

Large-Scale Renewable Energy Siting

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October 13, 2022



**HAWAI'I
STATE
ENERGY
OFFICE**

Ni'ihau

Kaua'i (KIUC)

72,300 Pop.
80 MW Peak
69.5% RPS
39¢ per kWh

O'ahu

975,000 Pop.
1,100 MW Peak
32.8% RPS
47¢ per kWh

Moloka'i*

6,800 Pop.
5.8 MW Peak
52¢ per kWh

***Maui County**

50.2% RPS
46-56¢ per kWh

Maui Island*

157,900 Pop.
193.4 MW Peak
46¢ per kWh

Lāna'i*

2,800 Pop.
6.11 MW Peak
56¢ per kWh

Kaho'olawe

State of Hawai'i

1.4 Million Population

6 Grids

40% Renewable Portfolio Standard (RPS)

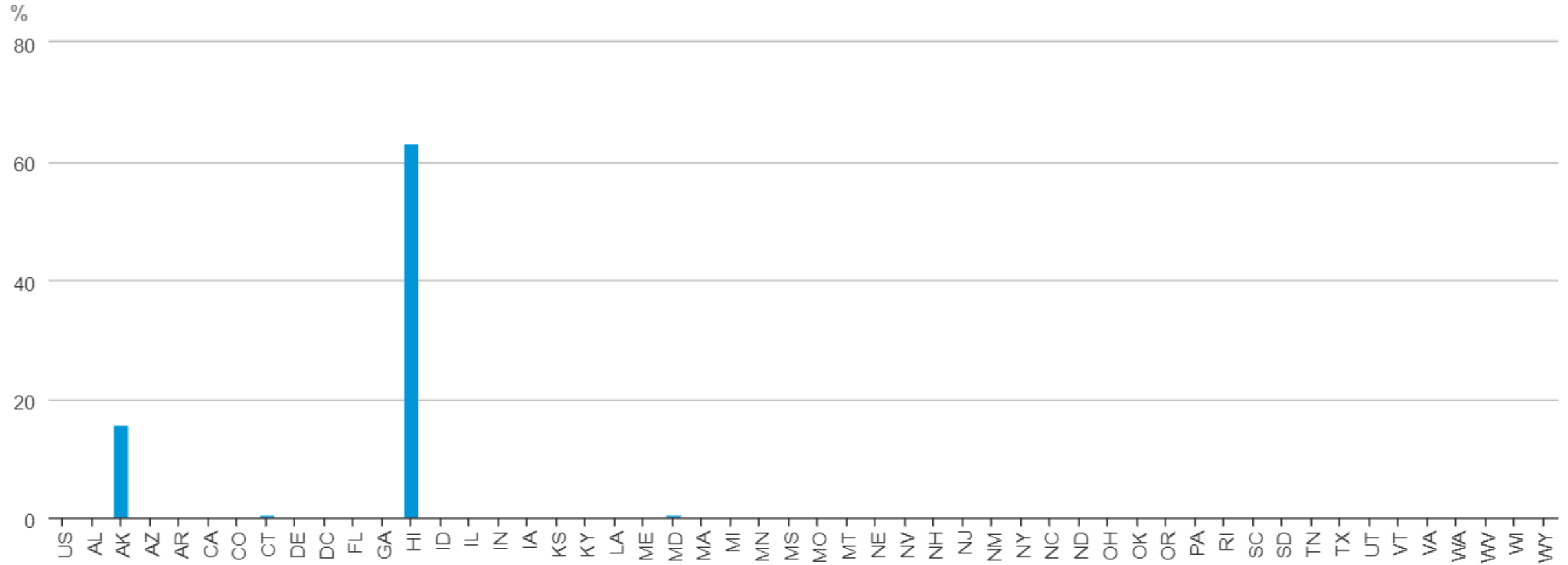
Average Residential Cost per kWh, Sept. 2022
Peak Loads, 2021

Hawai'i

201,500 Pop.
193.9 MW Peak
60% RPS
49¢ per kWh

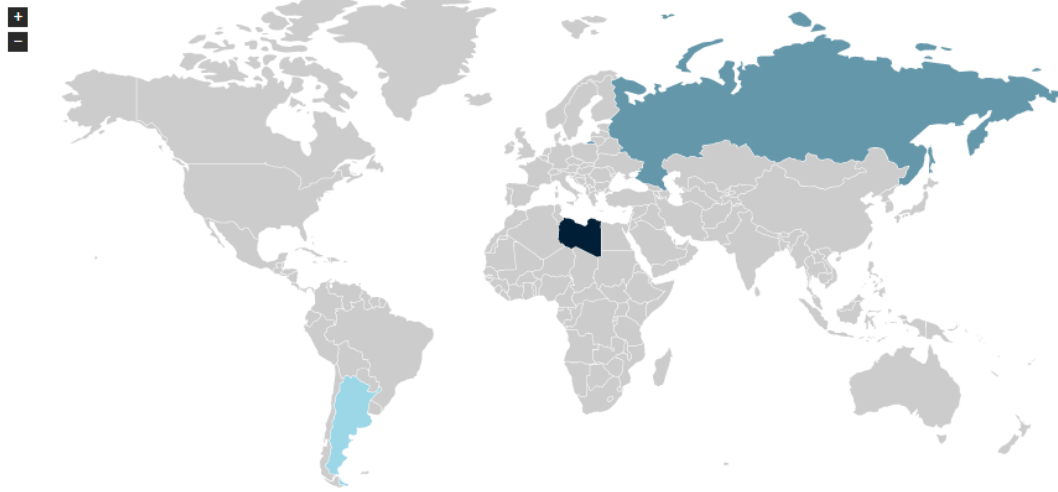
Petroleum-Fired Electricity Generation as Share of Total Net Generation, Jun-2022

 [DOWNLOAD](#)



