HAWAIʻI STATE ENERGY OFFICE

2024 ANNUAL REPORT

This report addresses reporting requirements for:

ACT 100, SECTION 7 (SLH 1999) HRS 201-12.8(C)
ACT 122 (SLH 2019) HRS SECTION 141-9
ACT 216 (SLH 2022 HRS SECTION 201-104
HRS 196-10.5(7)(C) HCR 17 (SLH 2023)
HRS 196-41(C)(3) SCR 82 SD1 (SLH 2023)
THIS ANNUAL REPORT REQUIRED BY EACH OF THESE STATUTES HAVE BEEN COMBINED INTO THIS SINGLE, COMPREHENSIVE REPORT.

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Beyond the Shifting Status Quo

A New Energy Transition Strategy

A Message from the Chief Energy Officer

Hawai‘i is a national and global leader in energy transition policy and deployment. The state was the first in the nation to establish a legally binding commitment to produce all its electricity from renewable resources, and it has long been a leader in distributed renewable energy resources (rooftop solar) and the use of inverter-based technology to connect those resources to the grid.

Despite such progress, Hawai‘i has the highest electricity costs and O‘ahu has the highest average greenhouse gas emissions intensity for electrical power generation in the country. During the run-up of oil prices post-Covid and following the Russian invasion of Ukraine, utility-scale renewables effectively shielded Kaua‘i from oil price volatility, which at the peak of the crisis resulted in electricity bills increasing by 58% on Maui and 92% on Moloka‘i.

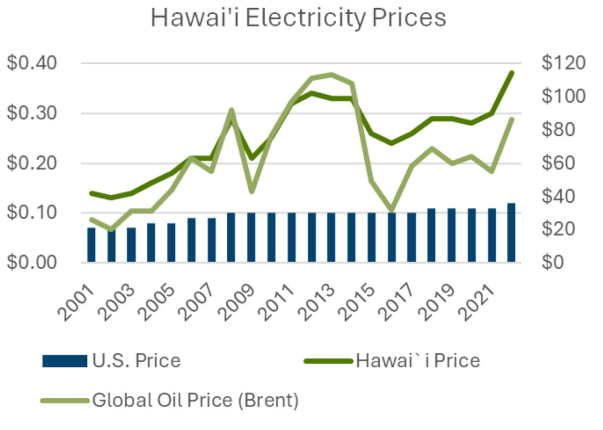


Figure 1 Electricity Prices follow oil prices. Electricity Prices from EIA; Brent oil prices from International Monetary Fund (IMF)

While Kaua‘i's success serves as a model for most of Hawai‘i’s main islands, O‘ahu faces a particularly challenging situation, as its underlying energy demand is approximately 19 times greater than Kaua‘i’s and represents approximately 70% of the state’s generation needs, necessitating significantly more resources to meet the electrical energy demand.

O‘ahu is also the headquarters of the United States Indo-Pacific Command (USINDOPACOM), the largest of six global geographic combatant commands defined by the Department of Defense's Unified Command Plan (UCP). With growing geopolitical risks within the USINDOPACOM area of responsibility (AOR), resilient, reliable, and affordable electricity is essential to fulfill U.S. national security objectives and protect national interests.

Transportation represents about half of the energy consumed in Hawai‘i, with about 90 percent of that split between aviation and ground transportation. The prospective growth of electrification of transportation will greatly expand the electricity sector for the foreseeable future. At the same time, the state's largest electric utility, Hawaiian Electric, is undergoing significant challenges that have complicated Hawai‘i’s renewable energy transition, just at the time the state becomes more reliant on the electricity sector. The downrating of Hawaiian Electric’s credit rating in the aftermath of the Maui wildfires has increased the cost of debt financing for the utility and independent power producers, challenging the financing of future renewable energy projects and necessary capital expenditures by the utility to continue moving the energy transition forward. The credit and capital crunch are exacerbated by the utility’s paucity of reserve capacity due largely to the historical

practice of extending the life of its generation fleet well beyond its useful life and mostly deferring high-efficiency power plant replacements.

Recognizing the unacceptable risks of pursuing the current pathway, the Hawai‘i State Energy Office (HSEO) has been tasked to develop a new energy strategy that goes beyond the status quo to reduce energy costs and carbon emissions in the electricity sector, to achieve two key objectives:

- Accelerate Hawai‘i’s energy transition to renewable and carbon-free energy.
- Evaluate options to replace residual fuel oil for power generation and create opportunities for capital investment in grid infrastructure and power generation to ensure and enhance energy system reliability and resilience.

The Alternative Fuels and Repowering Analysis undertaken by this office over the past year will inform a new and necessary energy strategy and acceleration of Hawai’i’s energy transition, with an emphasis on fairness and equity. It builds on over ten years of related studies, augmenting the body of knowledge with additional engineering and economic analyses, evaluation of permitting requirements, and approaches to community engagement. The Power Supply Improvement Plans (PSIPs) and the recent Integrated Grid Plan (IGP) from Hawaiian Electric are core reference studies.

Our new energy transition strategy must ensure that all future investments in Hawai‘i’s integrated electricity system result in a portfolio of fuels, power generation assets, and infrastructure that provide affordable electricity, energy security, resilience, and reliability for the next 20 years and beyond.

Mark. B. Glick

Chief Energy Officer

December 18, 2024

The Role of the Hawai'i State Energy Office

The Hawai'i State Energy Office (HSEO) is established under HRS §196-71 as a public body politic and an instrumentality and agency of the State of Hawai'i, placed within the Department of Business, Economic Development, and Tourism for administrative purposes. The purpose of HSEO is to promote energy efficiency, renewable energy, and clean transportation to help achieve a resilient clean energy economy.

The Hawai'i State Energy Office shall:

- Provide analysis and planning to actively develop and inform policies to achieve energy efficiency, renewable energy, energy resiliency, and clean transportation goals with the legislature, public utilities commission, state agencies, and other relevant stakeholders;
- Lead efforts to incorporate energy efficiency, renewable energy, energy resiliency, and clean transportation to reduce costs and achieve clean energy goals across all public facilities;
- Provide renewable energy, energy efficiency, energy resiliency, and clean transportation project deployment facilitation to assist private sector project completion when aligned with state energy goals; and
- Engage the private sector to help lead efforts to achieve renewable energy and clean transportation goals through the Hawai'i clean energy initiative.

HSEO is the state's primary government entity that supports the clean energy initiative. Under HRS §196-72, HSEO is led by the chief energy officer, who is nominated by, and with the advice and consent of the senate, appointed by the governor, in a term coterminous with the term of the governor. Subject to the governor's approval, the chief energy officer is tasked to formulate, analyze, recommend, and implement specific policies, strategies, and plans, in coordination with public and private sector stakeholders, to cost-effectively and equitably achieve the state's energy goals.

In 2024, the Green administration directed HSEO to develop an updated energy strategy in the aftermath of the Maui wildfires, which devastated the town of Lahaina and had profound impacts on Hawai'i's economy and largest electric utility. Consequently, HSEO conducted a comprehensive Alternative Fuels and Repowering Analysis on specific generation mix scenarios through 2050 to achieve or exceed state Renewable Portfolio Standards (RPS) targets and Hawai'i's 2045 net zero goal. An executive summary of the Alternative Fuels and Repowering Analysis is presented on page 30.

This Annual Report includes measures taken by HSEO in 2024 to address its 19 specific responsibilities under HRS §196-72:

1. Promote energy efficiency, renewable energy, and clean transportation to help achieve a resilient clean energy economy Identify, track, and report key performance measures and milestones related to the state's energy and decarbonization goals;
2. Identify, track, and report key performance measures and milestones related to the state's energy and decarbonization goals;
3. Provide technical assistance to state and county agencies to assess and implement projects and programs related to energy conservation and efficiency, renewable energy, clean transportation, energy resiliency, and related measures;
4. Coordinate the State's energy programs with those of the federal government, other territory and state governments, the political subdivisions of the State, departments of the State, and governments of nations with interest in common energy resources;
5. Identify market gaps and innovation opportunities, collaborate with stakeholders, and facilitate public-private partnerships to develop projects, programs, and tools to encourage private and public exploration, research, and development of energy resources, distributed energy resources, and data analytics that will support the State's energy and decarbonization goals;
6. Create and review proposed state actions that may have a significant effect on the State's energy and decarbonization goals, report to the governor their effect on the energy program, and perform other services as may be required;
7. Evaluate, recommend, and participate in the development of incentives and programs that encourage the development of energy efficiency, renewable energy, energy resiliency, distributed energy resources, and clean transportation resources;
8. Assess and evaluate the effectiveness and continued necessity of existing energy related incentives, tax credits, and programs, and provide recommendations and proposed changes;
9. Develop and maintain a comprehensive and systematic quantitative and qualitative capacity to analyze the status of energy resources, systems, and markets, both in-state and in other states and countries, particularly in relation to the State's economy, and to recommend, develop proposals for, and assess the effectiveness of policy and regulatory decisions, and energy emergency planning;
10. Develop and recommend programs for, and assist public agencies in the implementation of, energy assurance and energy resilience;
11. Support the development, evaluation, revision, and adoption of energy-related codes and standards that advance the State's energy goals;
12. Act as the State's energy data clearinghouse by identifying, collecting, compiling, analyzing, publishing, and where possible, monetizing energy and clean transportation data and analyses;
13. Advocate for the State's energy and decarbonization goals at relevant venues and departments, including but not limited to the public utilities commission, legislature, and division of consumer advocacy, to ensure that state energy policies and regulations align with the state strategic goals and are data-driven;

14. Support economic development and innovation initiatives related to and resulting from the State's renewable energy and distributed energy resources experience, capabilities, and data analyses;
15. Facilitate the efficient, expedited permitting of energy efficiency, renewable energy, clean transportation, and energy resiliency projects by:
    a. Coordinating and aligning state and county departments and agencies to support, expedite, and remove barriers to deployment of energy initiatives and projects; and
    b. Identifying and evaluating conflicting or onerous policies and rules that unreasonably impede project development and deployment and propose regulatory, legislative, administrative, or other solutions to applicable stakeholders;
16. Identify and recommend policies to align utility goals with those of ratepayers, including evaluating utility models that best support state energy goals;
17. Prepare and submit an annual report and other reports as may be requested to the governor and to the legislature on the implementation of this part;
18. Contract for services when required for the implementation of this part; List of contracts, scope summary, value, term, and status; and
19. Adopt rules, pursuant to chapter 91, for the administration of this part. [L 2019, c 122, pt of §2]

Emerging Threats and Challenges in the Electricity Sector

Beyond the tragic loss of life, the Maui wildfires exposed the threat of a new normal engendered by the greater intensity of climate and weather impacts; threats that must be addressed with actions to deploy resilience and energy security plans to limit future to life and property. The subsequent downrating of Hawaiian Electric's credit rating in the aftermath of the wildfires is indicative of the financial market response, increasing the cost of borrowing for the utility and independent power producers and challenging the financing of future renewable energy projects and necessary capital expenditures by the utility to execute the energy transition.

The net effect is to increase financing costs for all future projects undertaken or procured by Hawaiian Electric, including power generation, grid improvements, and wildfire mitigation plans. A significant portion of these increased costs are likely to be passed on to ratepayers, potentially resulting in higher electricity rates and an increased financial burden for utility customers. Already, several key renewable energy projects have been canceled, putting the pace of Hawai'i's transition to more affordable cost-stabilizing renewables at risk.

Hawaiian Electric Co. has spent millions on fire prevention efforts since one of its fallen power lines sparked the deadly 2023 Lahaina blaze. The company believes those steps already have drastically reduced the risk. (Marcel Honore/Civil Beat/2023)

To achieve the 100% RPS and decarbonization statutory objectives, the state must contend with these threats, and multiple challenges including:

- Affordability and a high cost of living (driving many families off island);
- Inefficient and aging powerplants;
- Limited access to low interest capital;
- Increased costs of decarbonized fuels and biofuel availability;
- Lengthy renewable energy project approval and development times – a timeline of five years on average that needs to be reduced to three;
- Slow permit processing times at state and county levels;
- Slow and costly utility interconnection processes;
- Land use constraints and competition for land; and,
- Community concerns and project opposition.

New policies to improve the status quo are intended to address three outstanding issues:

- Specific measures to accelerate the deployment of renewable energy, energy efficiency, and clean transportation.
- Fuel switching to mitigate oil price volatility, place downward pressure on electricity costs and reduce carbon emissions.
- Immediate reliability improvements that make it easier to integrate additional renewable energy through 2045.

On land-constrained O‘ahu, where distributed solar plays an irreplaceable role in the energy transition, targeted efforts must prioritize maximizing distributed energy resources (DER) or rooftop solar while balancing affordability and system-wide efficiency. This requires continued efforts on technical matters such as adequacy of dispatchable energy resources, safe deployment of inverter-based grid controls, and timely interconnection processes. There also must be new approaches to help low-income residents who have not benefitted. HSEO is working to remediate this issue with the Hawai‘i Green Infrastructure Authority on their Solar for All program to ensure that LMI households also see the benefits of rooftop solar on their electricity bills.

In the transportation sector, HSEO’s vehicle incentives and EV charging strategies are complementary to the groundbreaking Navahine F. v. Hawai‘i State Department of Transportation settlement of June 2024, indicative of the Green Administration’s commitment to take tangible, substantive actions to create a more resilient and increasingly decarbonized economy. Decisions must be based on scientific data and proven technologies that best achieve policy objectives to reduce carbon and costs while accelerating Hawai’i’s energy transition.

Decisions today must consider impacts on future generations. To meet decarbonization objectives, lifecycle carbon emissions and carbon intensity must be carefully considered in all decisions affecting the locations and circumstances under which energy is produced and shipped to Hawai‘i.

Energy Security and Reliability

In its 2024 Adequacy of Supply Report to the Hawai‘i Public Utilities Commission (PUC), Hawaiian Electric defines its Energy Reserve Margin as the percentage at which the system capacity must exceed the system load each hour to ensure grid reliability. With increasing quantities of variable renewable wind and solar resources, this capacity planning criterion is intended to account for current and future variable generation resources considering the dynamic nature of energy provided by wind, photovoltaic (PV), and implications of limited duration storage.

The amount of extra capacity for O‘ahu’s power grid at any given time beyond the expected peak demand (Energy Reserve Margin) during 2023 was factored to be 33%. Consistent with reported findings by Hawai‘i Natural Energy Institute (Figure 2), HSEO has observed that about 20% of Hawaiian Electric’s generation fleet has recently been offline or operating at a significantly derated capacity, calling into question whether it has adequate reliability reserves to address contingencies, forecast errors, and uncertainties inherent in the assumptions and methodology.

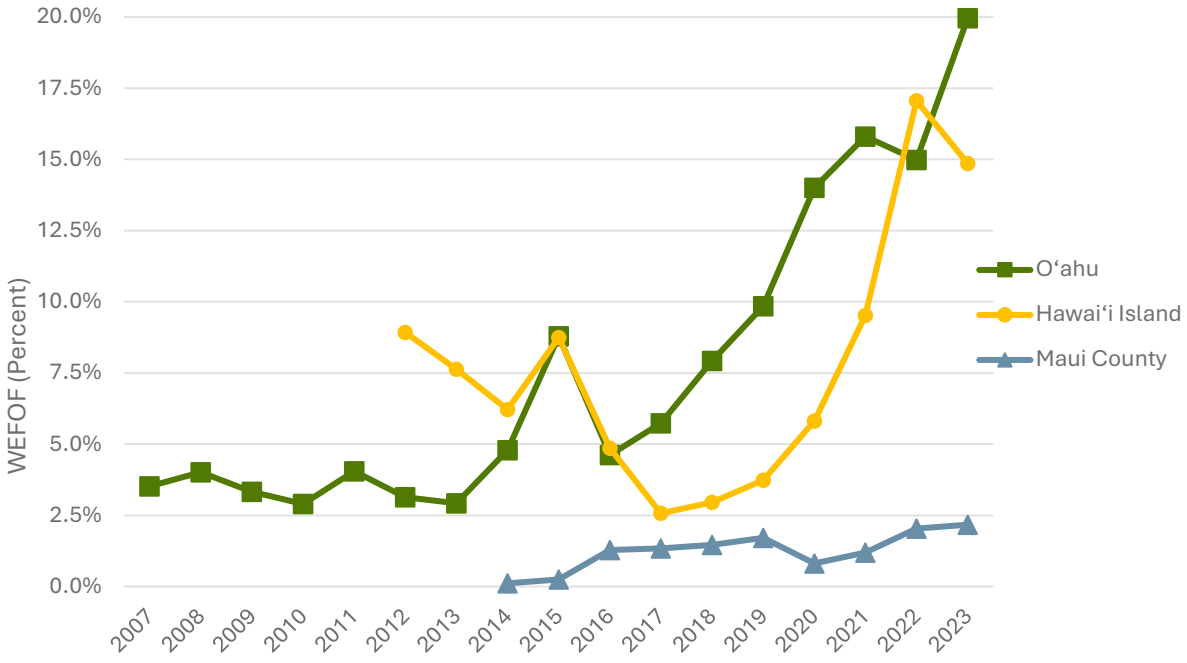


Figure 2: Hawaiian Electric Territory Weighted Equivalent Forced Outage Factor[1] (%), shows the increasing unavailability of HECO firm generators due to unplanned outages (Source: HNEI/Telos, Hawaiian Electric Power Supply and Generation Key Performance Metrics)

The unreliability of generators designated by the utility to serve as a backup during an expected loss of load events has been the cause of recent service disruptions. With spare parts no longer

[1] WEFOF is the percentage of time in an operating period in which a generating unit is not available due to forced outages and forced deratings. It is an indication of the reliability of a generating fleet.

available for routine maintenance on some units, the duration of Hawaiian Electric customer outages has trended steadily upward since 2015, even though the number of interruptions has fallen. Reliable generators are essential to serve as routine backup and are necessary to integrate more intermittent renewables on the grid.

