Community Outreach



- Reduce odds of adversarial escalation
- Minimize risk of opposition
- Demonstrate good faith effort - earn trust and increase credibility as experts
- Build into energy plans community's perspective



100% Renewable Energy by 2030 ... or Earlier

- Achieving 100% Renewable Energy Future for Moloka'i in collaboration with the community balancing clean energy, reliability, and affordability
- Looking to other island systems around the world achieving 100% RE
- Community feedback and support critical to success of plans
- Funding capital investments a challenge



Listening to the Voice of the Community

- Let's Talk Energy discussions on Moloka'i
 - Targeted roundtable meetings
 - Open community meeting
- The community:
 - Want lower bills
 - Want to be involved in planning for future of Moloka'i
 - Willing to be innovative to achieve 100% renewable energy
- In addition, businesses want reliable, quality power



Planning for 100% renewable energy on Moloka'i

100% Renewable Energy Evolution

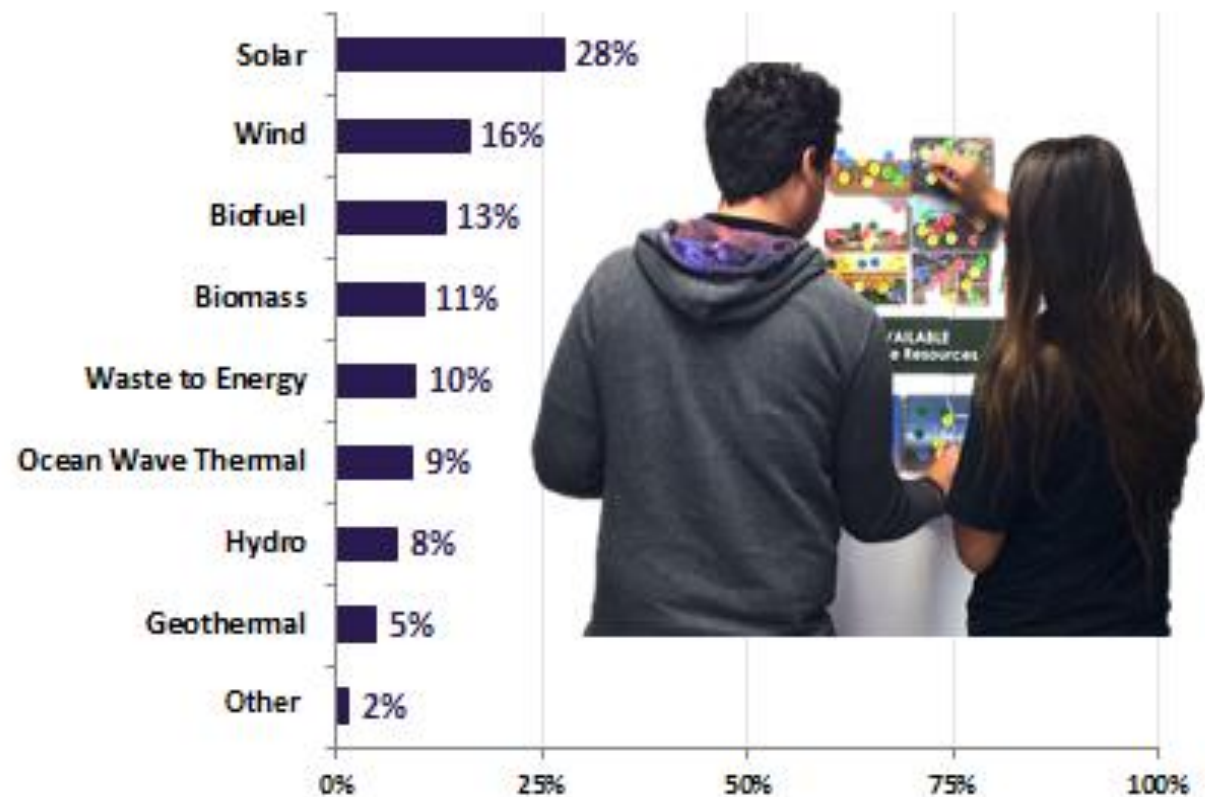
- Community involvement in planning discussions
- Maintaining system reliability
- Integrating clean energy and offering customers choices
- Affordable energy for all customers
- Hosted roundtable sessions with a focus on renewable energy