Source: U.S. Energy Information Administration

Imports of all grades to Hawaii 2021



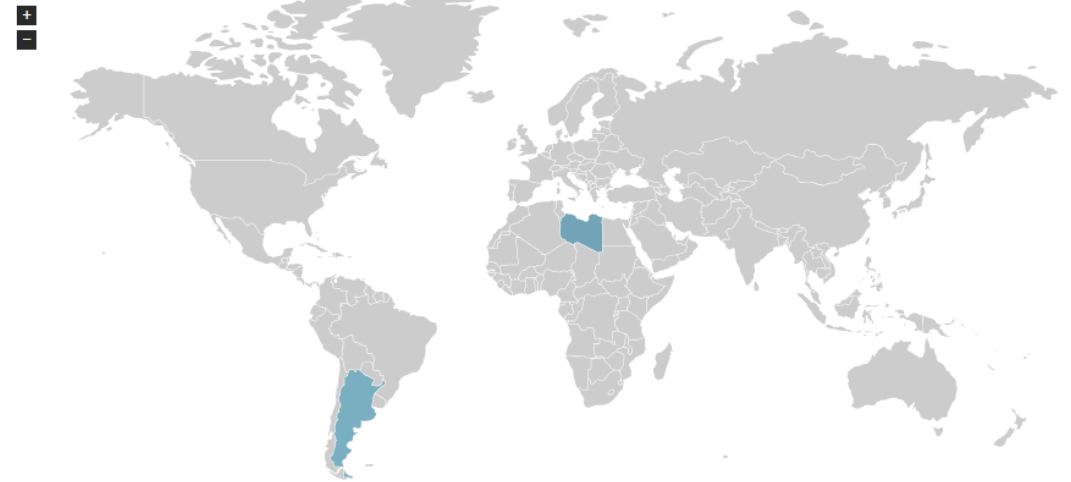
Petroleum imports to Hawai'i in 2021

Libya – 64%

Russia – 28%

Argentina – 8%

Imports of all grades to Hawaii Jun 2022



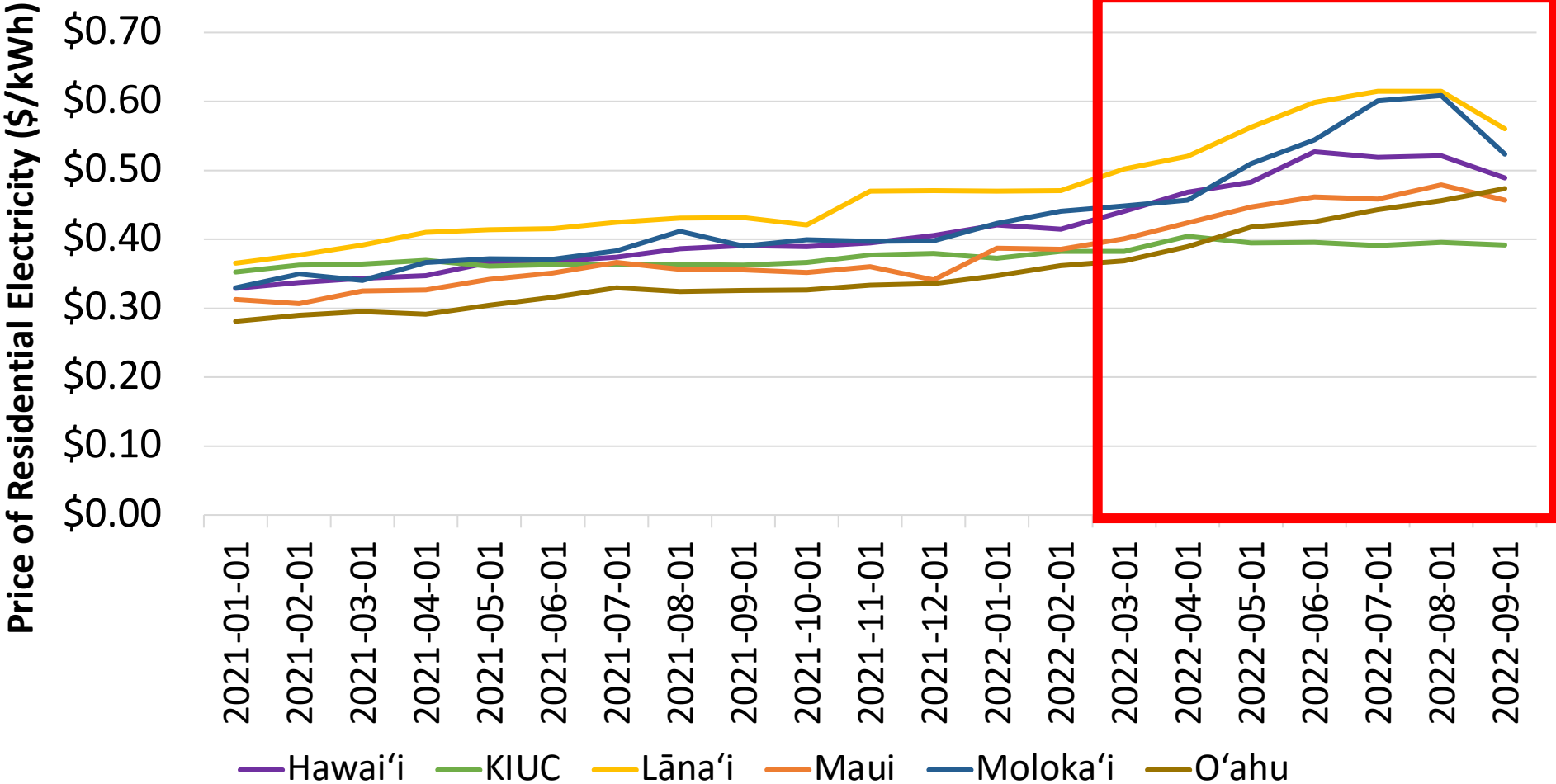
Imports by Country June 2022

In response to the war in Ukraine in April 2022, Hawai'i's only refinery announced suspension of Russian crude oil purchase.

Imports shifting to Argentina and Libya.

Average Electricity Prices by Island - 2021 to 2022

Residential Rates by Island Based on Average 500 kWh User
2021 - 2022

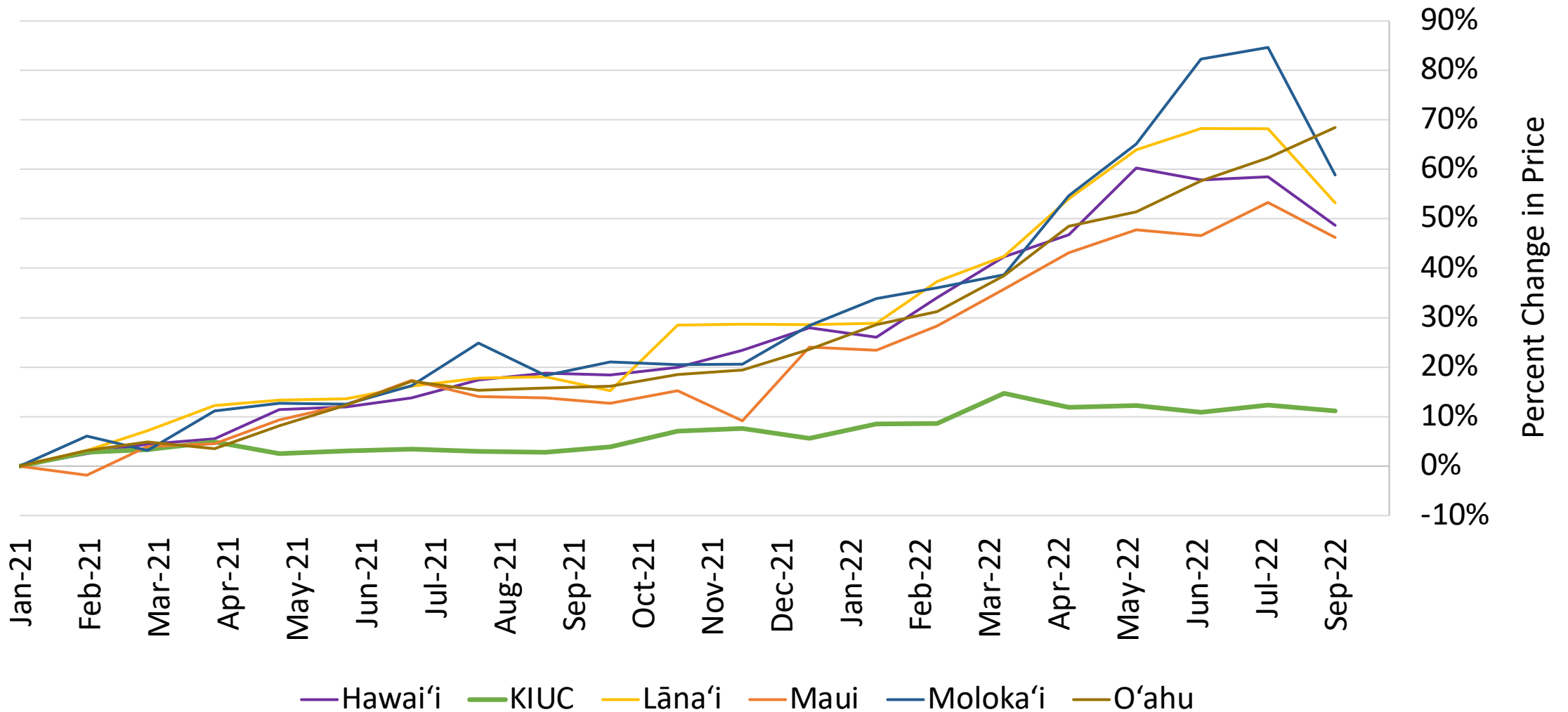


War in Ukraine increases oil prices April 2022

O'ahu costs exceed Kaua'i Island Utility Cooperative (KIUC) costs

KIUC energy costs plateau.