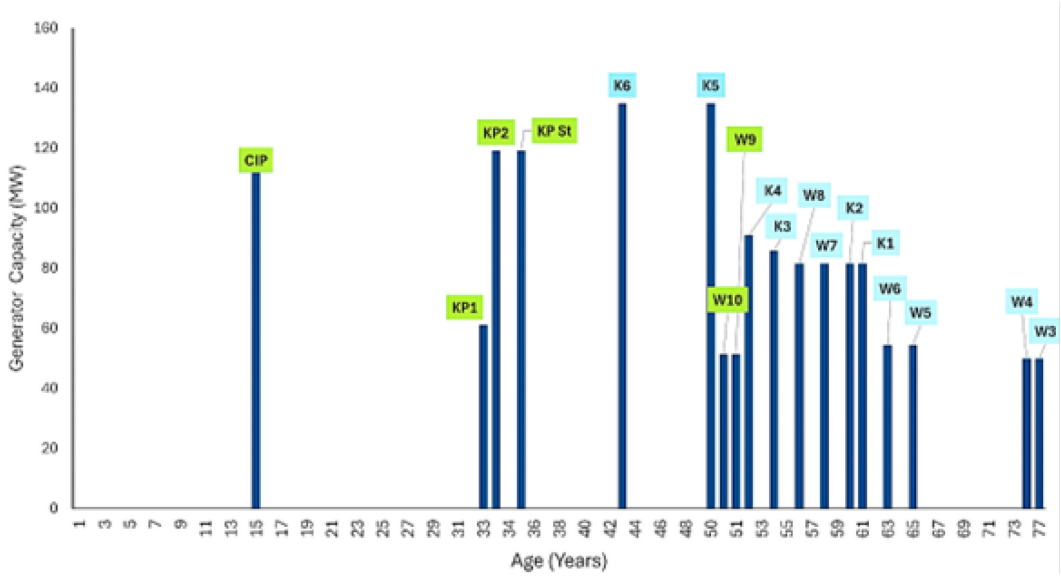


Figure 3 Age of O‘ahu Fossil Fuel Power Plants Age and Capacity in 2024. Source – EPA eGRID

Even under the status quo, power plant and grid improvements involving significant capital expense are necessary because many of the current power generators in Hawaiian Electric’s service territory are well beyond their useful life and are increasingly unreliable. For example, generators on O‘ahu at the Waiau Power Plant that provide 500 MW of capacity, or about half of the peak electricity needs for the island, were first built over 50 years ago. On Maui, most of the generation capacity is provided by generators that are between 44 and 76 years old.

HSEO is also concerned about the unpredictable and volatile global petroleum market from which most of Hawai‘i’s low-sulfur fuel oil is sourced. In 2024, the vast majority of Hawai‘i’s petroleum products were imported from foreign countries including Libya, Argentina, Nigeria, and Algeria. The state’s reliance on foreign regimes and markets makes it vulnerable to geopolitical events that impact oil price volatility and increase energy insecurity and costs.

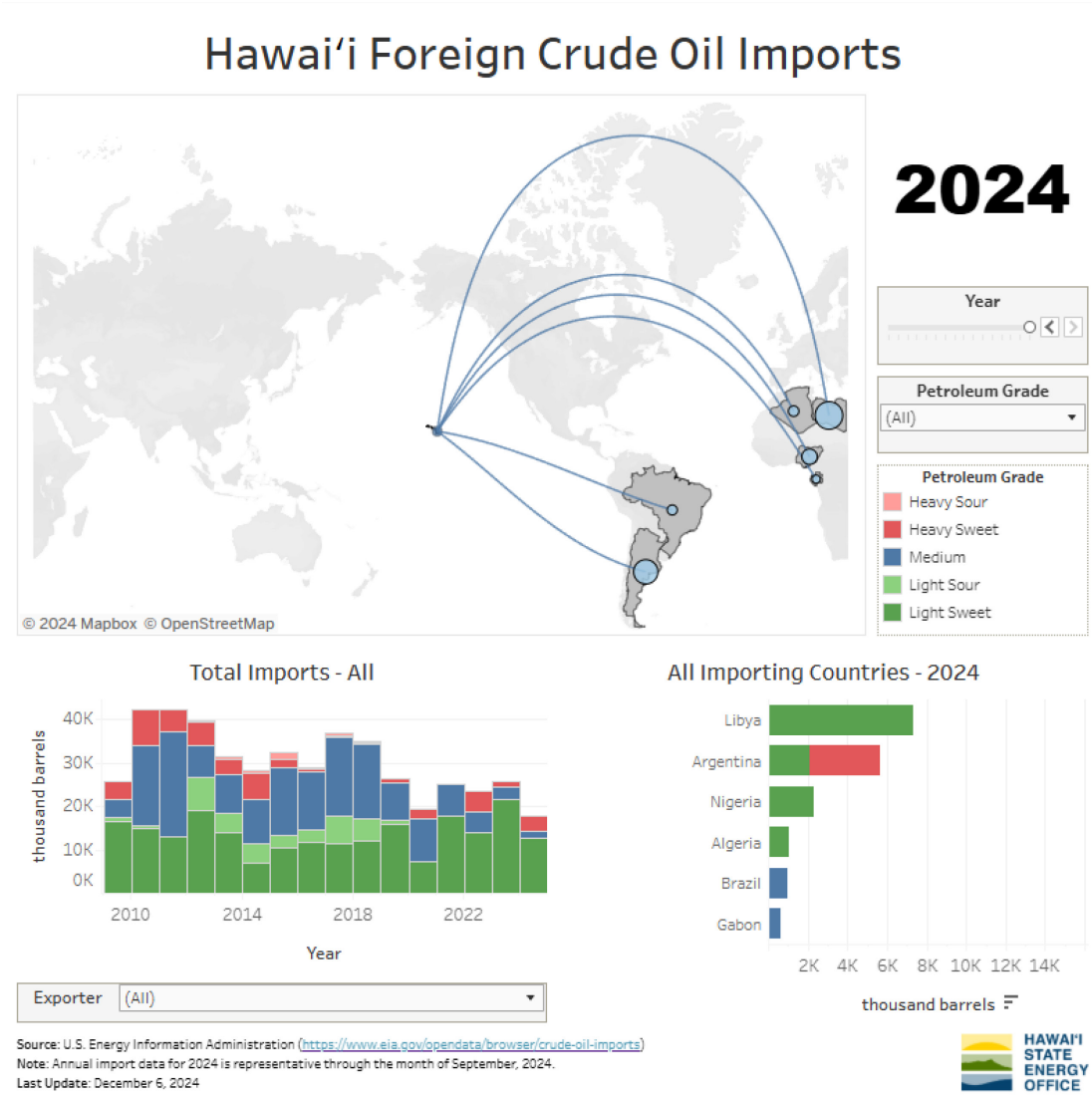


Figure 4 Hawai'i Foreign Crude Oil Imports – U.S. Energy Information Administration API Dashboard - U.S. Energy Information Administration (EIA)

The Current Status of Renewables

Hawai‘i has made significant strides in the development of renewable energy. In 2023, the state achieved 35% of its electrical generation from renewable sources, a key milestone aligned with its Renewable Portfolio Standards (RPS) law, which mandates 40% clean electricity by 2030, 70% by 2040, and 100% by 2045. The clean energy generation mix varies significantly across islands:

- **Kaua‘i** led with 58% of its electricity from renewable sources, primarily driven by utility-scale solar PV (25%), hydroelectric (12%), and distributed solar PV (13%).
- **Hawai‘i Island** generated 52% of its electricity from renewable sources, with a substantial contribution from geothermal energy (14%), distributed solar PV (17%), and wind (11%).
- **Maui County** sourced 35% of its electricity from renewable sources, with wind (16%) and distributed solar PV (19%) as key contributors.
- **O‘ahu** generated 30% of its electricity from renewable sources, relying heavily on distributed solar PV (15%) and a mix of other sources, including the multi-purpose H-Power waste-to-energy facility (4%), utility-scale solar PV (6%), and wind (4%).

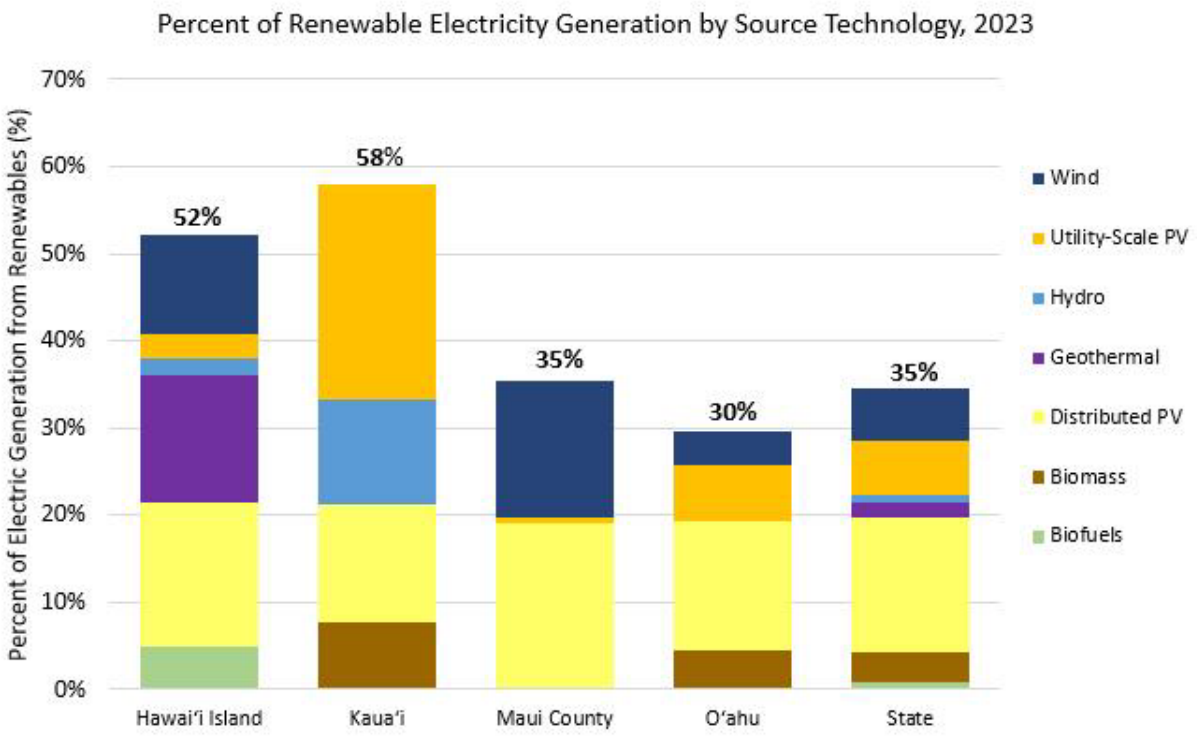


Figure 5 Hawaii 2023 RPS. Percent of renewable energy generation by resource as reported by each utility. Data compiled by HSEO, Source PUC Docket 2007-0008.

Statewide, the largest contributors were distributed solar PV (15%) and wind (6%), with smaller inputs from utility-scale solar PV (a resource that is projected to grow), geothermal, hydroelectric, biofuels, and biomass (inclusive of waste-to-energy).

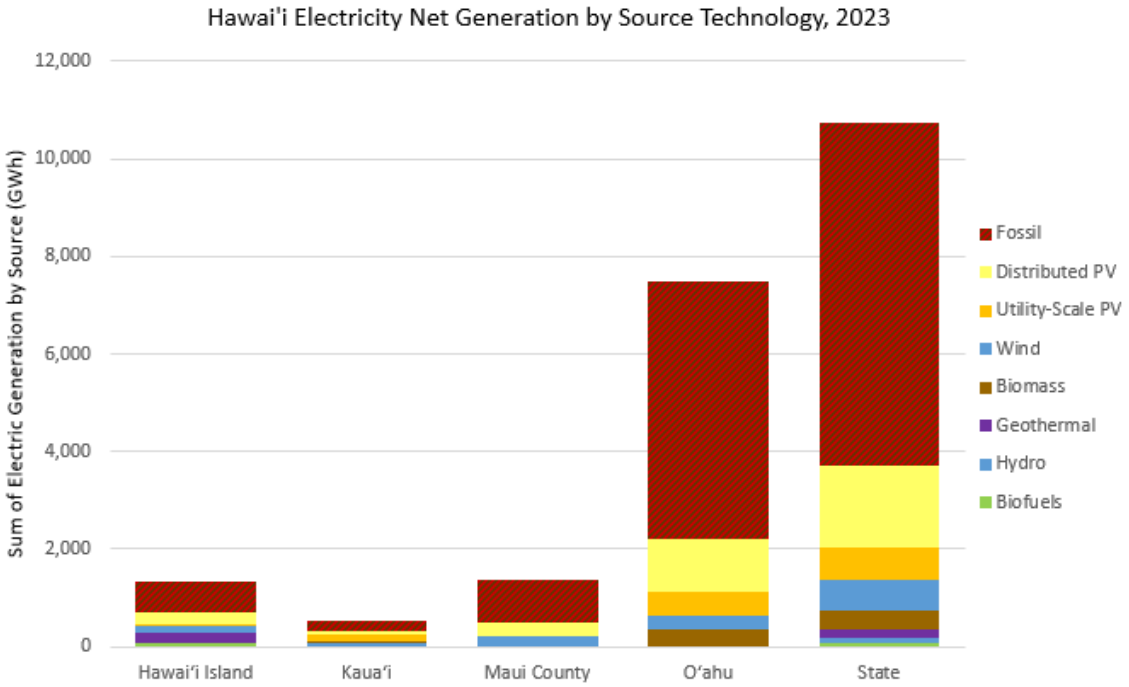


Figure 6 Sum of net generation by energy resource as reported by each utility. Data compiled by HSEO, Source PUC Docket 2007-0008.

While the percentage of RPS is important to track, the total generation is also of critical importance, as certain islands, namely Oʻahu, have substantial electrical energy demand, making progress on these islands more difficult. Hawaiian Electric does not separate reporting for Maui County, however, both Lānaʻi and Molokaʻi, have small electrical energy demands, making their progress on the RPS critical.

2024 Developments

Despite the aggressive pursuit of federal funding to accelerate our transition to 100% renewable energy, federal funding is only one piece of the funding necessary to modernize Hawai'i's energy system. Private sector capital is essential in providing the lion's share, supplemented by federal grants and loans that support grid upgrades, hazard mitigation, energy resource development and technological innovation. Of the two major contributors to capital, it is the private sector that must leverage the capital to fully stabilize the system and keep the state on track to achieve decarbonization by 2045.

Quarterly Securities and Exchange Commission (SEC) filings by Hawaiian Electric and published reports by Lawrence Berkley National Labs (LBNL) and DBEDT reflect approximately $624 million in private sector investment in renewable energy and DER projects in Hawaiʻi in 2024, equivalent to roughly one-third of the global wildfire settlement payable by the utility.

Projects Declaring Commercial Operations

Figure 7 Plus Power Kapolei Energy Storage site. Image courtesy of Plus Power.

Plus Power: The first of the renewable energy projects to declare operations in 2024, Kapolei Energy Storage is a 185 MW / 565 MWh battery storage project providing load shifting and fast-frequency response services to Hawaiian Electric.

AES: West Oʻahu Solar Plus Storage The West Oʻahu facility is generating 12.5 megawatts (MW) of clean energy for Oʻahu's power grid, supported by a 50-megawatt hours (MWh) battery energy storage system, under a 25-year power purchase agreement with HECO at $0.115 per kilowatt-hour.

AES: Kūihelani Solar Plus Storage facility, Maui Hawaiʻi's largest renewable energy project came online May 31 generating 60 megawatts (MW) of renewable energy, supplemented by a 240 MWh battery storage system at a cost of 8 cents per kilowatt-hour.

Ameresco: Kūpono Solar Launched June 6, supplying 42 MW of PV supported by a 168 MWh battery storage system.

Under Construction: Par Pacific Kapolei Refinery Upgrade Par Pacific's refinery in Kapolei, operating since 1972, is reconfiguring one of its processing units to produce renewable fuels starting in 2025. The $90 million upgrade will enable the facility to produce over 60 million gallons annually of renewable diesel for power generation, marine, and ground transport, sustainable aviation fuel for airlines, and renewable naphtha for power generation and synthetic natural gas.

Projects Cancelled

Clearway Energy

- Makana La Solar LLC: 80 MW AC photovoltaic ("PV") generating facility coupled with an 80 MW/ 480 MWh battery energy storage system ("BESS") proposed for the island of O'ahu
- Puako Solar LLC: 60 MW AC PV generating facility coupled with a 60 MW/ 240 MWh BESS proposed for Hawai'i Island.
- Kaiwiki Solar LLC: 55 MW AC PV generating facility coupled with a 55 MW/ 220 MWh BESS proposed for Hawai'i Island.