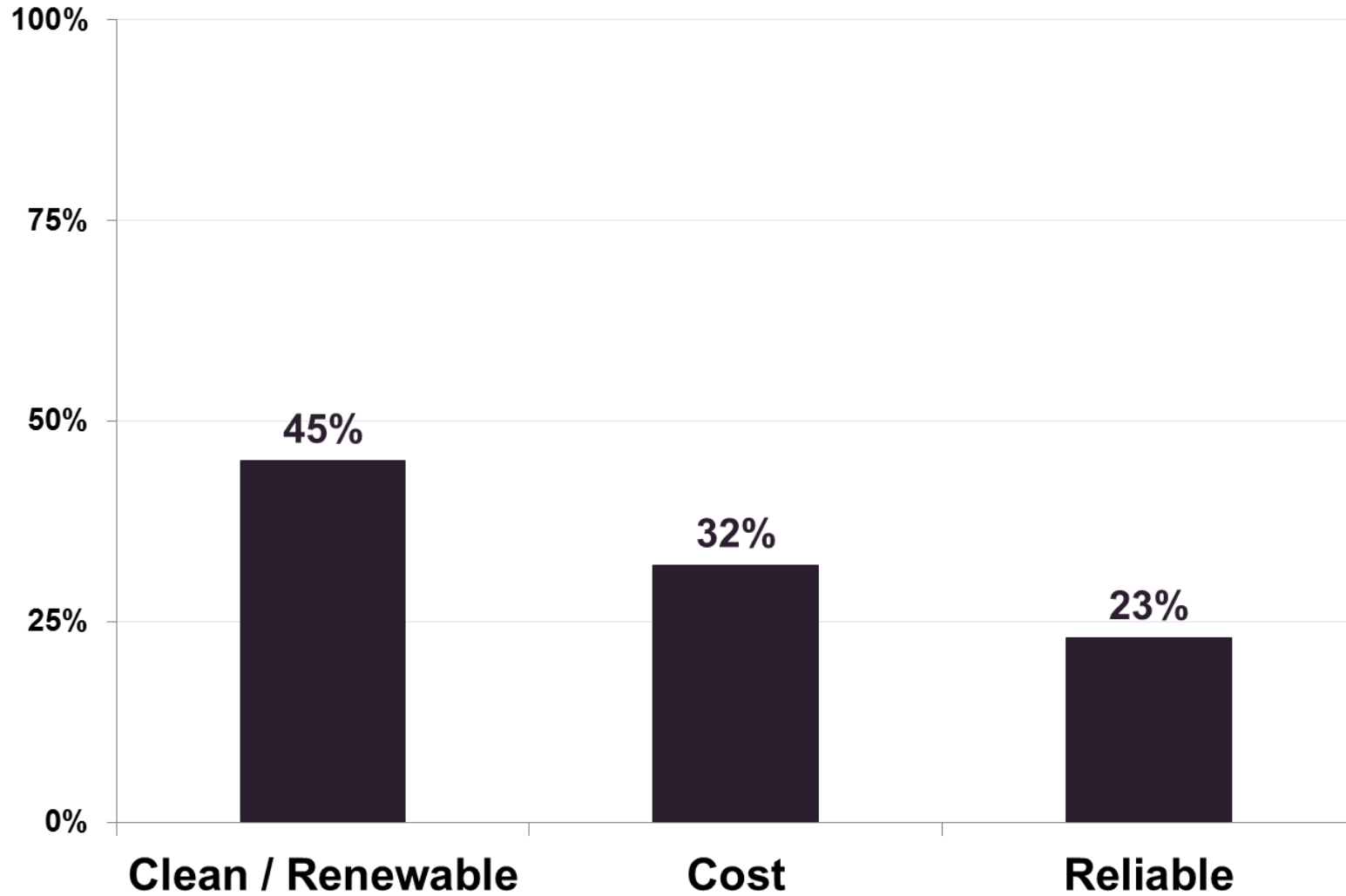


Community Process

**475
community
comments
received
about
8 different
energy
resource
options**

From 113 roundtable respondents





What's important to you?



Providing Clean, Affordable, Reliable Energy

- Providing choices for customers
- Learning from other islands around the world
- Possible infrastructure investments:
- Work with potential providers of renewable energy
- Partnership with Hawaii Natural Energy Institute



Offering Customer Choices

- Net Energy Metering Queue
 - Move NEM customers queue forward
- E-Gear Pilot Project
 - Customer sited energy storage
- Other options
 - ConnectDER devices



Offering More Customer Choices

- Pilot Solar Programs
- Electric Vehicles and Charging Stations
- Community Based Renewable Energy
 - Demand Response / Time-of-Use Rate Options
 - Low day-time rates to absorb PV energy
- Electric Vehicles
 - Fast charger installation to encourage EV adoption
 - Lower overall household costs for energy and fuel