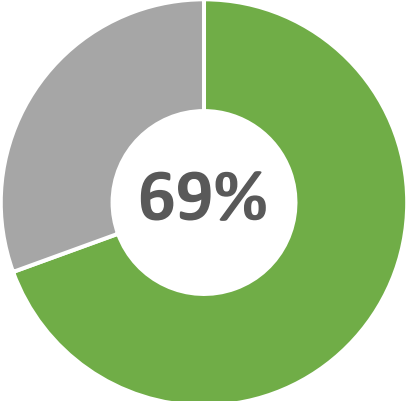
Percentage Change in Electricity Price, All Sectors January 2021 Baseline



Baseline Month-Year: January 2021. Data Source – Utility Rate Reports

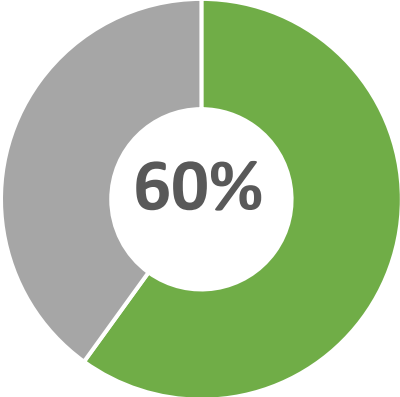
2021 Renewable Portfolio, Based on Electricity Sales

Kaua'i (KIUC)



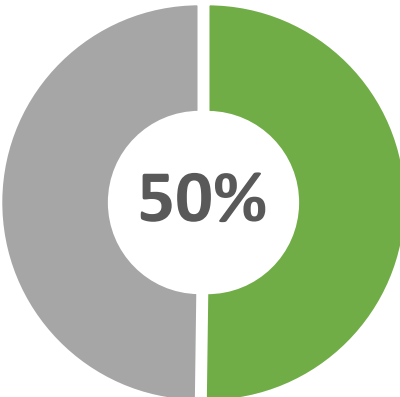
- Utility-Scale PV 30%
- Distributed PV 15%
- Hydroelectric 14%
- Biomass 11%

Hawai'i Island



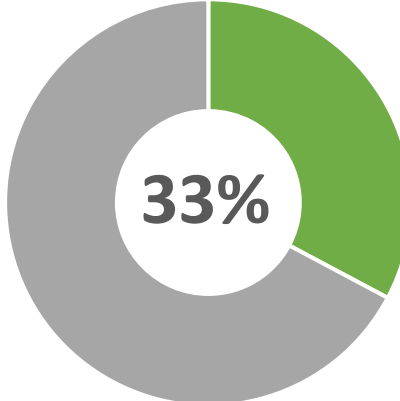
- Distributed PV 19%
- Geothermal 18%
- Wind 15%
- Biofuels 4%
- Hydroelectric 4%

Maui County



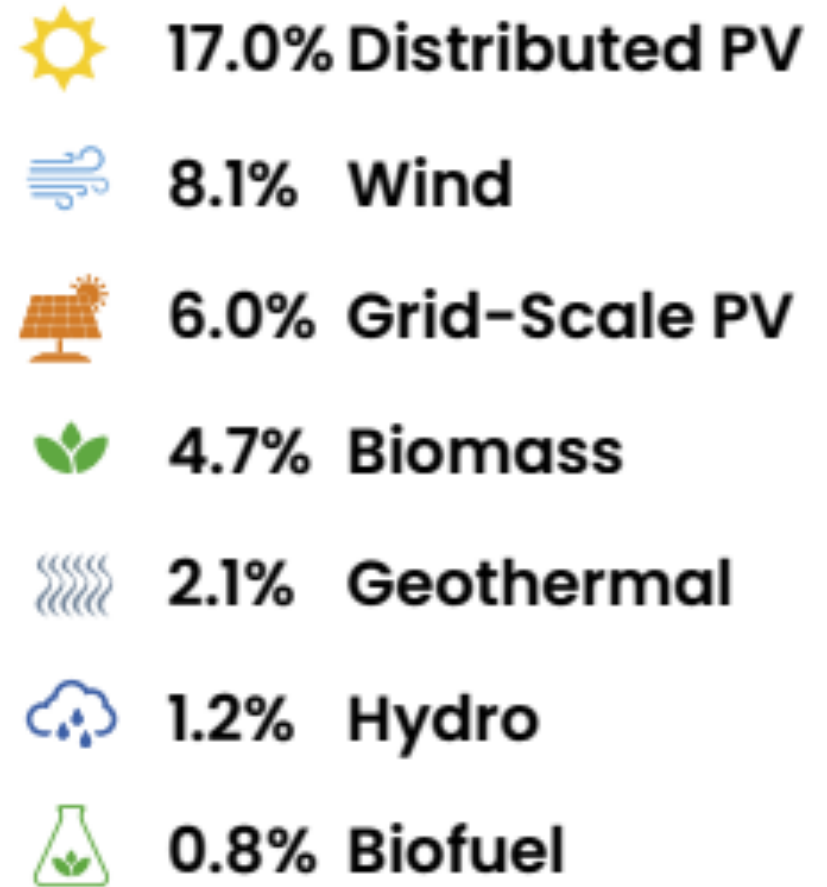
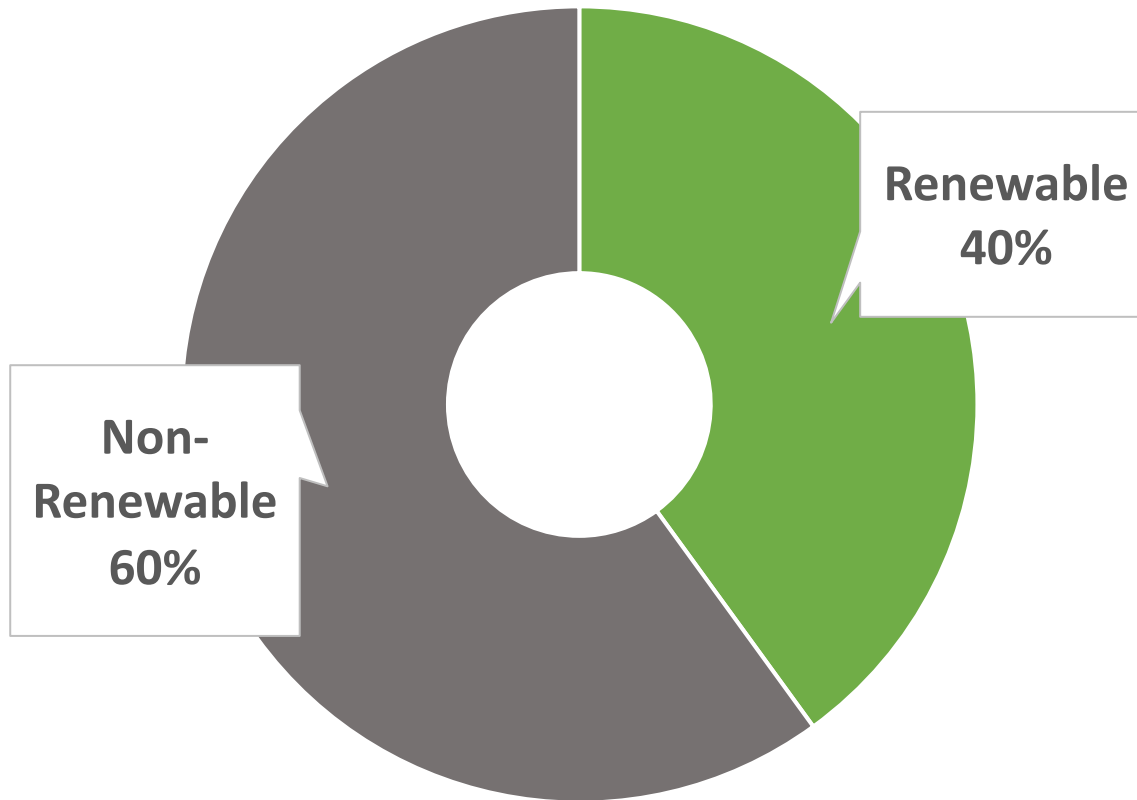
- Wind 26%
- Distributed PV 23%
- Utility-Scale PV 1%
- Biofuels < 1%