Par Hawai'i

- 30.6 MW firm renewable cogeneration facility on O'ahu

AES

- Pu'u Hao Solar, LLC, Maui

Renewable Energy Bills Signed into Law in 2024

SB2537 SD2 HD1 CD1 RELATING TO ENERGY: Clarifies that the Chief Energy Officer is responsible for supporting the renewable portfolio standards and reporting on certain energy matters.

HB2020 HD2 SD2 CD1 RELATING TO RENEWABLE ENERGY: Expands the definition of "renewable energy producer" that is used to determine the Board of Land and Natural Resources' disposition of public lands to renewable energy producers to allow more public lands to be leased for the generation of more types of renewable energy.

HB2390 HD2 SD1 CD1 RELATING TO RENEWABLE ENERGY: Requires the Public Utilities Commission to explicitly consider the effect of the State's reliance on fossil fuels on lifecycle greenhouse gas emissions and gives the Public Utilities Commission the discretion to waive a lifecycle greenhouse gas emissions assessment for energy projects that do not involve combustion of fuel.

No modifications to HSEO statutes (HRS 196 Part V) were introduced in 2024.

Renewable Energy

Intermittent Renewables: Solar and Distributed Energy Resources

Distributed (rooftop) solar has been, and will continue to be, a leading contributor to the state's energy goals, generating 16% of Hawai'i's electricity in 2023 and improving the reliability and resilience of the grid during outages. Hawai'i's progress in rooftop solar adoption is nation-leading and a remarkable achievement to be proud of. Rooftop solar offers the most direct access to the clean energy transition for the majority of Hawai'i residents and businesses, especially low- and moderate-income residents and those living on Hawaiian Home Lands and it can assist businesses and households impacted by the public safety power shutoff program.

However, rooftop solar alone is not adequate to meet statewide electricity demand and reliability requirements for several reasons including:

1) **Intermittent nature of solar and storage needs:** While battery storage technology is advancing and rooftop solar installations paired with battery storage are becoming more common, solar is still an intermittent resource and is only available only when the sun is shining. Meeting demand during long periods without sunshine and peak demand hours is challenging and has technical limitations.

2) **Limited roof space:** Estimates indicate that O'ahu has approximately 3,934 MW of rooftop capacity available of installable capacity, which would be a very challenging number to achieve realistically.[2] Even if all available roof space was filled, the technically available capacity represents a small portion of the projected total capacity needed on O'ahu, which is projected to be about 4500 to 6500 MW in 2045, estimated under aggressive energy efficiency and generous wind adoption assumptions in the 2024 HSEO Decarbonization Report, see Chapter 4. Additionally, more MW of solar is needed than other generation sources due to solar relatively low-capacity factor.

3) **Transmission and Distribution Limitations**: Rooftop solar systems are decentralized, which can present challenges for the grid in managing voltage fluctuations, ensuring adequate transmission capacity, and maintaining grid stability, especially when solar output fluctuates. Technology is improving (e.g. smart inverters), however, there are major technology and feasibility limitations that must be considered. It is important to acknowledge, Hawai'i is a leader and pioneer in addressing this issue. Other electric utilities around the world look to Hawai'i on how to integrate such a large amount of solar on the grid.

4) **Cost**: While rooftop solar can lower costs for individuals who install the solar on their roofs, it is not currently as cost-effective as utility-scale developments (Figure 8).

[2] Grue, N., Waechter, K., Williams, T., & Lockshin, J. (2020, October 1). *Assessment of wind and photovoltaic technical potential for the Hawaiian Electric Company*. National Renewable Energy Laboratory. Updated July 30, 2021.

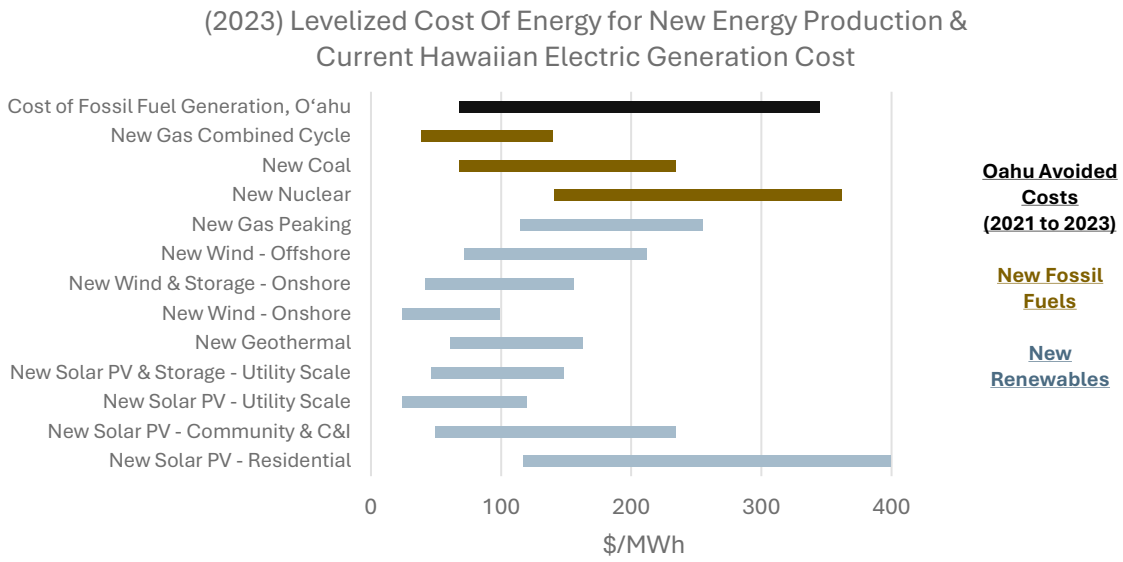


Figure 8 Levelized cost of energy for new energy production, in dollars per MWh. Data sources: Lazard LCOE and Hawaiian Electric Avoided Costs of Energy Reports.[3, 4]

Rooftop solar acceleration must consider the impacts on all state ratepayers. To date, the largest beneficiaries of rooftop solar and battery incentives have been early adopters, largely comprised of single-family homeowners and households in the top income brackets (Figure 9). Those under net energy metering agreements (NEM) who receive retail payments for the energy supplied to the system, effectively pass on additional costs to other ratepayers, many of whom are least able to bear the burden of high utility bills. While they do increase renewable penetration and provide grid services, these benefits must be balanced with costs, and HSEO is working to ensure increased access and more equitable tariffs for future adopters.

[3] Hawaiian Electric Avoided Energy Costs (2023)

[4] Levelized Cost of Energy Analysis, Lazard (2023)

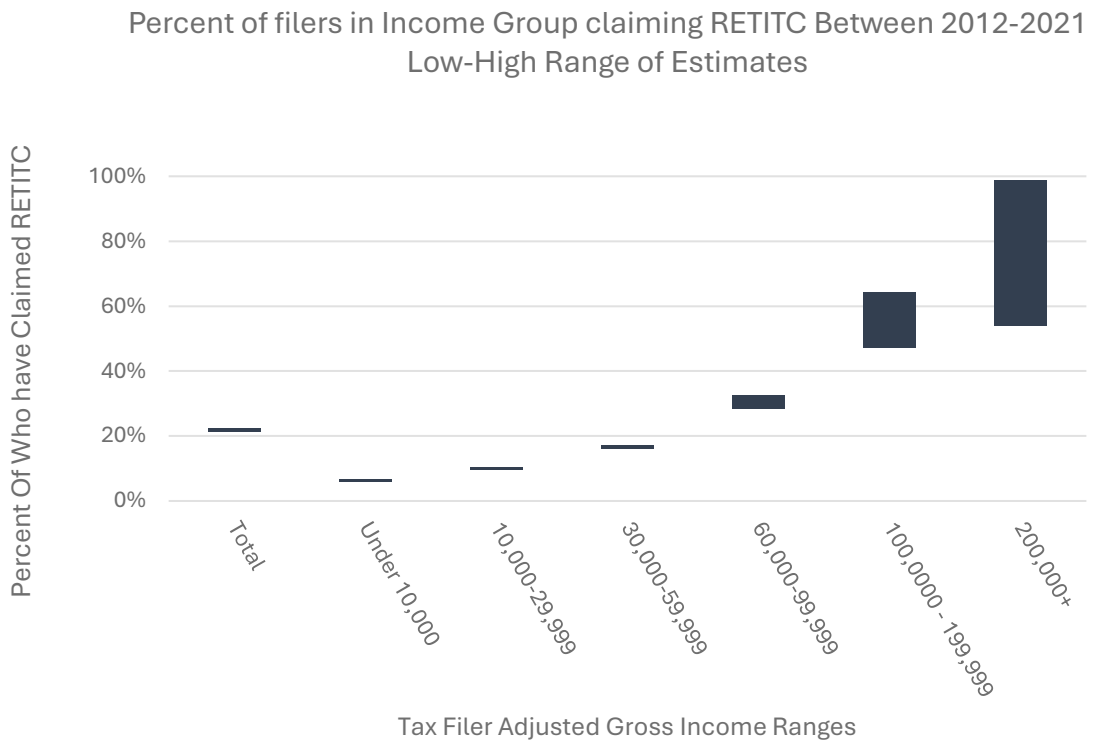


Figure 9 HSEO Decarbonization Report, 2023. Percent of Filers who have claimed the RETITC. Graphs show range between 2012-2021 (Source: Tax Credits Claimed by Hawai'i Taxpayers | Department of Taxation). Due to individuals moving towards higher brackets from 2012-2021, estimation was done using three methods: 1) Accumulating Percentages from Figure 1, 2, the total who had claimed in the bracket each year divided by the total number of people in the bracket in 2021, & Figure 3, the total who had claimed in the bracket each year adjusted for the change in bracket size each year, divided by the total population in the bracket in 2021.

Utility Solar and Battery Energy Storage Systems

Utility-scale solar installations, with dispatchable batteries capable of providing power day or night, can provide electricity at a lower cost than fuel oil and diesel currently burned by Hawai‘i’s electric utilities. The “avoided costs” of electricity in 2023 on O‘ahu and Maui was about $0.20 per kWh.

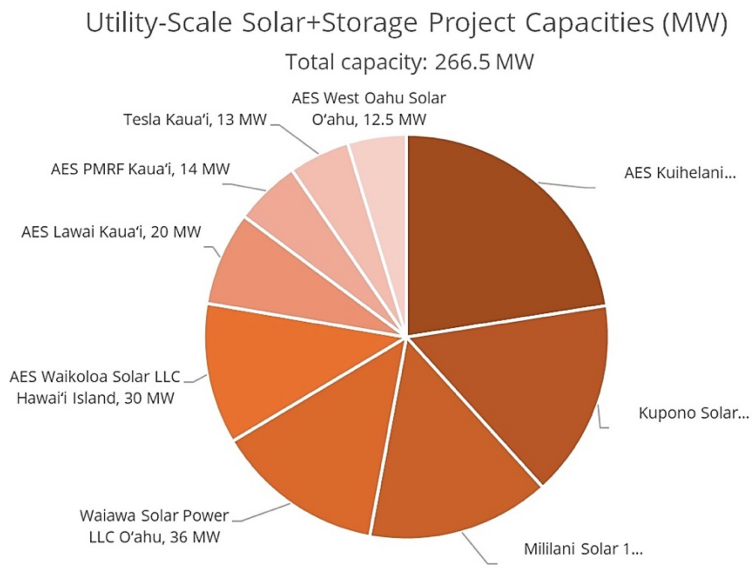


Figure 10 Utility Scale Solar + Storage Capacities. HECO 2023 Sustainability Maps and KIUC 2023 Annual Report.

Kaua‘i’s Shining Example

Kaua‘i has a peak power demand of about 80MW for its approximate 70,000 residents and 30,000 tourists at any given time. In 2023, renewable energy accounted for 57.6% of the energy produced on Kaua‘i and Kaua‘i Island Utility Cooperative (KIUC) routinely operates on 100% renewables for several hours a day.

The Kaua‘i grid has a feature that many larger grids lack: a technology called grid-forming inverters. An inverter converts direct-current electricity to grid-compatible alternating current. The island’s grid-forming inverters are connected to utility-scale battery systems.

As engineer Andy Hoke explained in an article for the National Renewable Energy Laboratory (NREL), the only economical way to integrate such high levels of renewable energy into our grids is with grid-forming inverters, which can be implemented on any technology that uses an inverter, including wind, solar photovoltaics, batteries, fuel cells, microturbines, and even high-voltage direct-current transmission lines—critical to preventing blackouts if a generator fails.

The reduced reliance on fossil fuels provides Kaua‘i ratepayers with the lowest average costs in the state. On O’ahu, with constraints on available land and 19 times the electricity demand load, the challenge is exponentially greater.

Bioenergy

Bioenergy includes biomass (wood chips and other solid fuels, including municipal solid waste) and biofuels (liquid or gaseous fuels, including biodiesel, sustainable aviation fuel (SAF), ethanol, and renewable natural gas).

Biomass and biofuels are both forms of stored energy since they can be stored for days, weeks, or months and dispatched when needed.

Locally produced biofuels have the potential to support ground transportation as a fuel for internal combustion engines, air transportation as a feedstock for SAF and as a fuel for power generation. The economic potential for biofuels is constrained by competing productive uses of natural resources, such as food production, and competing demand for aviation and ground transportation fuel substitutes.

The technical potential for locally produced biofuels is constrained by land area and water availability, directly impacting scalability. Available land is a significant factor in determining where local biofuels fit in the energy portfolio. Designated available agricultural land will need to be further analyzed to determine its viability for biofuel production.

As seen below, only a small proportion of agricultural land in Hawai‘i is currently used for crop production. Given Hawai‘i’s goals to produce more local food and reduce food imports, the growth of biofuel feedstocks should only be prioritized in areas not actively used for crops or pastures, or if energy crops can be used as a cover or rotational crop, ensuring they complement rather than compete with food production. It is important to note, that introducing a new large-scale monocrop could have negative effects on overall agricultural diversity and soil health. Further, an overreliance on a single crop may not be agriculturally sustainable. From a land use efficiency perspective, solar power is a potentially preferred alternative for power generation.

Figure 11 Statewide land capacity and land use efficiency comparison for different fuel technologies.

New biofuel production may be better suited for decarbonizing portions of the transportation sector where fuel substitutes may prove more challenging (e.g., heavy-duty vehicles, aviation). For locally produced or refined biofuels, additional capital investment will be required to build biofuel production facilities and modify existing power plants to consume biodiesel as a fuel source. This large capital expenditure will result in a fraction of the firm power generation required to meet the anticipated demand.

Current Bioenergy Programs and Bioenergy Use

The Energy Feedstock Program (HRS §141-9) requires both HSEO and the Hawai'i State Department of Agriculture to "maintain cognizance of" local developments in the area of energy feedstocks and report to the Legislature. This section is provided in compliance with the statute.

Energy feedstock activities in the state in 2024 included work on aviation fuel, crop research, economic feasibility, and land suitability studies by the Hawai'i Natural Energy Institute (HNEI); feedstock demonstrations and crop trials by Pono Pacific; planning for a renewable fuel unit at Par Hawaii's Kapolei refinery; feedstock work, fuel production, and fuel distribution by Pacific Biodiesel; use of biomass for power production by the Mahipapa power plant on Kaua'i; development of a facility by Aloha Carbon to convert locally-generated wastes into organic fertilizer and renewable power; continued use of methane from the Honouliuli Wastewater Treatment Plant for distribution by Hawai'i Gas; and continued production of oilseeds by Terviva.

HNEI continued work on numerous alternative fuel projects in 2024, including conducting research on feedstocks and technologies for the production of SAF also providing analysis on the potential in-state production of plant-based oils by Pono Pacific in partnership with Hawaiian Airlines and Par Hawaii to increase local production and refining of SAF. Additionally, HNEI quantifies feedstock potential in assessments of alternative fuels available on their website.

Par Hawaii's planned upgrade of a diesel hydrotreater to a renewable hydrotreater at its existing refinery–to produce biofuels including renewable diesel, sustainable aviation fuel, renewable naphtha, and renewable LPG–resulted in the recent public announcement and blessing of the $90 million project, currently under construction.

Energy feedstock activities by Pono Pacific Land Management included feedstock research for use in refining liquid renewable fuels, crop trials and data collection, economic feasibility, and land suitability studies focused on the oilseed crop *Camelina sativa*. Crop trials were conducted on Hawai'i Island, Maui, O'ahu, and Kaua'i with various farming partners including Meadow Gold Dairy, Mahi Pono, Kuilima Farm, and Aloun Farm. If crop trials are successful, locally grown feedstocks would be used in addition to imported feedstock by Par Hawai'i to produce locally refined biofuels.

The only biodiesel producer in the state, Pacific Biodiesel, uses a combination of used cooking oil, imported beef tallow, and oils from sustainable agriculture to support its annual production of nearly 6 million gallons of biodiesel on Hawai'i Island. At the Hawai'i Agriculture Conference in November 2024, Pacific Biodiesel shared its vision for its refineries in Hawai'i to produce a minimum of 16 million gallons of biodiesel annually from 100% Hawai'i-sourced feedstock, using a total of 75,000 acres by 2040, to support Hawai'i's circular economy and state energy objectives.