Learning from Others

Roadmap

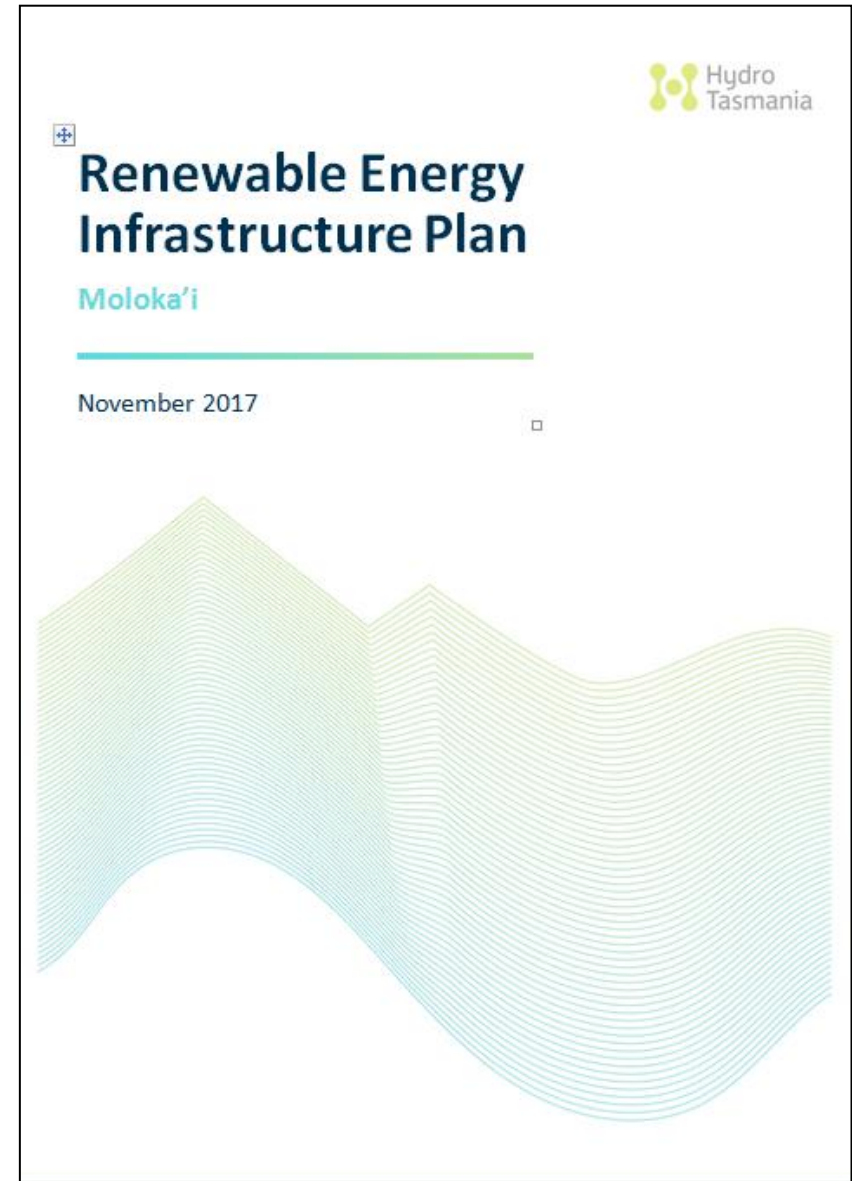
- Selection Criteria for potential consultants
- Utility experience in operations
- Experience with small island grids
- Capable to address similar challenges facing Moloka'i
- Low inertia systems
- Reliability/Protection



Learning from Others

Hydro Tasmania

- Consultant selected to develop roadmap for grid improvements to bring Moloka'i forward to 100% renewable energy



Infrastructure Investments

Microgrid Management System

Energy Storage

- Central
- Distributed

Load Bank

Digital Protection Equipment

Synchronous Condensers



Renewable Energy Providers

Opportunity to purchase solar energy from Moloka'i New Energy Partners



Half Moon Venture photo

- Large-scale solar and battery project
- Providing Moloka'i customers 2.64 megawatt of solar energy
- Energy Storage - 3MW/15MWH
- Located on 37 acres of industrial land near Pala'au power plant
- Agreement reached after many years and a requirement to obtain community input
- Supported in part by New Market Tax Credits funding
- Scheduled operation by end of 2019



Partnerships

Hawaii Natural Energy Institute

- Energy Storage
- Load Bank

County of Maui

- Electric Vehicles and Charging Stations
- Demand Response



A 16-year old today on Moloka'i

Molokai High Roundtable

Will be **21** years old in 2023 and **43** years old in 2045



Mahalo!