O'ahu

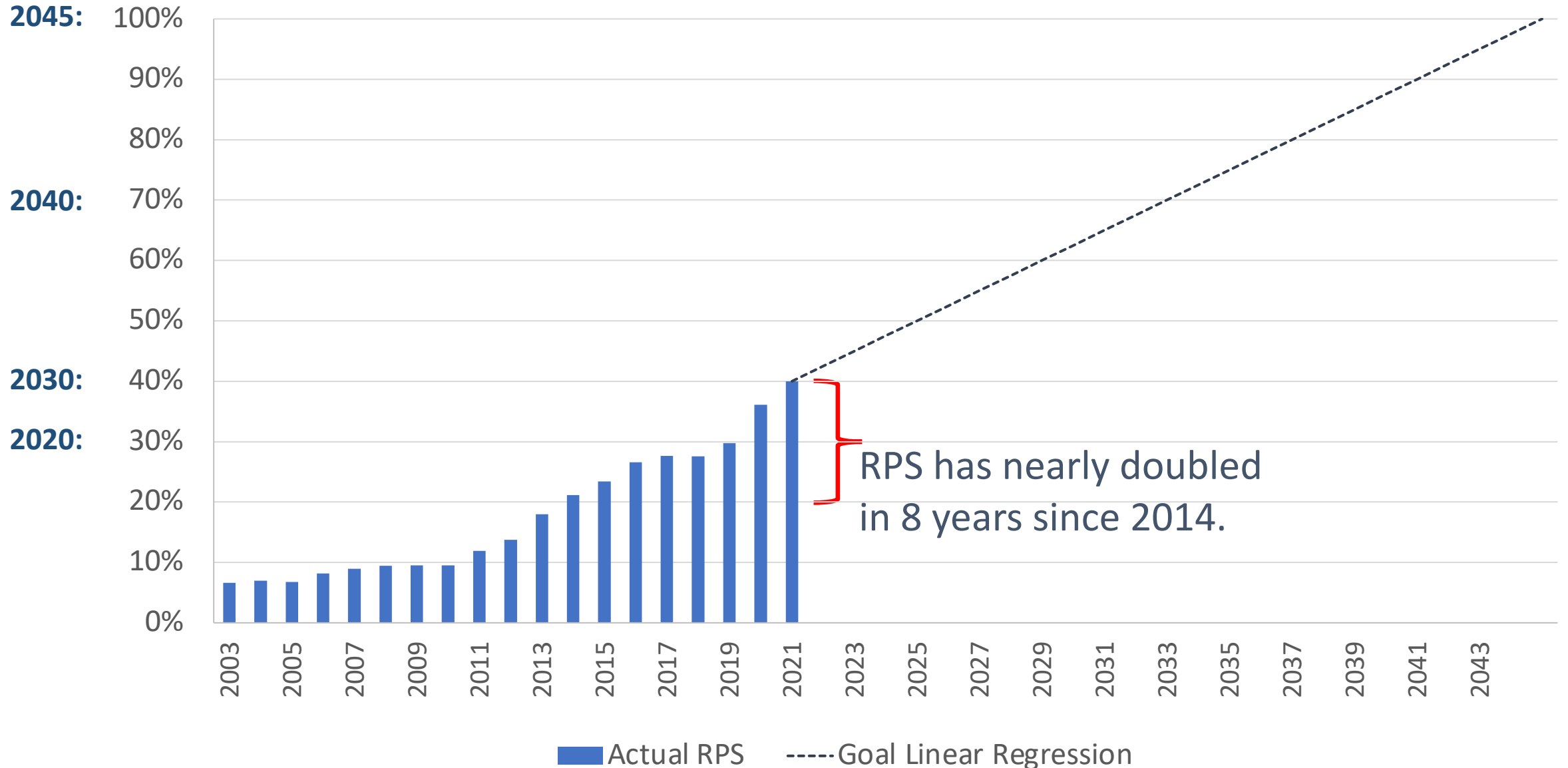


- Distributed PV 16%
- Utility-Scale PV 6%
- Biomass 6%
- Wind 4%
- Biofuels < 1%

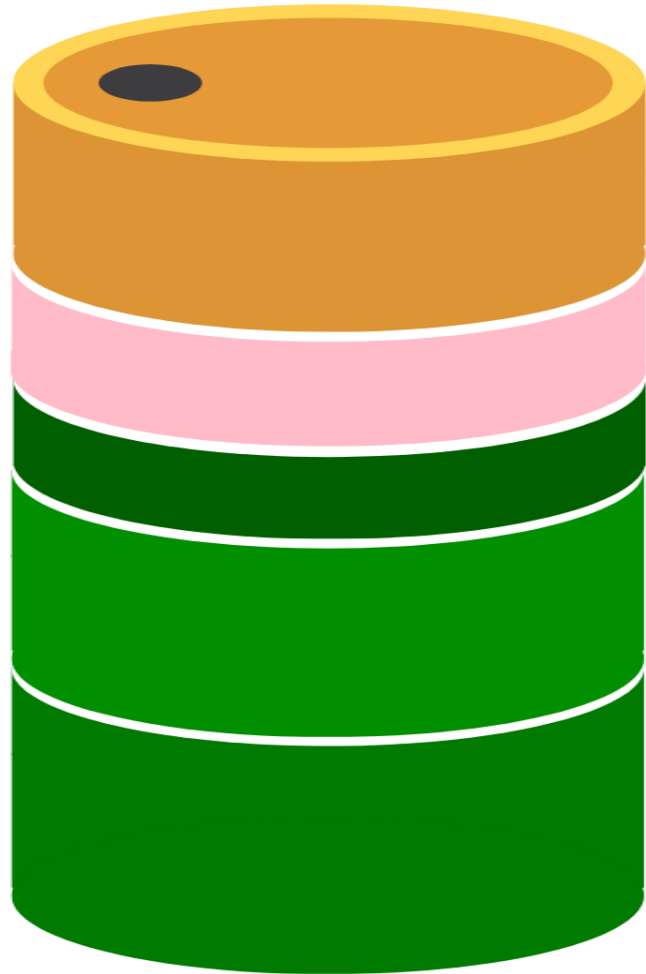
Statewide Renewable Electricity Sales, 2021