Photo courtesy: Pacific Biodiesel

In early 2024, Pacific Biodiesel announced an expansion of its agricultural operations to Kaua'i to develop a model for the production of biofuel from multiple locally grown oilseed cover crops in rotation with other food crops. The project will produce culinary oils and other value-added food products, meal for animal feed, biodiesel, and co-products such as glycerin and potassium saltcake (non-petroleum fertilizer) in a regenerative agriculture system. According to Pacific Biodiesel, 2024 harvests included 35 acres of sunflowers from its founders' 115-acre Maui farm as well its first 100 acres of sunflowers in Kaumakani, Kaua'i.

The Mahipapa biomass-to-energy facility on Kaua'i is owned by Pacific Current and is powered 100% by eucalyptus wood chips sourced from plantations established and under the control of the owner. According to the EIA, in calendar year 2023, the facility used 77,000 tons of biomass to generate 42 gigawatt-hours of electricity.

Waste to Energy

The production of electricity from waste (primarily municipal refuse-derived fuel) continued at H-POWER on O'ahu. According to the EIA, in the calendar year 2023, the facility used over 613,000 tons of waste to generate about 323 gigawatt-hours of electricity.

In 2024, Simonpietri Enterprises made progress on its Aloha Carbon project to convert demolition debris and other solid wastes generated on O'ahu into renewable fuel for use by customers on O'ahu. The Aloha Sustainable Materials Recovery & Fertilizer Facility will convert wastes including those from demolition, invasive species removal, and vegetation management into electricity and steam to power itself and co-located fertilizer and recycled material building products manufacturing. The company won several competitive grants from USDA and US Department of Energy and was awarded its first patent for waste gasification. Initially, hydrogen and renewable natural gas fuels will be produced.

Recent articles and postings also indicate continued progress by Terviva in developing Pongamia (*Millettia pinnata*) for use in food production. Locally available oils are a potential fuel feedstock.

In 2024, significant attention was given to crops and waste materials for energy production, alongside ongoing interest in forest biomass, soil carbon, and carbon sequestration. Several stakeholders supported using overgrown biomass removal and active farming as wildfire management strategies. However, concerns remain about the potential greenhouse gas emissions from biomass energy and its impact on soil health, fertilizer inputs, and ecosystem carbon balances, highlighting the need for careful assessment of these approaches.

Renewable Natural Gas

Renewable natural gas (RNG) is produced by Hawai'i Gas at its facility using biomethane sourced from the City and County of Honolulu's Hono'uli'uli wastewater treatment plant. The RNG is injected into the existing Hawai'i Gas pipeline, where it is mixed with synthetic natural gas derived from petroleum naphtha. In 2023, Hawai'i Gas produced 329,269 therms of biogas to biomethane through the Hono'uli'uli Biogas Project. The company extended its contract with the City and County of Honolulu from December 31, 2024, to December 31, 2034, securing an additional ten years of RNG production (Docket No. 2016-0340).

Hawai'i Gas is pursuing landfill gas capture from the City and County's Waimānalo Gulch Landfill (pending the City's RFP), as well as additional biogas from the Sand Island WWTP (pending the City's RFP). Hawai'i Gas released a Renewable Natural Gas (RNG) and Renewable Hydrogen Request for Proposals (RFP) in 2023 to procure RNG and renewable hydrogen to reduce emissions from the utility and increase renewable production. HSEO and the Consumer Advocate participate in quarterly updates, provided by Hawai'i Gas, to ensure the offices are up to date on various RNG and clean hydrogen projects pursued by the gas utility.

Lifecycle Carbon Emissions of Bioenergy

As with all fuels, the lifecycle carbon intensity of biofuels is a critical component in determining whether biomass, biofuels, or RNG alternatives exhibit lower emissions than their fossil fuel alternatives. As a part of the alternative fuels analysis, HSEO has developed a framework, utilizing the Greenhouse gases, Regulated Emissions, and Energy use in Transportation (GREET)[5] model to better evaluate the lifecycle carbon impacts of bio-based fuels.

The developed framework for biofuels encompasses six critical stages: land use change (LUC) and soil carbon flux, feedstock production and collection, feedstock and co-product transport, fuel production, fuel distribution, and final combustion for electricity generation or transportation use. Each stage considers specific emission sources, such as land conversion, farming practices, and energy inputs, as well as emissions from refining and transporting fuels. In Hawai'i, unique factors such as limited local feedstock production, land constraints, and reliance on imported resources

[5] The GREET model is widely used to assess emissions across different stages of a fuel's lifecycle, including extraction, processing, distribution, and end use. It supports policymaking, sustainability analysis, and industry practices focused on reducing greenhouse gas emissions. While the tool was originally made for transportation fuels, it has since been adapted to assess emissions across various sectors.

introduce complexities in accurately accounting for lifecycle emissions. Addressing these challenges requires granular data, supply chain transparency, and a tailored regulatory framework that incorporates regional and international variations in environmental practices.

In terms of lifecycle greenhouse gas (GHG) emissions, biofuels, particularly imported first-generation biofuels and feedstocks derived from corn or palm oils (common in today's biofuel market), may have a higher overall impact than some fossil alternatives, particularly when land use change (LUC) and other upstream emissions are included. The lifecycle emissions often depend on the feedstock used for biofuel production, the scale and location of land conversion, and the efficiency of the biofuel production process. Key factors that contribute to the lifecycle GHG comparison between biofuels and natural gas in stationary combustion or electricity generation:

1. **Direct Emissions in Combustion**: Both biofuels and natural gas emit CO_2 when combusted, but biofuels are typically considered "carbon neutral" at the combustion stage because the CO_2 released is assumed to have been absorbed during the feedstock growth. Accordingly, biogenic emissions should also be accounted for, EPA's AP-42 Compilation of Air Pollutant Emission Factors (especially Chapter 1 for combustion processes) provides values specific to wood, waste-derived biofuels, and other biogenic sources.
2. **Land Use Change (LUC) Impacts**: The most substantial lifecycle emissions difference can arise if biofuels require land conversion, such as clearing forests or grasslands for biofuel crops. This release of carbon stored in vegetation and soil can generate large "carbon debts" that may take decades or even centuries to offset, depending on the type of land and feedstock involved. For example, palm oil or soy-based biodiesel from deforested areas could result in far higher lifecycle emissions due to the initial carbon release.
3. **Upstream and Production Emissions**: The production of biofuels involves processes like fertilizer application, water use, and energy input, which can lead to significant GHG emissions. However, certain biofuels, such as waste-derived biodiesel or advanced cellulosic biofuels, tend to have lower production emissions and do not require significant land conversion, making them more comparable to or even lower in emissions.

HSEO plans to work with bioenergy developers and providers to ensure bioenergy feedstocks utilized in the state reduce lifecycle carbon emissions.

Wind

Onshore Wind

In 2023, eight onshore wind facilities in Hawai‘i collectively produced 649 gigawatt-hours, equal to 6% of Hawai‘i’s electricity supply.

There are important considerations when siting wind projects, especially relating to proximity, shadow, and noise impacts on occupied buildings such as homes, schools, resorts, and apartments. HSEO has actively researched issues, solutions, and policies from other jurisdictions and provided recommendations to the Honolulu City Council regarding revisions to land use ordinances to address concerns.

Additional challenges with wind energy include environmental impacts, particularly on native wildlife. Advances in turbine technology and mitigation measures are actively being pursued and implemented at Hawai‘i wind energy sites to minimize these impacts. These mitigation measures include smart curtailment, habitat restoration, wildlife management (i.e. mongoose trapping), audible and ultrasonic animal deterrents, and ongoing and active monitoring and reporting of incidental take.

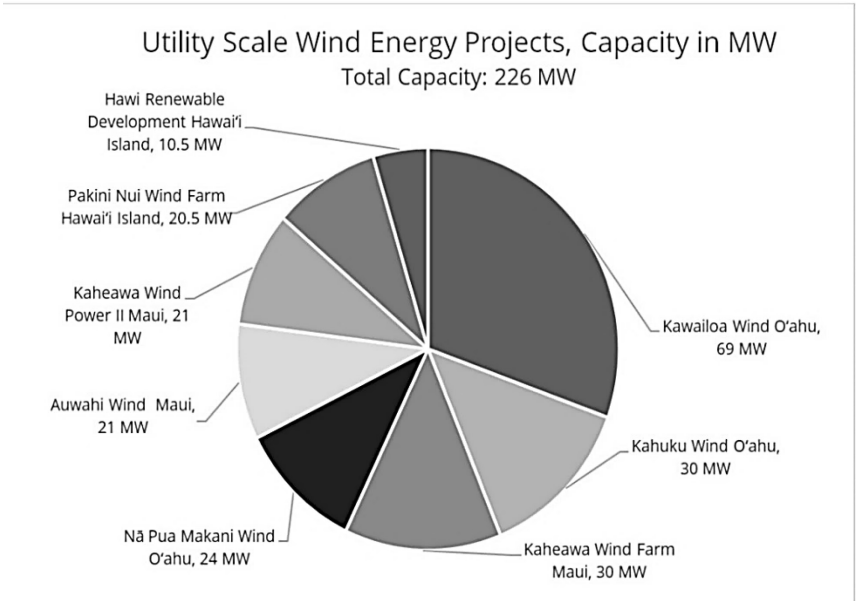


Figure 12: Source: Utility Scale Wind Energy Projects Hawaiian Electric

Offshore Wind

Offshore wind is identified in Hawaii's IGP as a resource with significant potential to support the state's renewable energy goals. Its ability to provide more consistent energy when solar generation is unavailable makes it a valuable complement to Hawai'i's existing renewable energy portfolio, but its development comes with tradeoffs.

In Hawaiian Electric Company's Integrated Grid Plan (IGP), offshore wind is included in multiple scenarios to achieve the 2045 legislated RPS. The current IGP preferred plan projects that substantial capacity (400 MW) from offshore wind energy will be needed to achieve the 2040 RPS law (Figure 13).

By leveraging ocean space, offshore wind addresses the state's land-use limitations, reducing competition for land needed for agriculture, housing, and cultural and environmental preservation. Its inclusion in the IGP reflects its capacity to contribute to Hawai'i's long-term target of 100% renewable energy by 2045. At the same time, the development of offshore wind presents challenges.

High upfront costs of infrastructure, including floating turbines for Hawai'i's deep waters, and potential environmental and cultural impacts, such as effects on marine ecosystems and traditional ocean use, require careful consideration. While offshore wind may reduce reliance on non-renewable energy sources and offer resilience benefits, its implementation must be weighed against these tradeoffs.

HSEO plans to work with communities to weigh the trade-offs. A full environmental review, consistent with federal and state laws, must occur before any development.

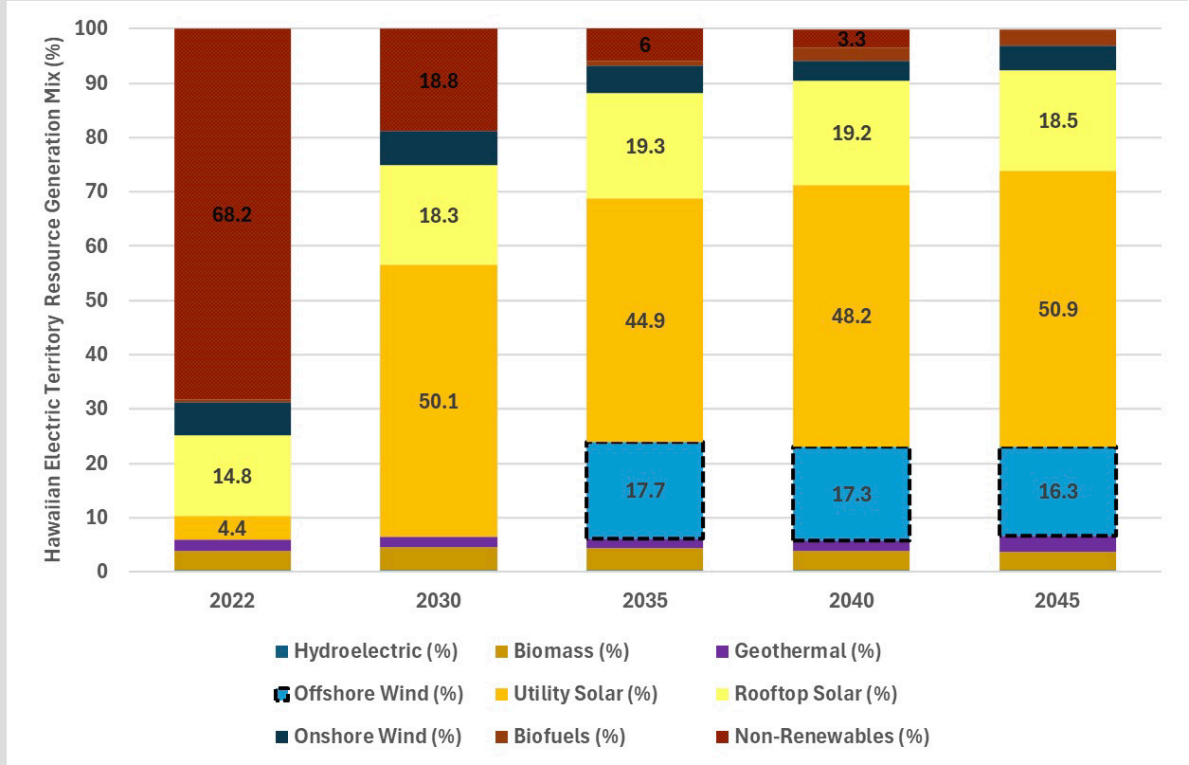


Figure 13 Statewide resource generation mix / RPS percentages– preferred plan base scenario as proposed by Hawaiian Electric in the 2023 Integrated Grid Plan. Source: https://hawaiipowered.com/igpreport/IGP-Report_Final.pdf

In August, HSEO participated as a stakeholder in the Bureau of Ocean Energy Management's (BOEM's) Intergovernmental Task Force meeting in Honolulu, the first since 2016. Recordings of the meeting are posted on the BOEM Hawai'i task force page.

BOEM established the BOEM/Hawai'i Intergovernmental Renewable Energy Task Force to promote planning and coordination, and to facilitate effective and efficient review of requests for commercial and research leases and right-of-way grants for power cables on the Federal outer continental shelf (OCS). Members of the Task Force include representatives of Federal, state, and local government agencies, and offices who regularly engage with members of the Native Hawaiian community. BOEM also coordinates public information meetings to help keep interested stakeholders updated on major renewable energy milestones.

The BOEM task force serves as a renewable energy forum to discuss issues and concerns, including those identified by the Native Hawaiian community; exchange data and information about biological, cultural and physical resources, ocean uses and priorities; and facilitate early and continual dialogue and collaboration opportunities.

Aukahi Energy LLC, a joint venture involving a subsidiary of French utility giant EDF Group, has publicly shared its vision to put 22 to 30 floating wind turbines between O'ahu and Moloka'i to supply about 25% of the electricity used on Oahu at an estimated cost of over $1.8 billion.

Additional information is available on BOEM's Hawai'i activities page at https://www.boem.gov/Hawaii/.

Geothermal

Geothermal energy (heat from the earth) has the potential to have a transformative effect on Hawai‘i’s economy, as a source of firm power leading to greater energy self-sufficiency.

In 2024, Governor Josh Green, M.D. allocated $5 million from the Coronavirus State Fiscal Recovery Fund for slim hole geothermal resource characterization to identify possible locations of reliable local clean energy in the state. This resource assessment will be conducted by the University of Hawai‘i’s Groundwater and Geothermal Resource Center (HGGRC), building on their research and the existing body of knowledge.

Geothermal could play a role in phased transition plans to progressively cleaner fuels and generation options, combined with energy storage options such as hydrogen in the future, but we need to understand:

- What areas contain the resource?
- Where and how could geothermal development be culturally appropriate?
- Where and how could geothermal development benefit host and surrounding communities?
    - What measures can be taken to ensure equitable development, community benefits, lower electricity prices, and opportunities for participation?
- What type(s) of geothermal technologies are best suited for an area?
- What regulatory and permitting requirements and policies currently exist and how can they be improved?

HSEO is focused on answering these questions.

Currently, geothermal energy, produced by Puna Geothermal Venture (PGV) annually provides 193 GWh to the electrical grid on the island of Hawai‘i. The company has received PUC and DLNR approval to replace its 12 power-generating units with three newer units and add a fourth in a second phase of development, allowing for an output increase from 38 to 46 to 60 MW in a power purchase agreement with HECO that will run through 2052.

In October, HSEO attended the 2024 Indigenous Symposium and Geothermal Rising Conference in Waikoloa, which focused on cultural, technological, and environmental aspects of geothermal energy with an emphasis on indigenous-led geothermal development in North America, Aotearoa New Zealand, and Taiwan.

Pathways to Decarbonization: Key Findings

The state's 100% Renewable Portfolio Standards (RPS) and decarbonization policies continue to drive Hawai'i's energy transition. Post-Maui wildfires, the status quo will not deliver affordable energy or attract the capital to build a resilient, decarbonized energy ecosystem. The high cost of living persists as the most serious issue facing Hawai'i families, while the electricity sector is predicted to experience profound increased demand from the electrification of transportation, leading to a more integrated and interconnected energy system in Hawai'i.

During 2023-24 fiscal year, HSEO prepared a comprehensive statewide Decarbonization Report, pursuant to Act 238 (2022), with 30 discrete recommendations, many of which are HSEO priorities for implementation.