Hawai'i's Renewable Electricity Requirements, 2003-2045



Hawai'i's Petroleum Use By End-Use Sector



Electric Power: 25%

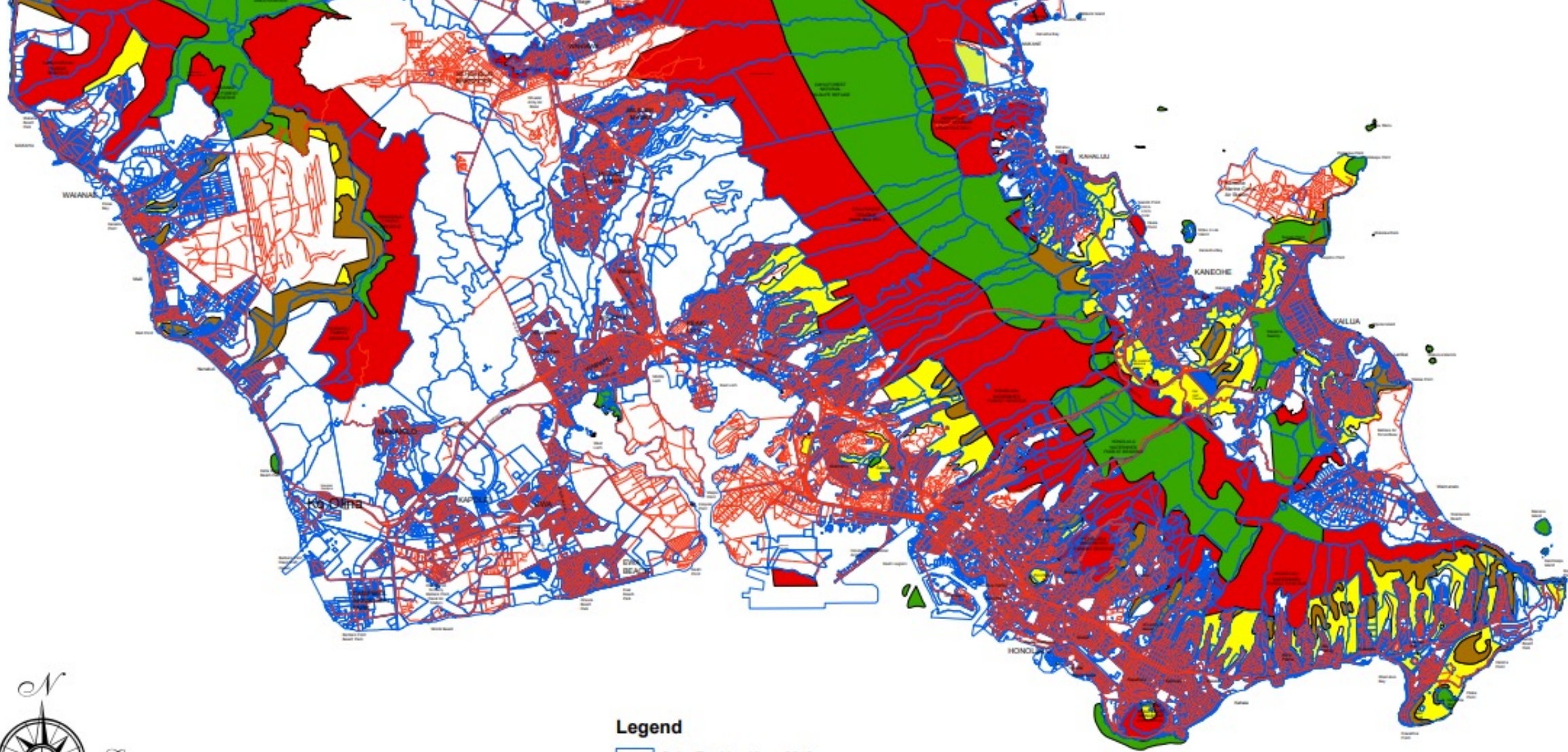
Other: 11%

(Residential, Commercial, Industrial)

Transportation – Marine: 3%

Transportation – Ground: 24%

Transportation – Air: 38%



1:80,000

Legend

-  Oahu Tax Map Key - 2012
- Conservation Subzone**
-  Conservation
-  GENERAL
-  LIMITED
-  PROTECTED
-  RESOURCE
-  SPECIAL

This map is intended for visual representation of proposed subzone designation. It should not be used for boundary interpretations or any other use beyond the limits of this data. (Prepared on the State of Hawai'i's GIS - NOVEMBER 2012)

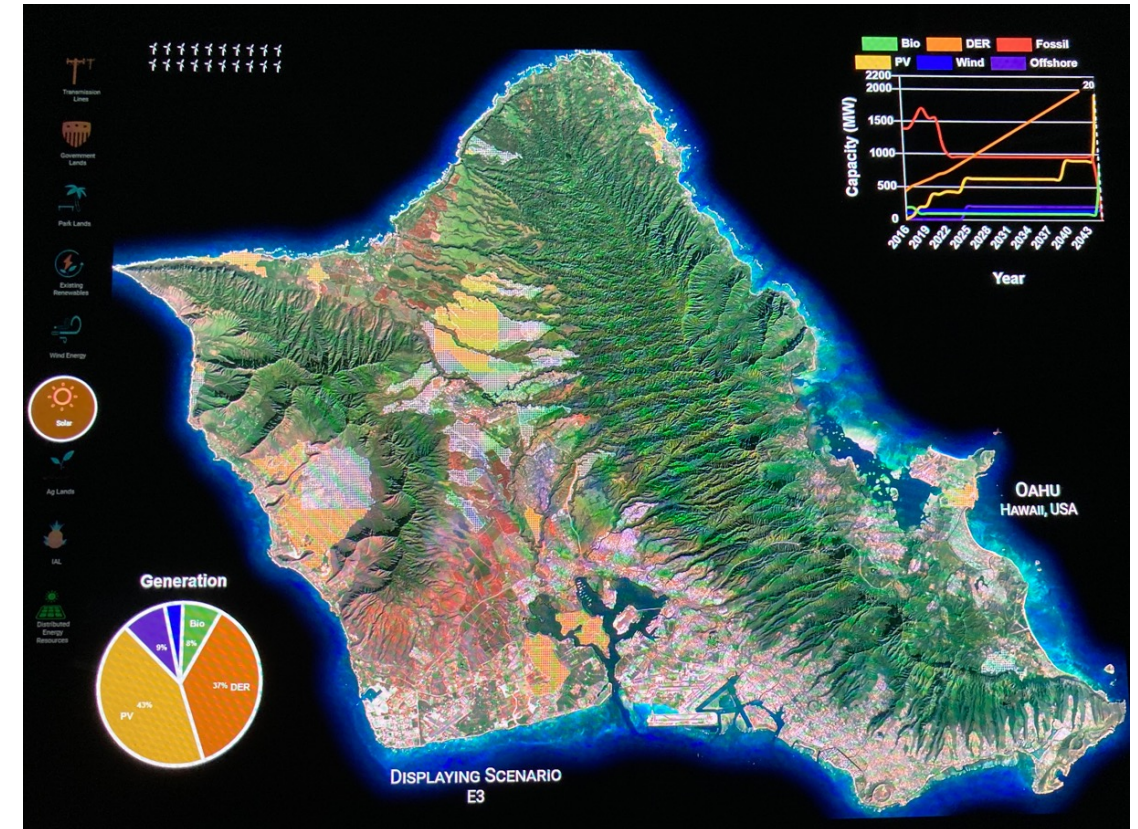






Land Constraints, Sensitive Environments, Renewable Resource Availability, Community Concerns...

- Complicated situation
- Objective: appropriate siting, EARLY
- Need: accessible information
- Used by:
 - Project developers
 - Land owners
 - Communities
 - Others



Information on Projects and Siting

Hawai'i State Energy Office (HSEO) On-line Tools:






- Permitting Wizard
 - Permit information updated; app ready for refresh
- EnerGIS
- Project Directory

Other (Federal, University, Utility Information):


- O'ahu and Maui Island Near Term Grid Needs Assessment
- Hawai'i Powered Dashboard: hawaiipowered.com

Permitting Wizard

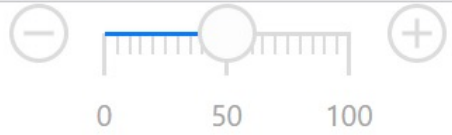
STATE PERMITS

Permit Name	Start - End (Months)	Duration (Months)	Department
Noise Permit	0 - 3	3	DOH, Environmental Management Division (EMD) 
Noise Variance	0 - 6	6	DOH, Environmental Management Division (EMD) 
Pesticides Applicator Certification	0 - 1	1	HDOA, Plant Industry Division, Pesticides Branch 
Pesticides Experimental Use Permit	0 - 1	1	HDOA, Plant Industry Division, Pesticides Branch 
Power Purchase Agreement Approval	0 - 9	9	Public Utilities Commission (PUC) 