The Pathways to Decarbonization Report to the 2024 Hawai'i State Legislature revealed that Hawai'i's continued reliance on low sulfur fuel oil (LSFO) and diesel has been a major contributor to the high costs of energy and the largest contributor of carbon emissions on the islands. O'ahu, where 67% of electricity comes from residual fuel oil, will continue to be the most challenging island to transition due to its large population, growing electricity demand, and limited land availability. As published in the recent GHG Inventory, by the State Department of Health, Hawai'i's Energy Sector contributes to 87% of emissions within the state. Within the energy sector, stationary combustion, i.e. power plants, contributed to the largest portion of emissions, followed by domestic aviation and ground transportation, respectively.

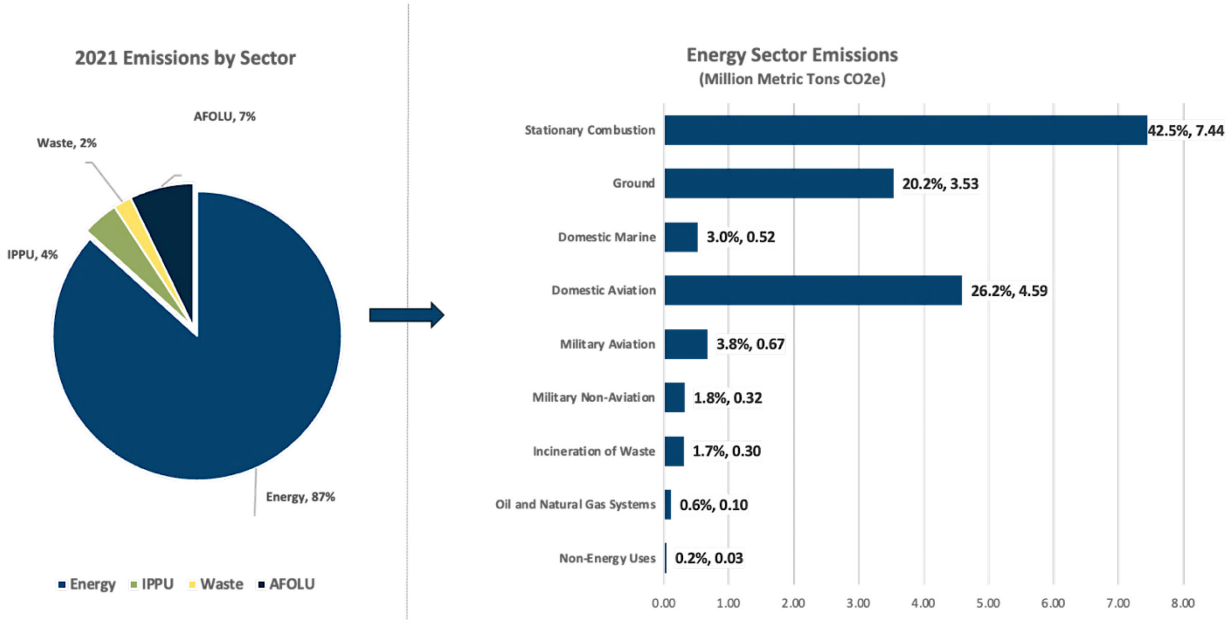


Figure 14 2021 Emissions by sector (left) and energy sector category emissions (right) in million metric tons CO2e (GWP 100). HSEO compiled graphic. Source – Hawai'i Department of Health, Clean Air Branch, Hawai'i Greenhouse Gas Emissions Report for 2020 and 2021, Final Report (dated May 2024)

The Decarbonization Study highlighted a significant anticipated need for decarbonized fuel imports across sectors (Figure 15), alongside a substantial increase in electricity demand to support the energy requirements of transportation electrification.

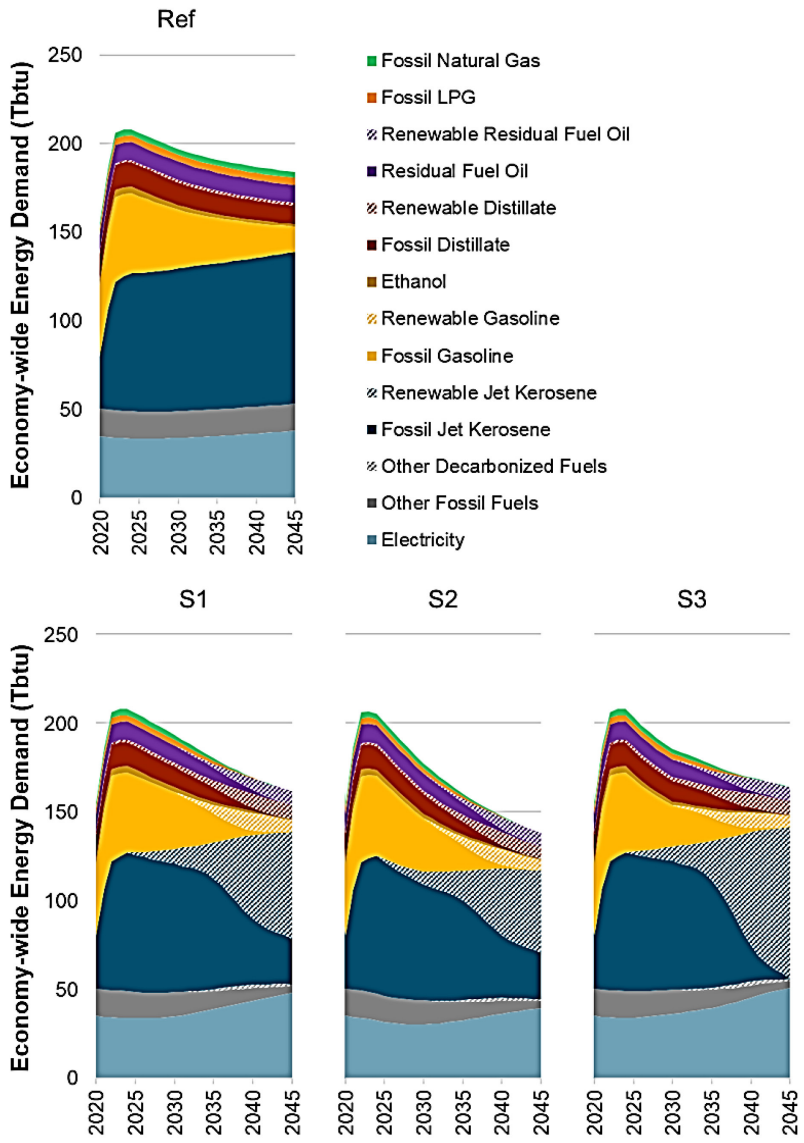


Figure 15: Economy Wide Energy Demand by Fuel Type for Different Decarbonization Scenarios

Since the publication of the report, HSEO has gathered feedback from various stakeholders. Two of the most common criticisms of the report were:

1) the use of very aggressive energy efficiency assumptions and the challenges of achieving the level of energy efficiency prescribed in the report, and
2) the simplifying assumption that bio-based fuels are carbon neutral (acknowledged in Chapter 5 of the Decarbonization report).

These assumptions were updated in the 2024 Alternative Fuels and Repowering Analysis to follow.

Alternative Fuels and Repowering Analysis: Preview

By statute, HSEO is tasked with providing analysis and planning to actively develop and inform policies to achieve energy efficiency, renewable energy, energy resiliency, and clean transportation goals with the legislature, public utilities commission, state agencies, and other relevant stakeholders (HRS §196-71). These key goals include the Renewable Portfolio Standard (RPS) mandate established by HRS §269-92 and the statewide net negative emissions goal as established by HRS §225P-5.

The Alternative Fuels Study is an essential component of a broader and more complex plan for Hawai'i's energy future. Decision-makers must balance a wide array of priorities, including economic impacts, environmental goals, technological advancements, and community needs when determining the state's energy strategy. This study builds on over ten years of related studies, including the recent Act 238 Decarbonization Report, augmenting the body of knowledge with additional engineering and economic analyses, evaluation of permitting requirements, and approaches to community engagement.

A key objective of 2024's Alternative Fuels and Repowering Analysis was to provide an unbiased analytical assessment of which lower carbon-intensive fuels reduce costs could economically replace low-sulfur fuel oil in the near term, reduce costs, decarbonize energy imports in the long term and provide direct access to capital to ensure Hawai'i's energy transition is not impeded.

In this analysis, all alternative fuels were on the table. The fuels considered included methane/liquid natural gas (LNG), hydrogen, biomethane, biodiesel, e-methane, hydrogen, e-ammonia, e-diesel, and e-methanol. HSEO and third-party consultants developed an evaluation matrix that served as a decision-making framework to compare alternative fuels. It was determined that any alternative fossil fuel must achieve cost and carbon reductions and be transitioned out in a manner consistent with Hawai'i's laws to go beyond net zero carbon emissions by 2045.

A preview of findings of HSEO's evaluation of fuels and power plant upgrades, based on the criteria of technological maturity, commercial viability, cost-effectiveness, and lifecycle carbon intensity, is summarized below:

- Land availability and other factors indicate that local clean energy supply will be insufficient to meet demand, especially when considering demand from electrified transportation. Accordingly, some energy imports will persist for both the electric and transportation sectors even after Hawai'i satisfies the 100% Renewable Portfolio Standard (RPS).
- The current Hawaiian Electric grid and development plans have unnecessarily high carbon emissions due to powerplant inefficiency compounded by reliance on low-sulfur fuel oil (LSFO), which will likely remain the primary fuel until the interim RPS mandates take effect.
- The import of liquified natural gas (LNG), as an alternative to low-sulfur fuel oil, could result in an approximately 45 to 50% reduction in lifecycle carbon intensity when used in more efficient power plants. Natural gas, restricted to O'ahu, can be used as a replacement for residual oil until the RPS is met in 2045, while local production of biodiesel is accelerated and as technology advances for clean ammonia and hydrogen imports.

- "Hard-to-decarbonize" activities that rely on combustion will continue to demand significant fuel imports past 2045, and the state must explore options to decarbonize those fuel imports as a complement to local renewable energy production.

Oil-fired power plants have been discouraged by federal law since 1978, however, the status quo would likely result in Hawaiian Electric's continued burning of petroleum fuels until prohibited according to interim RPS mandates and total phase-out in 2045. Hawaiian Electric's preferred path has been to fuel-switch to biofuels (biodiesel or renewable diesel) with the forecasted added cost of more expensive biofuels borne by ratepayers.

Further, carbon emissions of biofuels can vary widely, with carbon savings that may be minimal compared to LSFO and diesel, especially if burned in retrofitted power plants without substantial efficiency improvements. While biofuels offer the potential for GHG emissions savings, the lifecycle emission reduction potential is wide-ranging. GHG reduction estimates are heavily influenced by the system boundaries assumed in the analysis, the biogenic emission factors applied, feedstock characteristics, including associated land use changes, and the agricultural inputs and practices implemented. Certain biofuels, including many of the most common first-generation fuels on the market, do not result in lifecycle carbon savings when compared to fossil alternatives. In some cases, emissions from certain biofuels result in more emissions than fossil alternatives.

After evaluating all options, the analysis found that LNG under certain conditions has the potential to meet the carbon/cost/capital criteria towards meeting the ultimate energy transition objectives under guidelines that best achieves all policy objectives while minimizing adverse effects to ratepayers.

This analysis is complementary to the groundbreaking Navahine F. v. Hawai'i State Department of Transportation settlement of June 2024, indicative of the Green Administration's intention to go beyond the status quo and take tangible, substantive actions to create a more resilient and increasingly decarbonized economy. Decisions must be based on scientific data and proven technologies that best achieve policy objectives to reduce carbon and costs while accelerating Hawai'i's energy transition. Consideration of lifecycle carbon emissions requires careful consideration of the location and circumstances under which energy is produced and shipped to Hawai'i.

Policy guardrails will be necessary to ensure that any climate-damaging fuels, including LNG, are permanently phased out to enable economywide decarbonization by 2045, not distract from it. There is narrow, but beneficial, path for the inclusion of LNG in the energy portfolio. Its build-out should not allow for backsliding on the RPS.

Accelerating the Transition to Renewables

Switching to another fossil fuel does not satisfy our climate obligations. An alternative fossil fuel can make a significant reduction in near-term emissions but underscores how much more the state must do to meet the challenge of climate change.

The threat of more frequent and extreme climate events, sea level rise, saltwater intrusion, coastal erosion, altered weather patterns, ocean warming, coral bleaching, and the extinction of native and keystone plants and animals all necessitate immediate action to secure the health, safety, economic vitality, and welfare of Hawai‘i residents and ecosystems, avoiding billions of dollars of economic loss and the potential loss of priceless cultural sites.

Intended policy action will accelerate Hawai‘i’s energy transition to achieve 100% renewable electricity production in the counties of Hawai‘i, Kaua‘i, and Maui by 2035, and achieve 70% greenhouse gas emissions reduction across the electricity sector on O‘ahu by 2035, using 2005 as a baseline. An accelerated RPS requires collective action and shared responsibility to maximize renewable energy, end-use efficiency, demand response, and fuel switching to the extent necessary to achieve the requisite emission reduction targets.

The reality of climate change must be incorporated into the day-to-day decision-making of both state agencies and private companies. This includes reducing building energy use, switching to more efficient modes of transportation, relying on clean distributed energy resources to improve climate resilience, and acknowledging the ever-increasing risk of natural hazards to daily operations and new capital improvement projects.

State agencies must prioritize programs that directly benefit low-and moderate-income residents, helping them avoid the risks of climate change by reducing energy costs and participating in the energy transition, for example by facilitating access to solar and providing job training.

Agencies must also consider the emissions of their budget and procurement choices because the climate impacts of their decisions today can no longer be ignored or made to be someone else’s responsibility.

To achieve this acceleration, the Hawai‘i Public Utilities Commission must require utilities to act with urgency to mitigate climate risks, which include both aging grid infrastructure and a continued over-reliance on one of the dirtiest fossil fuels available in the market. Working together, the state and private parties can identify modern rate structures and programs to ensure the widespread adoption of dispatchable clean distributed resources on all buildings, especially on land-constrained O‘ahu where distributed solar plays an irreplaceable role in the energy transition. This entails continued efforts on technical matters such as interconnection standards and the safe deployment of inverter-based grid controls, as well as collective action to help low-income residents benefit from solar subsidies.

In the transportation sector, as directed by HRS §196-71(b)(2), HSEO serves to “lead efforts to incorporate energy efficiency, renewable energy, energy resiliency, and clean transportation to reduce costs and achieve clean energy goals across all public facilities[.]” Examples include energy benchmarking for state facilities, installation of electric vehicle infrastructure at public facilities,

and cross-functional work with numerous agencies including the Department of Transportation and the Department of Education. HSEO values its partnerships with other state and county agencies and is eager to continue working with them to lower their operating costs, increase their energy resiliency, and reduce the public sector's collective carbon footprint.

Cumulative Installed PV -- As of Sep 30, 2024

	Number of PV Systems			PV Capacity, MW		
	Number	% Residential	% Commercial	Capacity	% Residential	% Commercial
Hawaiian Electric	77,039	97%	3%	1,037	42%	58%
Hawai'i Electric Light	17,621	95%	5%	174	56%	44%
Maui Electric	17,831	93%	7%	223	45%	55%
Total	112,491			1,434		

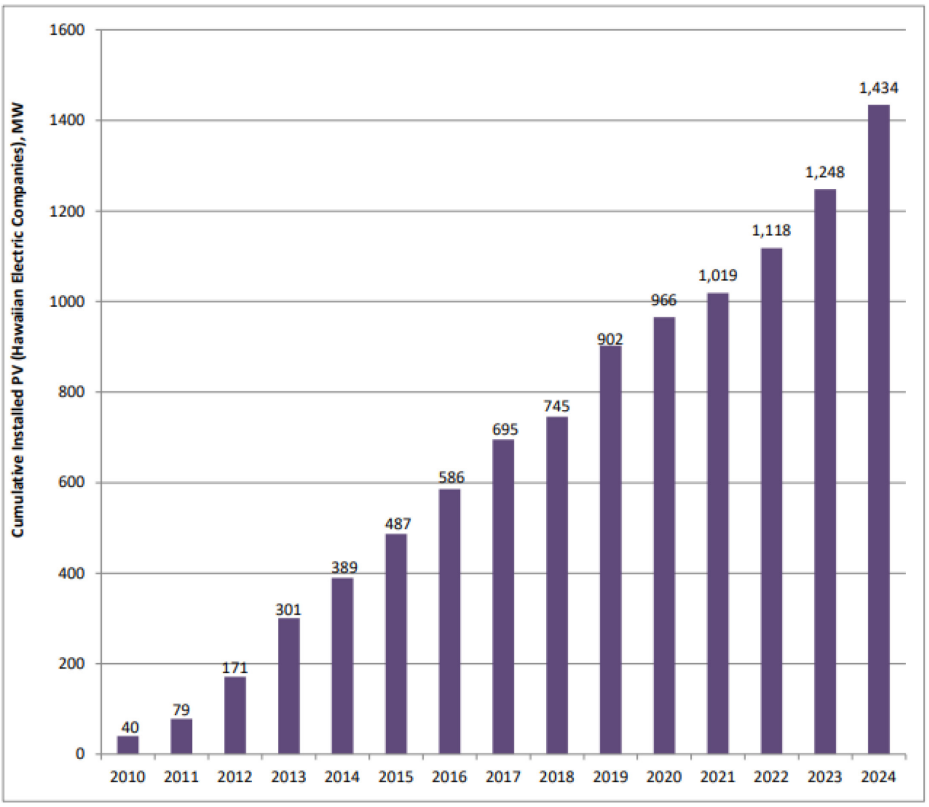


Figure 16: Cumulative installed PV including distributed energy resources (DER) also referred to as "rooftop solar" or Customer Energy Resources (CER)) and grid-scale "commercial" solar of 415.4 MW. Source: HECO

A New State Energy Strategy

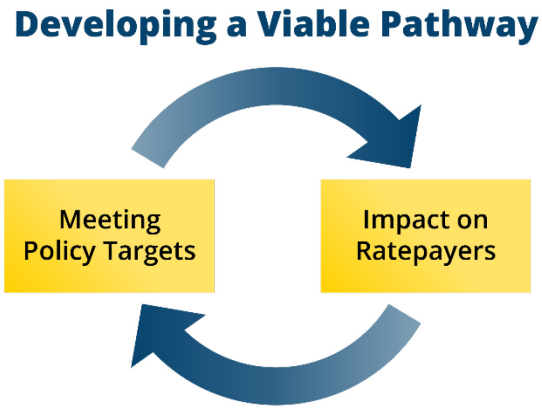
Affordability and reliability are the foundation of Hawai‘i’s updated state energy strategy. Today, O‘ahu’s firm energy is predominantly comprised of low-sulfur fuel oil (LSFO), a bottom-of-the-barrel residual of crude petroleum, that fuels an aging and largely inefficient powerplant fleet.

Current data indicates that an updated state energy strategy must address ways to decarbonize and upgrade firm power generation infrastructure through fuel switching while increasing renewable energy, efficiency, and clean transportation. The preferred path balances ratepayer impacts with carbon reduction, with consideration of infrastructure needs, permitting timelines, and input from communities.

Firm energy is necessary to ensure grid stability and reliability. Electricity generation from fuels is also needed in the near term to fulfill demand while intermittent resources (such as solar and wind) are developed.

Accordingly, the decarbonization of firm energy needs to occur while Hawai'i develops other forms of renewables—an action that has not been prioritized since the establishment of the Hawai'i Clean Energy Initiative in 2008. The Energy Transition Acceleration and Alternative Fuel and Repowering Analysis focuses primarily on firm energy needs.

The objective of a new state energy strategy is to define a viable pathway that addresses multiple policy priorities: oil price volatility, low carbon, costs containment, and a more resilient grid, requiring multiple iterations of analysis to ensure both policy objectives (i.e. RPS law) and impact on ratepayers are balanced.



Act 100 Priority Objectives and Policies will continue to implement the 19 key responsibilities assigned to the chief energy officer under HRS §196.72. This function provides the context for each of the agency’s priorities and actions. Specifically, it tasks the chief energy officer to formulate and implement an updated state energy plan that lowers costs, lowers emissions, and attracts the capital investment needed to achieve Hawai‘i’s clean energy transition and strengthen the energy ecosystem.

The major objectives of an updated state energy plan to achieve decarbonization for Hawai'i under Act 100 can be summarized as follows:

Major Objective 1: Develop a Realistic Pathway to Statewide Decarbonization

End State: A strategy and implementation pathway to meet statewide greenhouse gas (GHG) emissions limit and sequester more atmospheric GHG emissions than emitted no later than 2045 pursuant to HRS §225P-5, and in accordance with Act 238 (2022) and HRS §324B-71. This also relates to HSEO and CEO duties under HRS §196-72(d)(2) and (d)(6).

Major Objective 2: Significantly Reduce Power Sector Carbon Emissions by Fuel Switching and Repowering to Reduce Energy Costs and Attract Capital Investment in the Electricity Sector.

End State: Grid modernization, economic stabilization of the state's largest utility and five associated independent grid systems, achievement of interim 2030 target under legislated 100% RPS by 2045, lower electricity costs for ratepayers. Recent renewable project development headwinds require an influx of capital to get back on track to meet 2045 targets.

Major Objective 3: Maintain Focus on Emergency Response, Energy Security and Grid Resilience

End State: Deployment of technology and grid resilience strategies to protect critical infrastructure, lives and property from climate change events, including blackouts and energy shortfalls.

Major Objective 4: Reduce Energy Waste through Energy Efficiency and Commercial Building Performance Standards

End State: Design and Implementation of $68 million in home energy efficiency upgrades for low- and moderate-income Hawai'i households earning less than 150% of the Area Median Income. Adoption of a Building Performance Standard (BPS) to improve the energy performance of the state's largest commercial buildings (50,000 square feet and above) accounting for approximately 80% of the state's commercial energy usage and 78% of total commercial building emissions.

Major Objective 5: Accelerate Renewable Energy Development

End State: Understanding and consensus by stakeholders and policy makers on renewable energy resource adequacy and scenarios to realize the state's 100% RPS and decarbonization policies by 2045. As one example, geothermal resource characterization to inform assessments and decision making, with the potential for long-term transformational impact for greater energy self-sufficiency in Hawaii's energy system.

Major Objective 6: Lead-by-Example with State Zero-Emissions Vehicles, Charging Station Deployment, and Diesel Vehicle Replacement

End State: Transition of 100% of light-duty passenger vehicles procured for the state's fleet to zero-emission vehicles (ZEVs) by December 31, 2035. The introduction of zero-emission coaches in tour and charter operations as well as electric school buses, forklifts, and tractors.

Major Objective 7 Jobs and Workforce Development, Community Outreach and Engagement

End State: Keiki to career pathways, skilled trades development, and the realization of meaningful career opportunities arising from the transition from imported foreign fossil fuels to locally generated renewable energy. Increased public knowledge of, capacity for, and engagement in energy policy creation and decision-making.

Costs and Carbon

Affordability

While power outages draw immediate attention, affordability and cost of living are the overriding issues for Hawai'i residents. In a recent survey for the state of Hawai'i Climate Advisory Team (CAT) 93% of residents cited the cost of living as an extremely serious problem (Figure 17).

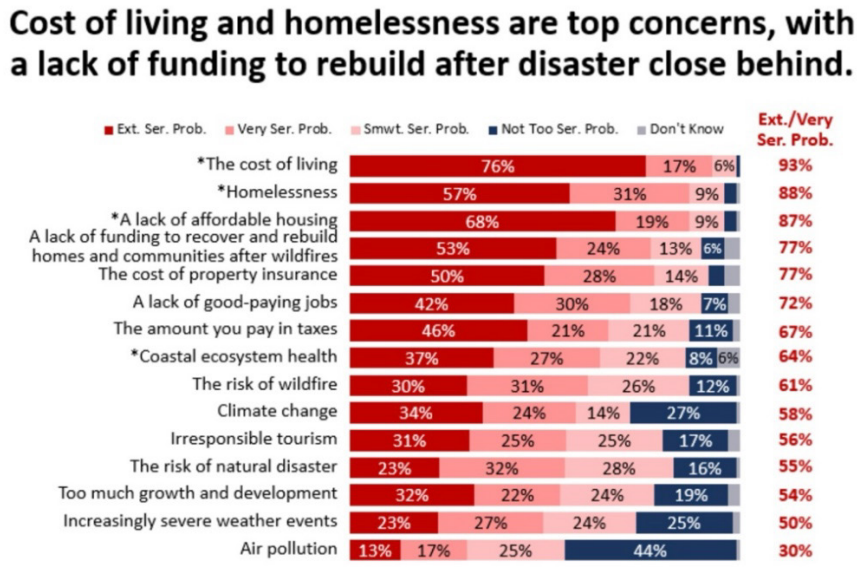


Figure 17: Source: 2024 Hawai'i Survey conducted by FM3 Research for the State of Hawai'i Climate Advisory Team (CAT).

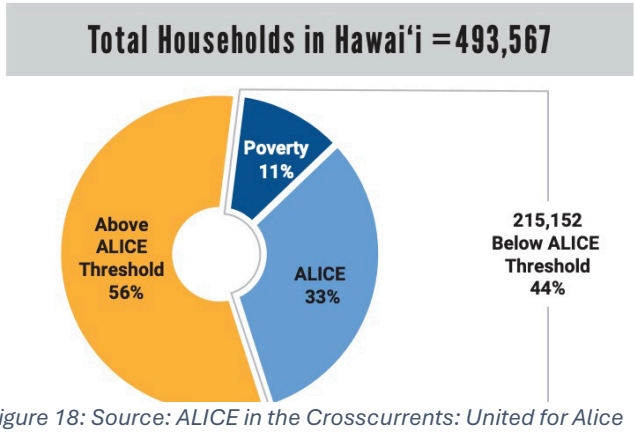


Figure 18: Source: ALICE in the Crosscurrents: United for Alice 2023 State Report (Hawai'i)

Between 2021 and 2022, the number of ALICE households increased by 16,666 (to 33% of all households). By 2022, of the 493,567 households in Hawai'i, 215,152 — 44% — were below the ALICE Threshold (Figure 18).

To implement a new state energy plan to both lower costs and lower emissions, the state must act as a 'first mover' and demonstrate leadership by example. Executive departments and agencies must prioritize projects and programs that reduce cost and emissions from energy use for residents, especially for low- and moderate-income households, those residing in overburdened and underserved areas, and those living on Hawaiian Home Lands. This requirement must extend to programs that directly serve the public and to HSEO energy expenditures.

Consistent with Hawaii's obligations under HRS §269-6, it must be a policy objective of the state to use the lowest greenhouse gas emitting energy source reliably available at the lowest cost. The Hawai'i State Energy Office must therefore coordinate with the Public Utilities Commission to:

a. Incorporate a cost of carbon into all projects and procurements, and the cost of emissions used in these determinations should be consistent with U.S. Environmental Protection Agency estimates, and in no case be less than $100 per ton of greenhouse gas emissions;

b. Assess any investment in a greenhouse gas emitting power plant based on whether it will save residents money, lower the lifecycle greenhouse gas intensity of the electricity system, and be fully depreciated by 2045.

c. Identify commercially available options to decarbonize electricity sector fuel imports by 2045 to permanently eliminate electricity sector greenhouse gas emissions.

Lifecycle Carbon Accounting

To improve lifecycle carbon accounting, the Hawai'i State Energy Office (HSEO) has developed a preliminary GHG accounting framework to standardize the quantification of carbon intensity for fuels and energy projects. This framework ensures emissions can be consistently compared across different energy sources. As part of this framework, emissions accounting includes all lifecycle stages, such as extraction and processing of materials, fuel production and refining, transportation, and final combustion.

HSEO has recommended adopting tools like the GREET model to quantify emissions across these stages while incorporating Hawai'i-specific factors like fuel sourcing, transportation distances, and power plant efficiencies. This approach emphasizes a comprehensive "well-to-outlet" or "well-to-use" methodology to capture emissions from upstream, midstream, and downstream processes. HSEO further advocates for mandatory carbon intensity (CI) thresholds and lifecycle screenings early in project evaluations to align with Act 54 requirements and ensure compliance with Hawai'i's decarbonization goals.

Additionally, HSEO underscores the importance of supply chain transparency to enhance accountability and reliability in emissions reporting, requiring developers or fuel suppliers to disclose detailed information about sourcing practices, transportation modes, and operational efficiencies at each stage of the lifecycle. By incorporating these practices and applying the framework consistently across regulatory approvals and state incentive programs, HSEO aims to improve transparency and ensure state resources are allocated effectively to decarbonization goals.

A More Aggressive Policy Framework

When the Hawai‘i Clean Energy Initiative (HCEI) was codified into law in 2010 (HRS 196-10.5), it formalized ambitious yet achievable targets to transform the state’s energy landscape. The initiative initially set a Renewable Portfolio Standard (RPS) of 40% renewable electricity by 2030 and an Energy Efficiency Portfolio Standard (EEPS) to reduce end-use energy consumption by 30%. Together, these goals formed the well-known "70% clean energy by 2030" slogan, spurring investments in renewable energy and energy efficiency projects. HCEI’s vision of reducing reliance on fossil fuels attracted national and international attention. Building on this momentum, the Hawai‘i State Legislature increased the RPS mandate in 2015 to 100% renewable generation by 2045, reinforcing the state’s leadership in clean energy innovation. The mandate was the first in the nation, and many other states have followed in Hawai‘i’s footsteps in establishing similar mandates.

The early success of HCEI has given way to a far more challenging but unassailable climate mandate to decarbonize the economy statewide by 2045. As noted previously in this report, there is insufficient available land on O‘ahu to produce enough renewable energy through solar and biofuels to meet electricity demand now and in the future. This means that Hawai‘i is faced with continued energy imports now and beyond 2045 for somewhere between 20 and 30% of its electricity production requirements. **These imports must be decarbonized.**

To meet these challenges, consistent with HRS §196-71, there are concrete measures HSEO can initiate, in coordination with other state agencies, to accomplish the existing 2030 targets:

a. Undertake analysis with input from the Department of Taxation, the Hawai‘i Tourism Authority, and the Department of Transportation to include aviation fuel in the Environmental Response, Energy, and Food Security Tax (Hawaii’s barrel tax), and establish a carbon fee on other fossil fuels, to provide lower cost and lower carbon energy options for low- and moderate-income residents while supporting the achievement of the state’s climate and clean energy goals;

b. Develop recommendations on how to decarbonize the energy sources specifically for the island of O‘ahu and incorporate these recommendations into the state Comprehensive Climate Action Plan;

c. Coordinate with the private sector to analyze and reliably maximize the deployment of dispatchable, distributed inverter-based resources on the electricity grid in order to minimize the fuel demands of the power sector and maximize local renewable energy;

d. Explore how open energy data positions Hawai‘i to support local innovators and enable more efficient markets that attract global innovators;

e. Evaluate options for decarbonizing distributed electricity backup power assets for commercial and industrial buildings, focusing on renewable energy technologies, including hydrogen generators and fuel cells, to displace standby generators;

f. Address the energy burden for low-and moderate-income (LMI) residents, specifically asset limited income constrained and employed (ALICE) households, those residing in disadvantaged communities, and those living on Hawaiian Home Lands, by developing “Building

Energy Performance Standards" for large existing buildings (including multifamily buildings), and "Zero Energy Ready Home" energy codes for new construction single-family homes, which can reduce "code fatigue" among developers and also reduce the cost of code compliance;

g. Propose updates to water resource characterization permits to provide clarity in the process for safe geothermal and carbon sequestration resource characterization and work to identify a geothermal deployment goal for the state that collects and incorporates community concerns, particularly from the Native Hawaiian community, into the resource characterization process;

h. Support all state and local agencies to the extent possible in developing adequate training and apprenticeship programs to ensure a qualified local candidate exists for every clean energy job.

Consistent with HRS §37-43, the Department of Budget and Finance must prioritize budget requests and expenditure approvals for Capital Improvement Projects that include energy efficiency by design, on-site renewable energy, and workplace charging for electric vehicles, and shall ensure that any proposed budget for a facility adequately funds those investments in emissions reductions by the state.

Consistent with §342B Hawai'i Revised Statutes, among others, the Department of Health must update relevant regulations, policies, and procedures for electric utility generating units to facilitate compliance with Title 40 of the U.S. Code of Federal Regulations by allowing compliance technologies that reduce water use, increase plant efficiency, and enable lower carbon fuels, including methods to monitor and verify emissions reductions.

Any submissions by HSEO or other state departments to the PUC must be evaluated according to standard PUC rules and practice. Nothing in the above is intended to supersede the independence and authority of the PUC.

Development on State Lands

Pursuant to HRS §171-95, among others, all executive state departments and agencies of the State should proactively facilitate the maintenance of existing and development of new renewable energy projects on state lands through active support for leasing and permitting, provided that the development of those projects complies with existing labor laws and the terms set forth in Administrative Directive No. 24-01, respects Hawai'i's cultural heritage and adequately conserves the State's habitats and natural resources.

HRS §171-95.3 (Renewable energy producers; lease of public lands without public auction) provides a process by which the Hawai'i Board of Land and Natural Resources may lease public lands to renewable energy producers without public auctions only pursuant to the process and parameters laid out in this section. HRS §171-95.3 provides for the Hawai'i Department of Business, Economic Development, and Tourism to assist in this process. HSEO has played a role in the evaluation process in the past and can assist the process again.

Energy Equity

A fair and equitable energy transition promotes broad inclusion and participation. At HSEO this includes workforce development to ensure high-quality jobs in the energy sector, renewable energy education for keiki, and advocating for meaningful community engagement and participation in government processes.

The inclusion of energy equity in the HSEO policy framework supports the siting of renewable energy projects where they provide measurable community benefits and ensure all members of the community enjoy not only the price stabilization and environmental benefits of new projects, but also advantages like educational scholarship and community infrastructure investments.

Community Engagement

Meaningful community engagement is required to successfully implement any measures intended to achieve policy objectives.

In a statewide survey released by Ulupono Initiative in 2024, 91% of respondents supported the expansion of renewable energy resources in Hawai‘i. Nevertheless, the tradeoffs inherent in the energy transition are not well understood.

Incorporating community concerns can help avoid paralyzing litigation over issues that could be resolved through education, consensus-building, and innovative responses to community concerns.