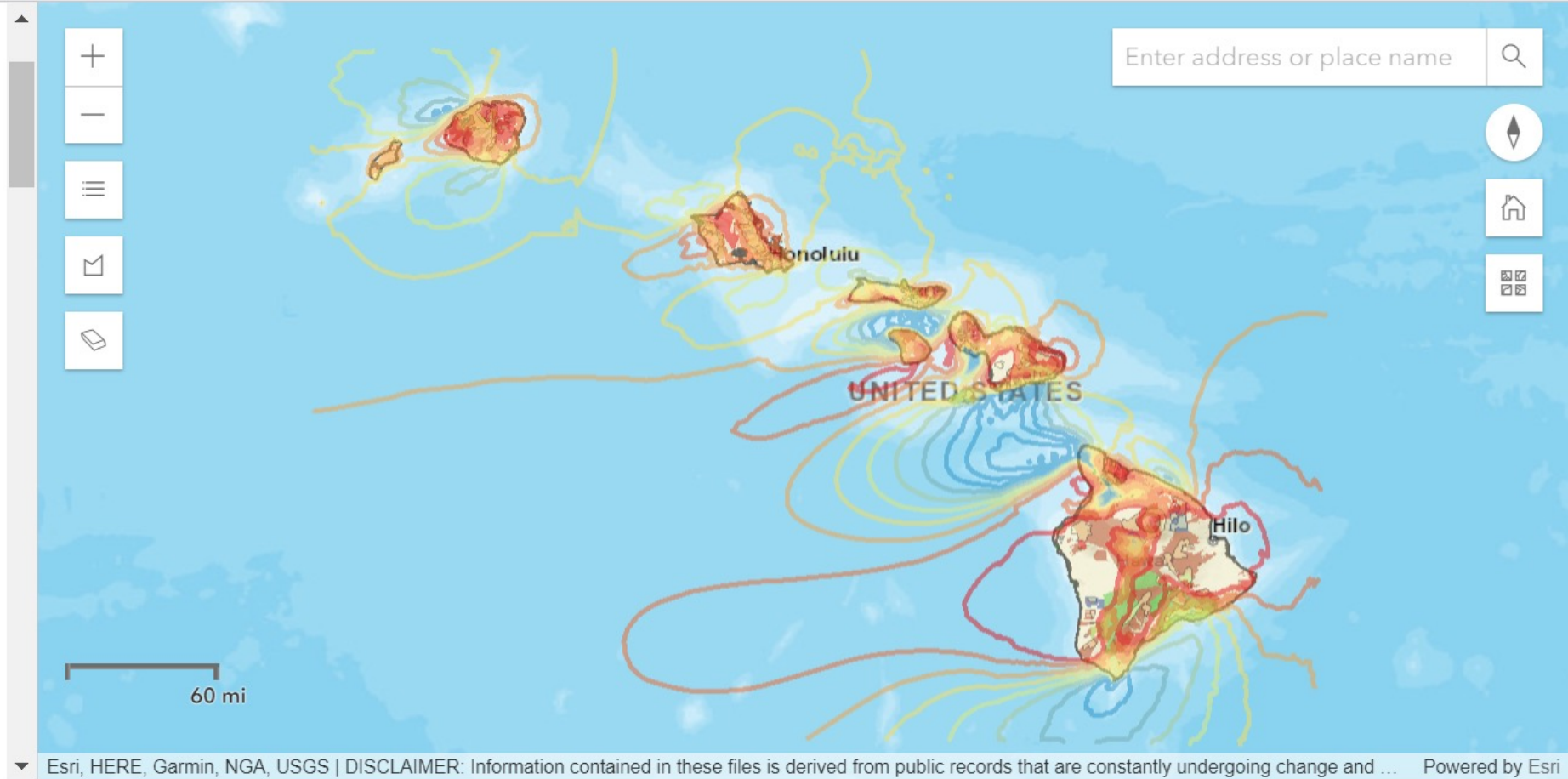
COUNTY PERMITS

Permit Name	Start - End (Months)	Duration (Months)	Department
Building Permit (Oahu)	0 - 3	3	DPP, Building Division 
OHA Consultation	0 - 4	4	Office of Hawaiian Affairs (OHA)