HSEO views Hawai‘i’s diverse communities as sources of important local knowledge and equal partners in the energy transition. As energy conversations occur, families throughout Hawai‘i are struggling. Many kama‘āina are forced to leave. In our experience working with communities, they are skeptical of “check-the-box” engagement commonly associated with previous developments in Hawai‘i. Energy projects and activities, large and small, must strive to ensure that impacted communities have opportunities for meaningful input during all stages of development.

New models for community-led development are emerging. The ‘Āina Aloha Economic Futures (AAEF) framework relies on a community co-creation model to foster a strong, self-sustaining economy that “decouples economic growth from environmental degradation.”

For example, the AAEF Assessment Tool can be used to identify the alignment of any alternative fuels project with ‘āina aloha values held by AAEF. By this measure, any alternative fuel should reduce environmental impact in comparison to our continued dependence on oil, including lifecycle emissions, and encourage more renewable energy through reduced curtailment and faster renewable energy integration.

In 2022, HSEO developed the Energize Kākou framework, rooting community engagement in Native Hawaiian values and assisting developers and communities to engage with each other productively through a culturally relevant process grounded in mālama ‘āina (stewardship of the land.)

The Energize Kākou framework provides stakeholders with a brief genealogy of natural resource management in Hawai‘i, best practices for community engagement, a stakeholder roadmap, meeting and culturally relevant promotional materials.

Recent discussions with community members yield some initial takeaways that will help guide HSEO's outreach efforts in 2025 and beyond:

- Energy self-determination, or the ability to influence and exercise governance over energy-related decisions, is a priority for communities across Hawai‘i. Many consider localized energy generation critical to self-reliance and resilience.
- Many communities approach engagement in a defensive stance. Recognizing this is important to engage in meaningful community discussions.
- Energy education is seen by communities as a critical—but currently lacking—element of Hawai‘i’s renewable energy transition. Working with communities to develop and provide energy education and informational materials increases the likelihood for success.
- There are several energy-related community engagement efforts underway across the islands. They are not necessarily occurring in parallel and pose the risk of undermining one another if not managed well. HSEO has increased its efforts to partner and coordinate with other public and private entities to coordinate community engagement efforts.
- Laulima (cooperation), as a guiding principle for engagement, recognizes communities as ready, willing, and able to lead discussion and effectuate immediate change. Grassroots community organizations throughout Hawai‘i understand localized community priorities and are often the first to provide and respond in times of need. (*Ko‘olau Reslience Hub Symposium December 10, 2024)*

HSEO was awarded federal congressionally delegated funds in June 2024 to deeply engage Hawai‘i communities on priority energy issues, partnering with community-based organizations (CBOs). In August 2024, HSEO contracted Pa‘akai Communications to serve as the outreach lead for the next two years, with plans to partner with select CBOs throughout the islands, building their capacity and supporting meaningful dialogue. In coordination with the USDOE, this project will also develop and share lessons learned to help inform energy conversations in other communities around the country.

International Engagement

15th Annual Hawai‘i Okinawa Clean Energy Taskforce

At the 15th Annual Hawai‘i Okinawa Clean Energy Task Force Meeting hosted by the Okinawa Prefectural Government in November, HSEO joined the Ministry of Economy, Trade, and Industry of Japan (MITI), Okinawa Electric Power Company, Okinawa Institute of Science and Technology (OIST), and a delegation from Hawaiian Electric, Ulupono Initiative, the University of Hawai‘i at Mānoa and Hawai’i Green Growth. Okinawa Prefecture provided detailed updates on the initiative to achieve carbon neutrality for Okinawa Island’s thermal power plants and a demonstration of hydrogen fueling facilities for power plants and vehicles.

Comments by Japan’s Prime Minister Kishida during his state visit to the United States were shared by MITI in a discussion on the shared goal of accelerating the clean energy transition, proposed in a new high-level dialogue on how Japan and the US implement our respective measures through the Inflation Reduction Act (IRA) and Japan’s Green Transformation (GX) Promotion Strategy. This dialogue is intended to accelerate energy transition progress in the coming decade by promoting complementary and innovative clean energy supply chains and improving industrial competitiveness. Japan recently created a Japan Climate Transition Bond to promote energy efficiency measures, renewable energy sources such as green hydrogen and ammonia and zero-emission thermal power plant generation.

International Leadership and Education Initiatives

HSEO joined the University of Hawai‘i to present information on the state’s clean energy transition to representatives of the Hawai‘i Asia Pacific Institute (HAPI) and Korea Development Institute (KDI) in August 2024, and discussed the energy transition with undergraduate students from several universities in Japan (Kansai, Chiba, Kobe, Meiji Gakuin, Toyo) as part of a two-week study program focusing on Hawaiian culture, history, and sustainability issues on September 3-13.

Pacific Forum International Visitors Leadership Program (IVLP)

Business leaders and government officials from Papua New Guinea and Japan met with HSEO on "Accelerating Clean Energy Deployment", sharing insights on barriers on the Hawai'i Clean Energy Initiative and barriers to deployment in visits hosted by the Pacific Forum in Honolulu.

13th Annual Festival of Pacific Arts and Culture (FestPac)

HSEO hosted an interactive exhibit at the 13th Festival of Pacific Arts and Culture (FestPac) displaying the HAVEN and VR data visualization tools. Attendees from Hawai'i and abroad utilized these tools to learn about Hawai'i's energy system, discuss priority energy transition topics, and highlight similarities between the issues faced in Hawai'i and other Pacific Island nations.

Young Southeast Asian Leadership Initiative (YSEALI) Fellowship Program

With the Office of Planning and Sustainable Development, HSEO cohosted a Malaysian fellow as part of the Young Southeast Asian Leadership Initiative (YSEALI) program of the US Department of State. The YSEALI fellow engaged in a variety of activities at the intersection of energy policy, technology, and community engagement, joining HSEO staff in stakeholder meetings, site visits, university guest lectures, and virtual discussions with national organizations such as the U.S. Climate Alliance, the U.S. Environmental Protection Agency, and the U.S. Department of Energy.

South Korea – Seoul National University Law Student Interns

During the 2024 legislative session, HSEO hosted two interns from Seoul National University Law School. During their time at HSEO, the two interns assisted with legislative bill tracking and bill drafting, with guidance from HSEO subject matter experts.

Hosting international fellows and interns reflects HSEO's commitment to fostering international collaboration and leadership development in the energy and climate sectors.

HSEO Branch Reports 2024

In this section, key performance measures and milestones related to the state's energy and decarbonization goals are summarized by Branch as they relate to 7 major objectives under Act 100.

Emergency Response, Energy Security and Grid Resilience

HSEO, as the primary and coordinating agency for State Emergency Support Function 12 (SESF-12), remains the subject matter expert for energy within the State's Emergency Management framework. HSEO participates in planning, trainings, and exercises to ensure readiness for activation during emergency responses. In this capacity, the HSEO is also responsible for maintaining the SESF-12 Annex to the State's Emergency Operations Plan, as well as the State's Energy Security Plan, which was updated this year.

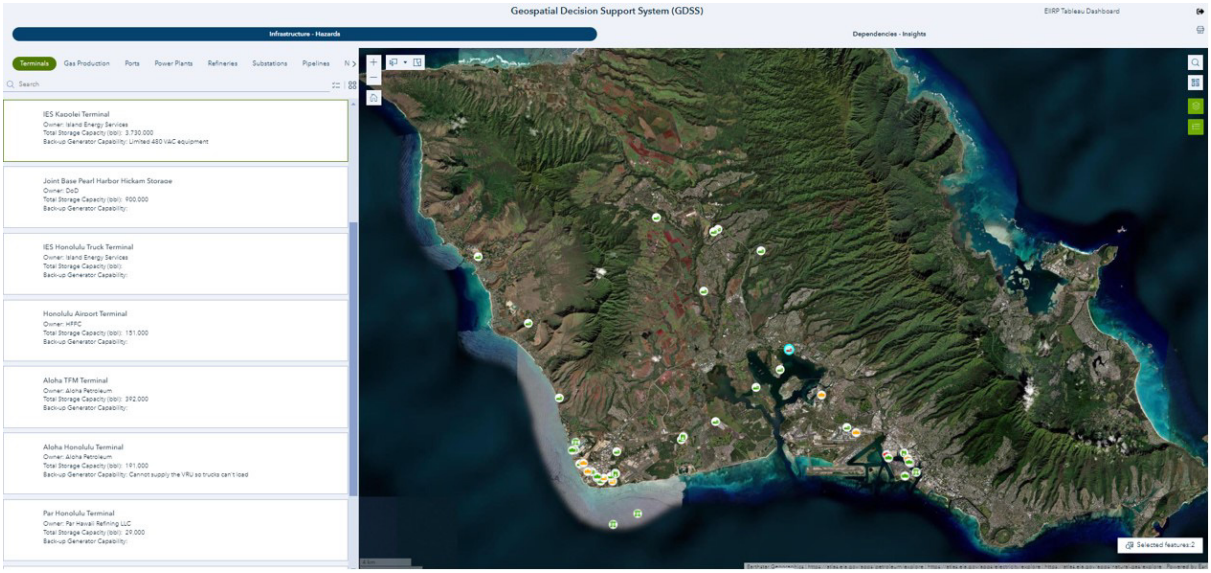
From August 8 to September 27, 2023, SESF-12 was activated in support of the State's emergency response and recovery effort to the Maui wildfires, supporting the deployment of 20 generators to support wells, pump stations and field boosters and coordinating a power line drop for a mobile morgue and power restoration for the disaster recovery center. Ongoing support from HSEO continues as a support agency for Infrastructure Recovery Support Function (RSF) activities. In the past year, SESF-12 has been activated for Tropical Storm Hone as well as partial activations for red flag conditions where Hawaiian Electric Company has considered implementing Public Safety Power Shutoffs (PSPS).

In 2024, HSEO participated in a number of exercises including the Department of Energy (USDOE) Clear Path XI exercise, the Federal Emergency Management Agency (FEMA) National Level Exercise (NLE), the Hawai‘i Emergency Management Agency (HI-EMA) Distant Tsunami Drill, and a crisis communications drill.

Aside from maintaining operational readiness, HSEO continues to build out an energy common operating picture (COP) by carrying out planning projects that help to better understand the statewide energy system and threats/hazards, vulnerabilities, and risks to that system. HSEO leverages these analyses to identify hazard mitigation and resilience measures and pursues implementation of mitigation and resilience projects by leveraging various federal funding opportunities.

Geospatial Decision Support System (GDSS)

Designed to improve energy system situational awareness, energy security and hazard mitigation planning, emergency response, and disaster impact analysis, the Geospatial Decision Support System (GDSS) is a novel GIS-based advanced visualization tool, displaying dependencies of Community Lifelines on Critical Energy Infrastructure. It serves as the foundation for a statewide energy COP, integrates Energy Industry Information Reporting Program (EIIRP) data, and allows the state to prioritize risk mitigation strategies and investments in response to natural hazards like hurricanes and volcanic eruptions, as well as energy-specific disruptions such as fuel shortages, energy market instability, and supply chain issues.



Developed by the Hawai‘i State Energy Office (HSEO) through a FEMA Hazard Mitigation Grant Program (HMGP) grant in partnership with HI-EMA, Office of Homeland Security (OHS), Statewide GIS Program, ICF, various critical energy infrastructure (CEI) owners and operators, the GDSS received awards from both the state of Hawai‘i and the National Association of Chief Information Officers (NASCIO) in 2024.

Building Critical Customer Hubs

HSEO partnered with Hawaiian Electric to secure $8.3 million in FEMA Building Resilient Infrastructure and Communities (BRIC) funding to build three Critical Customer Hubs (CCHs) for Windward Oahu. In a prolonged outage event, a CCH allows a local distribution circuit that serves multiple community lifelines to be quickly reconfigured into a microgrid and powered by mobile generation ensuring continued lifeline services to the community. HSEO and HECO are also pursuing FEMA HMGP (Maui Wildfires) funding for two CCHs in Lahaina.

Improving Grid Resilience

HSEO secured an additional $8.5 million in grid resilience funding from Infrastructure Investment and Jobs Act (IIJA) to be distributed using HSEO’s Advance Assistance (AA) evaluation framework,

assessing projects based on risk to Critical Energy Infrastructure (CEI) assets and local priorities. These funds are eligible to be used to implement mitigation measures such as vegetation management, pole hardening, undergrounding, and microgrids that benefit disadvantaged communities, protect community lifelines, and have a high likelihood of implementation.

Grid Resilience Innovation Partnerships

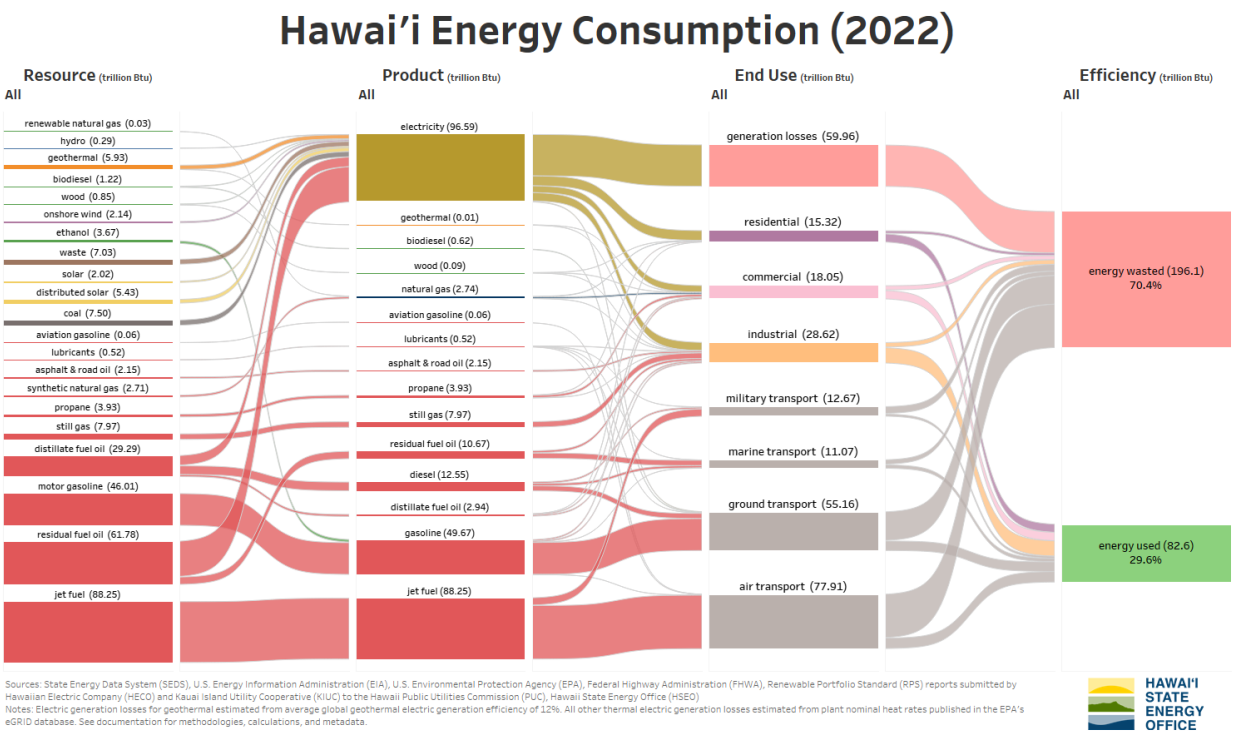
$17.9 million in federal funding was awarded to HSEO to support the Utility Solar Grid Forming Technology (USGFT) and Synchronous Condenser Conversion Technology (SCCT) demonstration projects, received in part through the Grid Resilience and Innovation Partnerships (GRIP) Grid Innovation Program. The projects extend Hawai‘i’s global leadership in grid-forming inverter-based resources. The GRIP program will provide half of the cost-share for each project, with total costs estimated at $36.3 million. KIUC is contributing the other half of the total project cost.

The USFGT project involves an innovative technology application for expanded renewables penetration and dispatch as well as increasing the reliability of island grid operation. The project adds battery storage and advanced grid-forming inverters to two existing solar power plants, creating a hybrid power supply with enhanced dispatchability and providing important ancillary services including frequency regulation, reactive power and voltage control, and operating reserves. The grid regulation service will provide significant regional and community benefit by furthering the capability of the system to accommodate 100% dispatch of renewable generation sources, enabling a more reliable and resilient island grid.

The SCCT project will convert an existing generator at the Port Allen power station to a synchronous condenser, which will provide increased system inertia and grid voltage regulation services to accommodate the stable operation of high-penetration renewable generation. This project will provide significant regional and community benefits by reducing the likelihood and consequence of disruptive events that would otherwise destabilize the system. This novel use of grid-inertia technology in a grid of Kaua‘i’s size will demonstrate a replicable solution for local, regional, and interregional grid enhancement and decarbonization, providing a reference case for duplication of the conversion technology in other jurisdictions.

A State Governance Structure for Energy Data

HSEO developed and manages a state governance framework for energy data to support measurement and evaluation of progress, explore monetization of analytics, and create common data standards and practices across Hawai‘i.



In 2024, the Resilience, Clean Transportation and Analytics Branch of HSEO:

- Aided in constructing model inputs, final data processing and visualizations for HSEO's Alternative Fuels and Repowering Analysis;
- Facilitated transition of data processing scripts from local CPU to AWS cloud and created new data pipelines in AWS;
- Completed an Energy Industry Information Reporting Program (EIIRP) refresh, updating an important dataset for situational awareness that requires petroleum importers to report volumes of product moving to and through the state;
- Conducted outreach, simplified and streamlined reporting forms in line with U.S Energy Information Administration (EIA) developed a new reporting portal with automated data validation and error check, and conducted training for reporting entities. Worked with reporting entities on catch-up submissions going back five years to establish a reliable baseline.