Renewable EnerGIS



- Biomass
- Geothermal
- Hydroelectric
- Solar
- Wind
- OTEC
- Wave
- Custom



Renewable EnerGIS

Attribute Query

Find parcels meeting criteria

Island

- Oahu
- Maui
- Lanai
- Molokai
- Kahoolawe

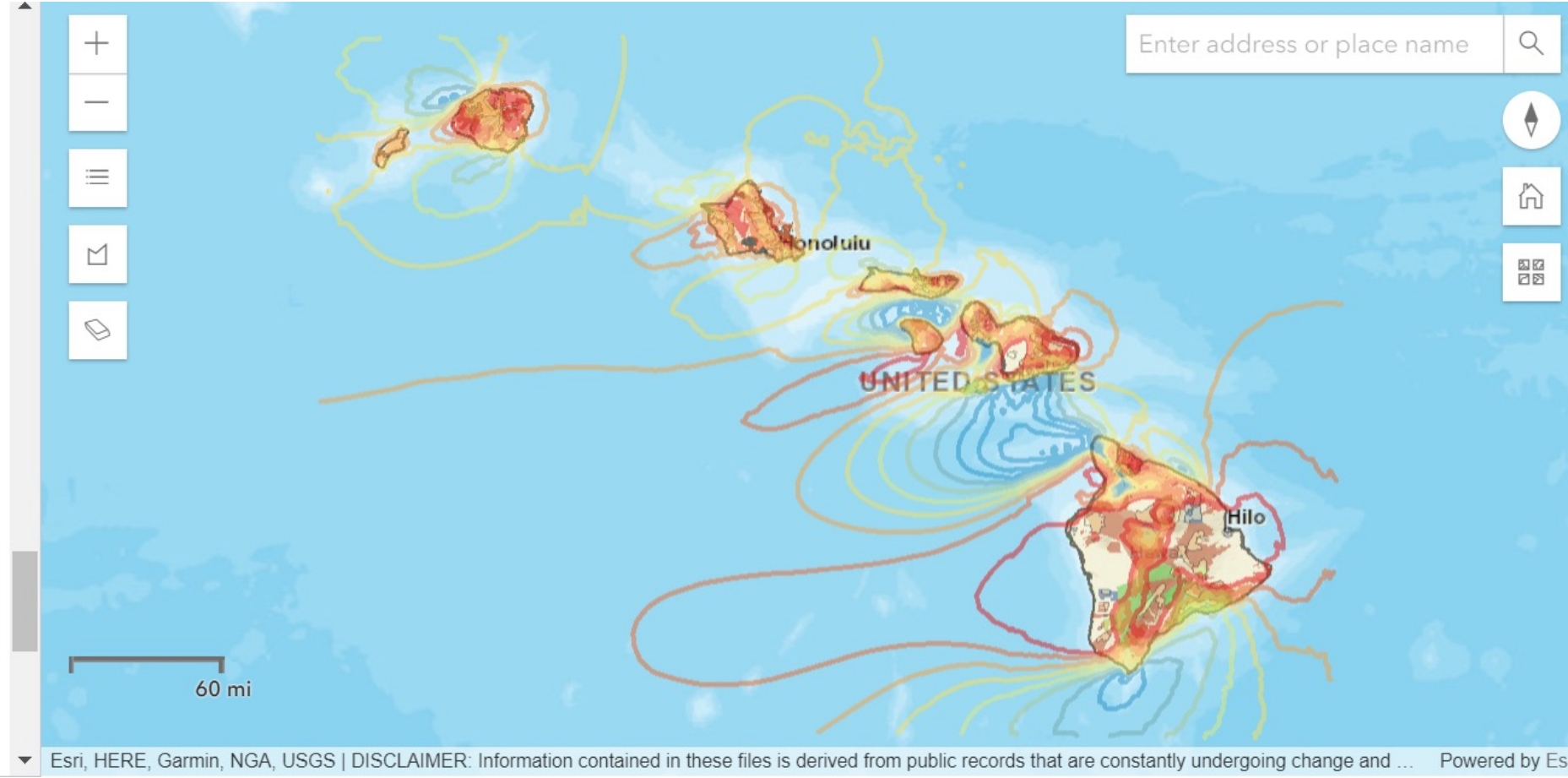
Acres

Critical Habitat

Reserves

SMA

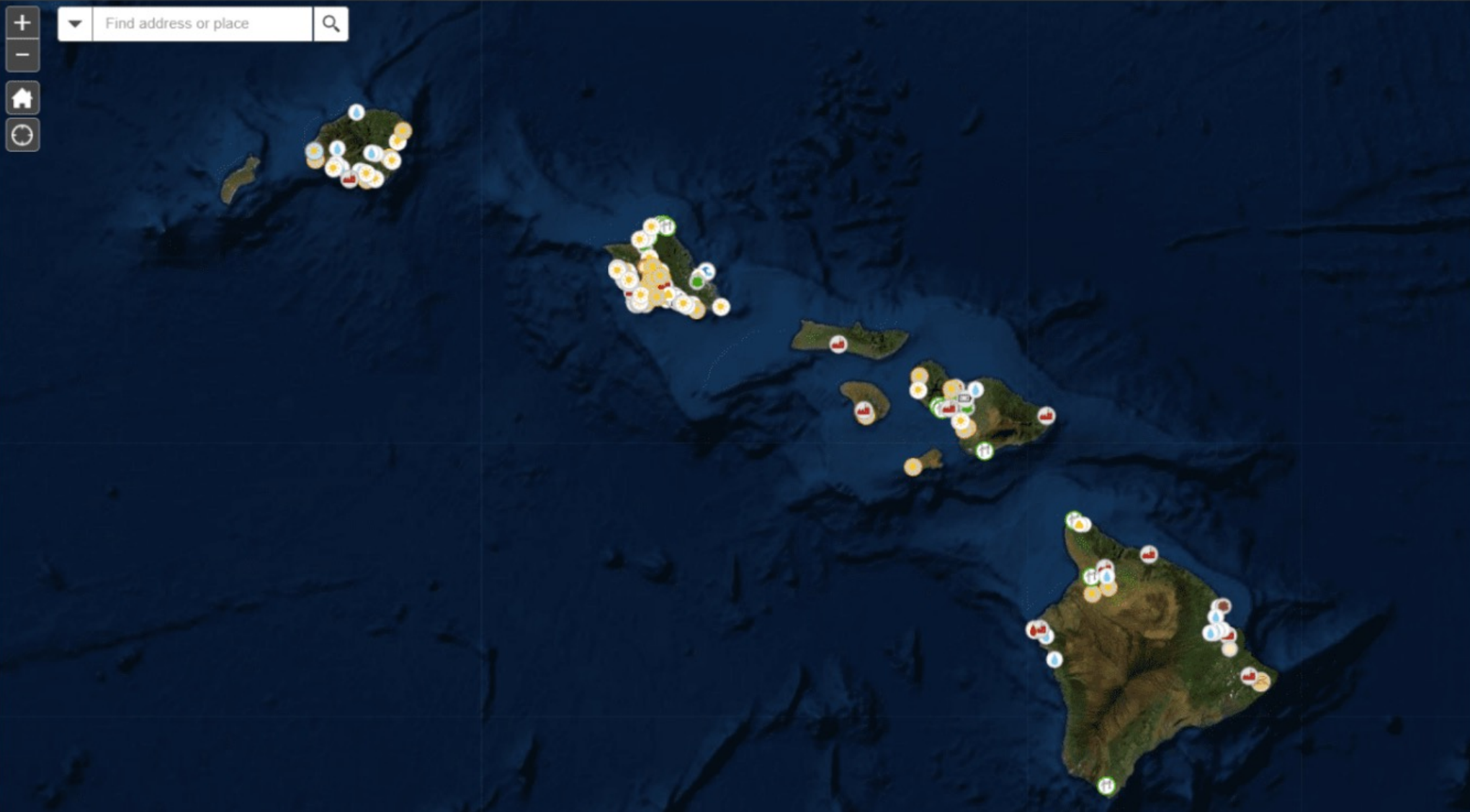
Potential Warm Groundwater



Hawai'i Statewide Energy Project Directory

Hawaii Statewide Energy Project Directory

Hawaii State Energy Office



Legend

Statewide Energy Project Directory

- Biofuel
- Biofuel + Fossil Fuel
- Biomass
- Energy Storage
- Feedstock Production
- Fossil Fuel
- Fossil Fuel / Bulk Storage
- Geothermal
- Hydroelectric
- Microgrid
- OTEC
- Solar PV
- Solar PV + Storage
- Solar PV + Storage + Hydroelectric
- Solar Thermal Desalination
- Standalone Energy Storage
- Waste-to-Energy
- Wave
- Wind

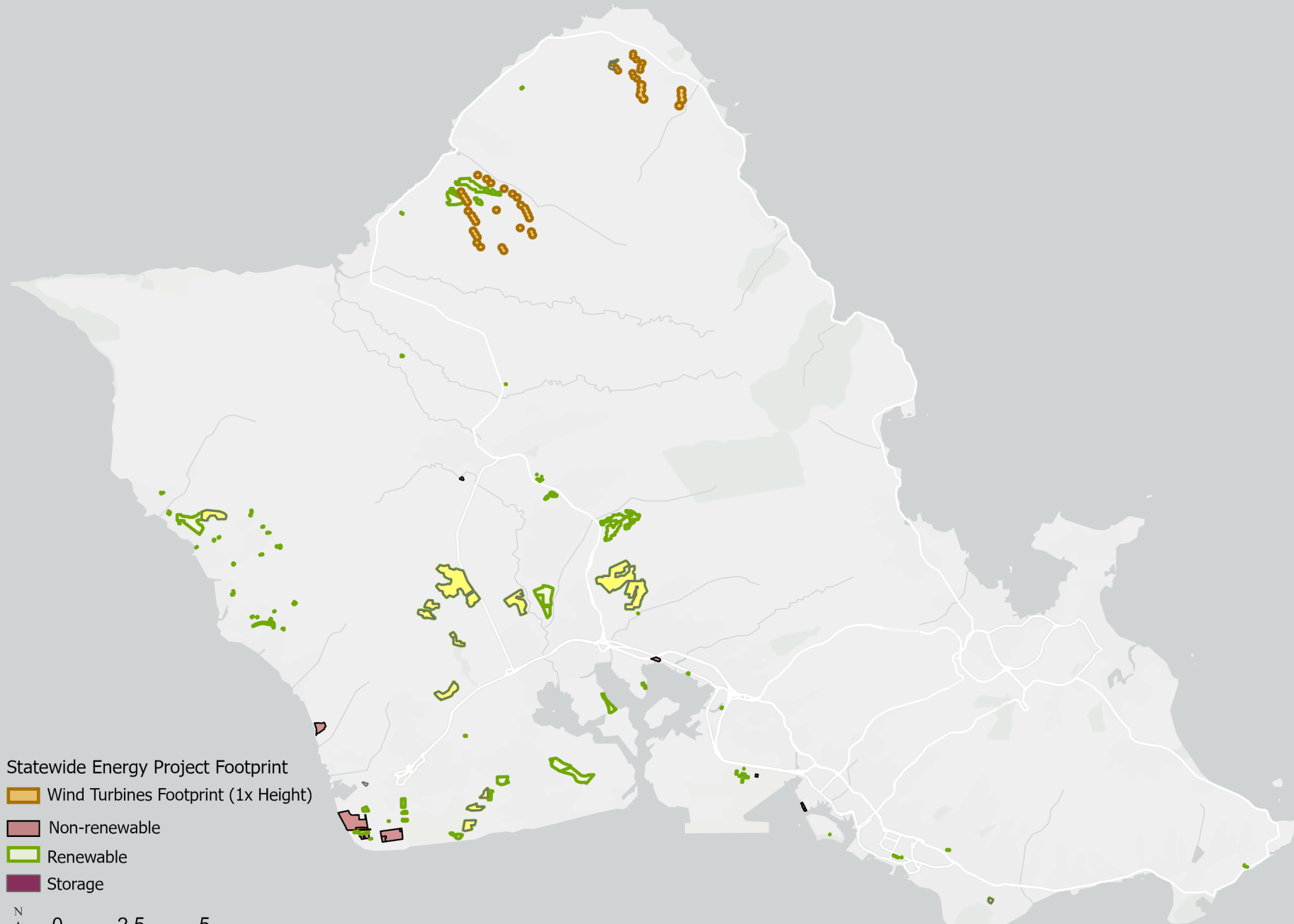
Hawai'i Statewide Energy Project Directory

Information

- Project technology type
- Project Description
- PUC docket number(s), if applicable
- Project status (existing or planned)
- Production capacity and storage capacity
- Historic net generation (updated from Energy Information Administration data annually)
- Coordinates for the estimated center point of the project's location.
- State and County Land Use Districts and Zones
- TMKs
- Etc.

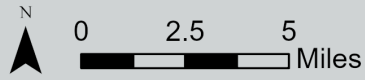
Layers

- Electric Power Transmission Lines and Substations (from EIA)
- Roads
- State Land Use Districts (SLUDs)
- Land Study Bureau Agricultural Designation
- Large Landowners Statewide, Government Lands, and DOD Parcels
- Sea Level Rise (SLR) Exposure Areas
- Parcels (TMKs)



Statewide Energy Project Footprint

- Wind Turbines Footprint (1x Height)
- Non-renewable
- Renewable
- Storage



Working with Communities

Civic Advisory Group

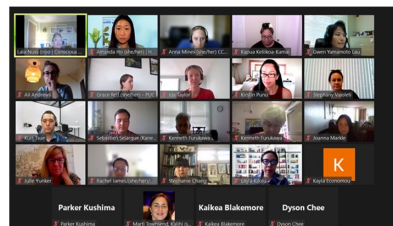


Energy Equity Hui

- Energy industry, environmental, social justice, and community representatives
- Identifying and meaningfully addressing energy inequities

Work Streams

- Equity Definition and Framework
- Legislation
- Renewable Energy RFP Process
- Community Benefits Enhancement



AmeriCorps VISTA Energy Equity Team

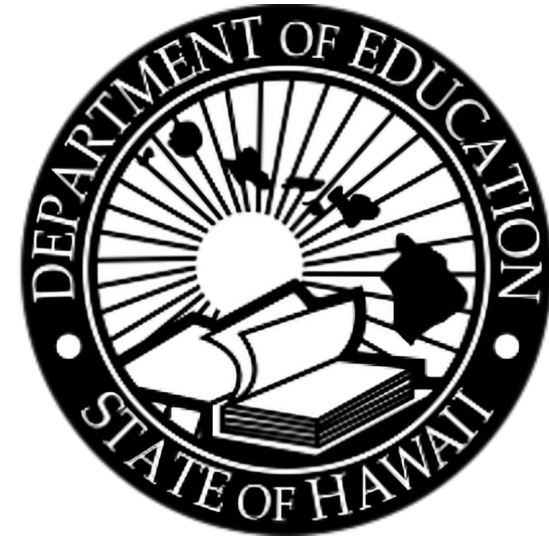
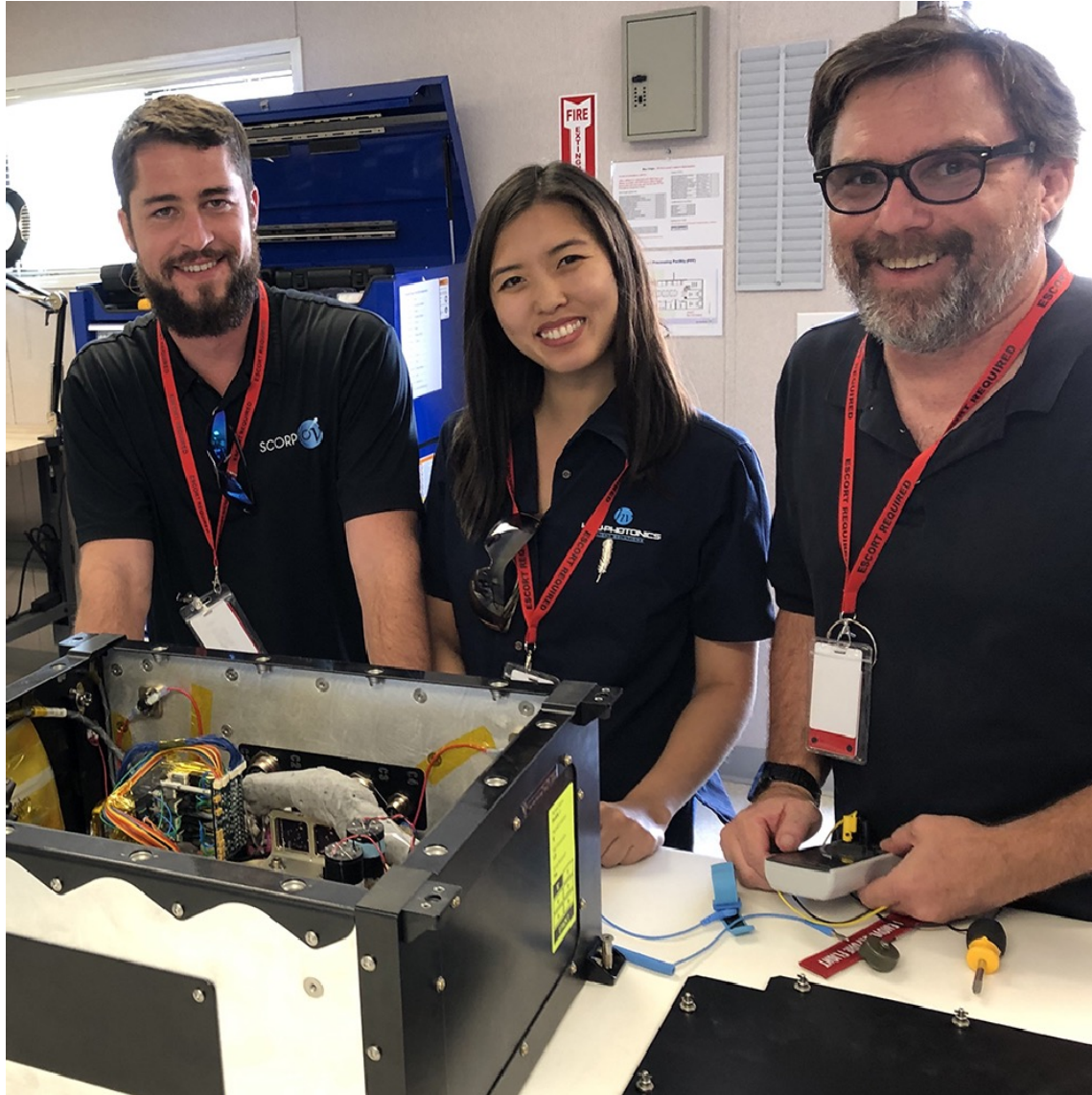
- Researched energy equity issues in Hawaii
- Surveyed staff
- Identified gaps
- Helped develop strategies



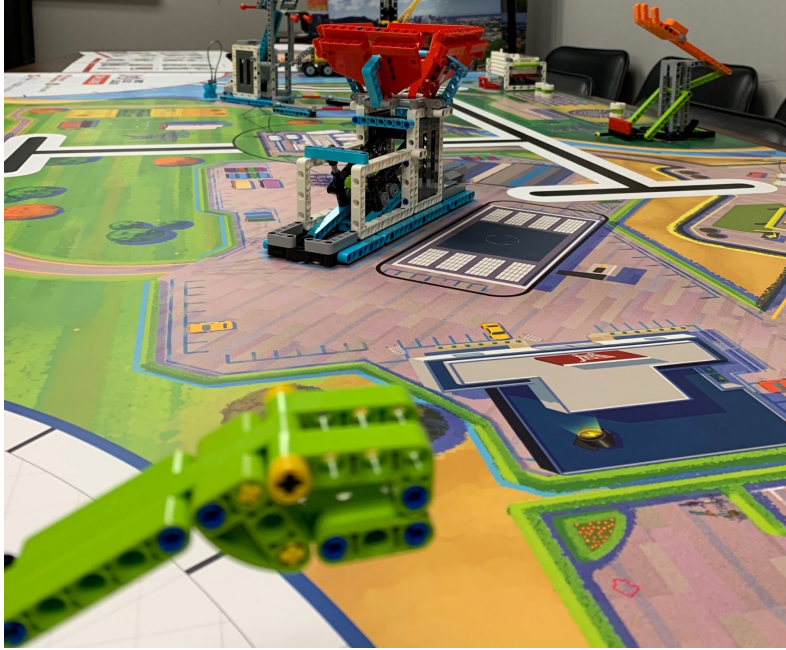
Clean Energy Wayfinders

- Create jobs for a new generation of clean energy leaders
- Identify community needs and concerns
- Address inequities in vulnerable communities
- Increase knowledge and opportunities
- Increase communication and trust
- ❖ Advance clean energy goals!





Energy Education





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