Energy System Modelling

In 2024, HSEO constructed models in NREL's Engage modeling software based on HECO and KIUC inputs for the Pathways to Decarbonization Report and developed data pipelines for model inputs and future iterations. Common data standards and practices across Hawai'i's energy ecosystem inform energy transition policy and facilitate public and private investment.

Energy Data Portal

HSEO hosts the Energy Data Portal which serves as a repository of energy related data to be used in analysis, planning and policy development. The data portal maintains over 80 data sets and secures new ones from government and private sector entities, working with fellows from the Data Science Institute of the University of Hawai'i to refactor and create new data pipelines. The information is openly available for any interested party to access on the HSEO website.

Energy Industry Information Reporting Program (EIIRP)

HSEO works closely with the Department of Business, Economic Development and Tourism's Research and Analysis Division (READ) to streamline the EIIRP process, which monitors and reports on various aspects of the energy industry in Hawai'i. A new webpage automates the submission and storage of industry information and performs data validation and error checking, flagging missing information to improve the accuracy and regularity of submissions.

Statewide Energy System Visualization

In 2024, the Resilience, Clean Transportation and Analytics Branch of HSEO (RCA) initialized the development of an interactive data visualization tool that depicts the statewide energy system in Hawai'i. The tool represents various data sources such as HSEO Pathways to Decarbonization Scenarios and the EIA's State Energy Data System (SEDS). The data is analyzed and packaged into an interactive Tableau data visualization that generates a snapshot of the current Hawai'i energy ecosystem and possible future scenarios.

Hawai‘i Advanced Visualization Energy Nexus (HAVEN)

HAVEN is a data visualization tool that assists planners, decision-makers, and other stakeholders to better understand the relationships, trade-offs, and impacts of policies, regulations, and other decisions made across the energy ecosystem.

Originally developed through a U.S. Department of Energy competitive grant in coordination with the University of Hawai‘i’s Laboratory for Advanced Visualization & Applications (LAVA Lab), HAVEN was designed to display utility resource planning data so users can easily visualize and compare the land use and geospatial impact of different plans. The project has evolved over the years to incorporate plans beyond the utility’s, such as the scenarios developed using the Engage energy modeling tool for HSEO’s Pathways to Decarbonization study, as well as added contextual layers for hazards facing the state, such as wildfire and sea level rise. HAVEN has been used to help facilitate community engagement and education and has proven to be a powerful educational and outreach tool that prompts conversation as users absorb the information displayed. Interest in the technology from other states, communities, and schools has driven iterations focused on user experience and portability.

In 2024, HSEO introduced a new virtual reality (VR) experience of O‘ahu power generation sites in partnership with LAVA Lab at the University of Hawai‘i at Mānoa.

The platform was updated with current decarbonization data for presentation to schools and communities (see Community Outreach) and key stakeholders including the National Association of State Energy Administrators (NASEO), the National Governors’ Association (NGA) and week-long demonstration at *“Ho'oulu Lāhui: Regenerating Oceania,”* the 13th Festival of Pacific Arts & Culture (FestPac).

Clean Transportation

The transportation sector is a major energy user in Hawai‘i. Ground transportation consumes about a third of the petroleum we import.

In June 2024, Governor Josh Green, M.D. joined youth plaintiffs in announcing the groundbreaking resolution of the *Navahine F. v. Hawai‘i Department of Transportation* constitutional climate case. The settlement of Navahine is the first settlement agreement of its kind, in which state government entities have decided to work with youth plaintiffs to implement specific plans to decarbonize the state transportation system.

Hawai‘i’s transportation sector accounts for 48.5% of total greenhouse gas (GHG) emissions in Hawai‘i and ground transportation emissions made up 38% of transportation emissions in 2019. HSEO further estimates that 85% of ground transportation emissions are from light-duty vehicles. Reducing ground transportation emissions is heavily dependent upon switching to electric vehicles and reducing the vehicle miles traveled (per vehicle and total) through the enablement of active transportation modes and expansion and improvement of the public transportation system.

State Fleet Transition to Zero-Emission Vehicles

In 2023, only 2.5% of state light-duty vehicles on the road were zero-emission vehicles and 93% were still internal combustion engine vehicles. As we make progress on decarbonization of the transportation sector, it is essential that every state department and agency commit to meeting or even exceeding legislated 2030 benchmarks. Hawai‘i statute requires all government agencies purchasing or leasing light, medium, or heavy-duty vehicles to seek vehicles that reduce dependency on petroleum-based fuels.

Since January 1, 2022, the requirement has been that new light-duty passenger cars procured for the state’s fleet must be zero-emission vehicles (ZEVs) and all new light-duty multipurpose passenger vehicles and trucks procured for the State’s fleet must be ZEVs effective no later than January 1, 2030. In addition, legislation directs that the state manage its fleets to achieve the following clean transportation goals: 100% of light-duty passenger vehicles in the state fleet are to

be ZEVs by December 31, 2030, and all light-duty vehicles in the state fleet (including multipurpose passenger vehicles and trucks) in the state fleet are to be ZEVs December 31, 2035.

Most state as well as county agencies may procure ZEVs as a service via the Hawai'i Department of Transportation (HDOT)'s contract with Sustainability Partners, which can include ZEVs, charging infrastructure, maintenance and energy on a per mile cost basis. In August 2024, HSEO launched a webpage for state fleet vehicle procurement and exemptions, providing information on the process and requirements for procuring state government vehicles, and through which agencies must submit vehicle procurement requests which are evaluated by HSEO and forwarded to the Department of Accounting and General Services for approval/ disapproval. HSEO also circulated a State Fleet Procurement Memorandum to all state agencies and departments, clearly outlining compliance obligations.

HDOT has demonstrated the viability of ZEVs having procured 135 ZEVs ranging from passenger cars, trucks, and transit vans in addition to hybrid street sweepers and interceptors with an additional 83 ZEV trucks on or. Information on HDOT's experience and Sustainability Partners can be found here. Where procurement of a ZEV would negatively impact the operations of an agency, an exemption request can be filed. Exemption requests are processed by the Hawai'i State Energy Office and a recommendation is provided to the Comptroller of the Department of Accounting and General Services (DAGS) who will grant or deny the request. The exemption form and relevant information can be found on the HSEO website and progress on the transition of the state fleet will be tracked in the HSEO Data Portal.

Converting our state fleets is a key area in which the state can make tangible, substantive reductions in emissions, leading by example.

Charging Infrastructure

As the electric vehicle market share increases (Hawai'i ranks 4th in the United States in the number of new EVs sold – 16% of the new vehicle market share are plug-in hybrid vehicles or plug-in battery electric vehicles), the need for adequate charging infrastructure increases.

In 2024, HDOT announced construction of the second electric vehicle charging station in the state funded by the National Electric Vehicle Infrastructure (NEVI) program. Work commenced on four 150-kilowatt direct current chargers on Aloha Tower Drive fronting Pier 7 on Oʻahu in August. The first NEVI-funded electric vehicle charging station opened on Feb. 28 at the Kahului Park & Ride on Maui. By August, more than 5,000 charging sessions at the Kahului station had occurred, which translates to a reduction of approximately 30,000 kilograms of carbon dioxide equivalent emitted into our atmosphere.

As a result of the Navahine settlement, the Hawaiʻi Department of Transportation plans to dedicate at least $40 million to expanding the public electric vehicle charging network by 2030 and accelerate improvements to the state's pedestrian, bicycle, and public transit networks. HSEO is supporting the Department of Transportation to achieve transformative changes to Hawaiʻi's transportation system and net-negative emissions by 2045 in keeping with the settlement. Accordingly, HSEO submitted a Supplemental Statement of Position in Docket 2021-0173, in support of HECO's application for $79 million to build out DCFC and Level 2 charging, based on statutory 2030 decarbonization goals supporting aggressive deployment and third-party market initiatives.

Volkswagen Settlement Fund

In 2018, DBEDT became the lead agency for administering Hawaiʻi's allocation from the Volkswagen (VW) Diesel Emissions Environmental Mitigation Trust. HSEO is responsible for deploying Hawaiʻi's $8.125 million allocation from the Trust. Hawaiʻi's Beneficiary Mitigation Plan includes the following eligible clean transportation programs to achieve the goals of the Trust:

- $4.15 million to projects that electrify Class 4-8 School Buses, Shuttle Buses, or Transit Buses;
- $2.75 million to projects which contribute to Hawaiʻi's Diesel Emission Reduction Act; and,
- $1.22 million to support projects that facilitate the deployment of Light Duty Zero Emission Vehicle Supply Equipment.

The state of Hawaiʻi, as a beneficiary of the trust, will use 15 percent of its total allocation on eligible costs for Light Duty Zero Emission Vehicle Supply Equipment. HSEO additionally submitted a request to allocate $1.2 million of trust funds to the purchase, installation, and maintenance of

light-duty electric vehicle charging stations, which may include a mix of Level 2 chargers and DC fast chargers.

Diesel Replacement Rebate Program

HSEO secured $4.5 million from the U.S. Environmental Protection Agency's Diesel Emissions Reduction Act (DERA) National Grants Program to increase the number of rebates available to replace aging diesel-powered equipment with electric or hydrogen alternatives. The Diesel Replacement Rebate (Program (DRR) program) Program) was developed by HSEO in collaboration with the Department of Health Clean Air Branch using Volkswagen Settlement and DERA formula funds to provide approximately $1 million dollars of rebates per year to advance Hawai'i's transition of medium- and heavy-duty vehicles to zero-emission vehicles (ZEVs).

The program has funded key projects such as Roberts of Hawaii's introduction of the nation's first zero-emission coaches in tour and charter services as well as electric school buses, forklifts, and tractors, demonstrating HSEO's commitment to improving air quality and addressing environmental justice concerns in communities facing environmental health challenges.

The new $4.5 million funding will double the rebates available over the next few years, helping Hawai'i replace aging diesel-powered equipment with electric or hydrogen alternatives.

Hawai'i Zero Emission Bus Program

HSEO continues to work with HDOT, the County of Kaua'i, the County of Maui, and the County of Hawai'i on a program to replace up to 12 MHD diesel buses with battery-electric zero-emission equivalent buses. Buses are set to be delivered in early 2025.

Working in collaboration with the partners, HSEO is leveraging VW Settlement funds with Federal Transit Administration (FTA) Low-No grant applications to replace aging diesel transit buses that are beyond their useful life with battery electric transit buses with supporting charging infrastructure. The collaboration between agencies and the counties allows for a larger program than what otherwise could have been achieved.

Travel Demand Management Study

The Hawai‘i State Energy Office and the O‘ahu Metropolitan Planning Organization (O‘ahuMPO) are collaborating on the State Government Employee Transportation Demand Management (TDM) Study, supported by Federal Planning Grant and U.S. Climate Alliance funds awarded to HSEO. This initiative aims to reduce vehicle miles traveled and greenhouse gas emissions by increasing transportation options for state government employees. The study offers a significant opportunity to influence travel behavior by providing diverse and efficient commuting options. By focusing on active and shared modes of transportation, the study also seeks to improve employee retention, support hiring efforts, and position the state as a leader in sustainable transportation practices, contributing to Hawai‘i’s climate and energy goals.

For the O‘ahu portion of the study, the team conducted surveys and analyzed data to identify key areas for improvement in transportation choices. With over 11,000 state government employees on the island, efforts to promote active and shared commuting modes can have a substantial impact on reducing congestion, improving accessibility, and supporting a more sustainable transportation system. The findings from O‘ahu will guide the development of recommendations to remove commuting barriers, enhance mobility options, and increase incentives for employees to adopt alternative modes of travel. These strategies align with the state’s commitment to achieving net-negative carbon emissions by 2045.

In its next phase, the study will be expanded to the neighboring islands, with surveys and data collection scheduled to begin in December 2024. Building on the insights gained from the O‘ahu analysis, HSEO and O‘ahuMPO aim to create a statewide strategy that supports transportation demand management for state government employees across Hawai‘i.

O‘ahu Multimodal Assessment Study

Another collaborative effort of HSEO and O‘ahuMPO, the O‘ahu Multimodal Assessment Study aims to develop innovative tools and strategies to enhance transportation planning and accessibility across the island. This two-phase study seeks to improve the evaluation and prioritization of transportation and land-use projects to align with sustainability and equity goals.

In Phase 1, the study focuses on developing a GIS-based Accessibility Tool, designed to measure access to key destinations such as jobs, schools, grocery stores, restaurants, and other essential services for all travel modes, including auto, transit, walking, and biking. It will incorporate metrics to assess accessibility, identify data gaps, and calculate project-level impacts. The outputs of the tool include an accessibility score, which will be integrated into the project selection and

evaluation process for the Oʻahu Regional Transportation Plan (ORTP) and the Transportation Improvement Program (TIP).

Phase 2 is scheduled to start in 2025 and builds upon the initial framework by conducting a multimodal needs assessment using the Accessibility Tool. This phase will identify transportation and land-use projects that improve accessibility to key points of interest while advancing sustainability goals. The study will also develop a framework for incorporating accessibility into project prioritization for the ORTP and TIP. Recommendations will include strategies to reduce Vehicle Miles Traveled (VMT), decrease GHG emissions , and promote multimodal transportation solutions. This study represents a significant step forward in aligning transportation planning with climate goals, enhancing mobility options, and creating equitable access to opportunities across Oʻahu.

Visitor Travel Study

The Hawaiʻi State Energy Office has received federal EECBG funds to conduct a study of visitor travel behavior. This study focuses on analyzing patterns across the state of Hawaiʻi to support sustainable tourism and reduce GHG emissions stemming from visitors' travel within the islands.

The study includes key activities such as data collection through surveys and cell phone data, predictive modeling to forecast travel demand, and the development of strategies to promote public transit usage among visitors. By reducing tourism-related VMT and emissions, the study will also identify opportunities for transit improvements and EV infrastructure expansion.

To date, the study has begun with the collection of data through an intercept survey conducted with visitors arriving on Oahu. The survey, which took place in July 2024, collected information on visitor demographics, transportation choices, and travel behaviors.

This survey is the first step in gathering the necessary data to inform the broader study. While the full study is still underway, this initial data collection provides valuable insights into tourist travel patterns and serves as the foundation for the next phases of the project. Moving forward, the study will continue to collect data analyze the collected data, develop predictive models for future travel demand, and identify strategies to increase less energy intensive alternative modes of transportation among tourists. The results of the study will support decision-making for transportation planning and sustainability efforts throughout the state, with the goal of reducing GHG emissions and improving the overall tourist experience in Hawai'i.

Oʻahu Mobility Hub Study

The Oʻahu Mobility Hub Study, funded by the state climate commission and OʻahuMPO, looks at existing state-owned parking lots and their suitability for future mobility hubs that could successfully support state and local plans and goals.

An inventory of parking began in early July 2023 and ran through April 2024. Site surveying was conducted via in-person site visits, direct contact with the managing government entity, and Google Earth satellite imagery. Over the eight months, roughly 300 parking lots and 31,000 individual parking spaces were inventoried.

Additionally, the following information was collected during the site survey, if applicable: site location, type (e.g., school, park, employee lot, etc.), managing department/agency, total designated spaces, total handicap spaces, total EV charging spaces, total carpool spaces, total bike spaces, and survey date. Handicap accessible parking spaces were intended to be tracked but many lots are currently missing this information. Bike rack infrastructure was a particular gap in the initial parking inventory study.

Most of the state-owned lots surveyed lacked any sort of EV charging accommodation. A GIS map layer will soon be added to the State GIS website for all departments to access. The origin of the State parking database began with the Modernizing Parking Policies to Achieve State Goals for Emissions Reduction final report conducted by the University of Hawaiʻi for the Department of Land and Natural Resources Office of Conservation and Coastal Lands in 2019. This work produced a large, but incomplete dataset of state-owned parking locations. It was continued by HSEO and the Hawaiʻi Climate Change Mitigation and Adaptation Commission in partnership with Alta, as a complement to the Oʻahu Mobility Hub Study.

The mobility hub analysis demonstrated that there are many suitable places (parking lots) to create mobility hubs across Oʻahu. A list of potential mobility hub locations was identified through the analysis representing the overall highest-scoring sites with potential for small, medium, and large mobility hub typologies. High-scoring sites were owned by various state agencies including the Department of Accounting and General Services (DAGS), Department of Education (DOE), Hawaiʻi State Public Library System (HSPLS), University of Hawaiʻi (UH), Department of Land and Natural Resources (DLNR), Office of Hawaiian Affairs (OHA), Department of Public Safety (DPS), and Hawaiʻi Public Housing Authority (HPHA), among others.

Energy Efficiency

Improving the effective use of energy resources through improved codes and efficiency standards is one of the most effective measures the state can undertake to realize its 2045 objectives. Reducing energy waste allows the renewable energy that is brought online to serve a higher proportion of the state's energy needs.

Hawai'i is keeping pace with its goal of reducing electricity demand by 4,300 gigawatt-hours by 2030 through efficiency and conservation measures with significant savings from lighting, cooling, water heating, and other measures. HSEO collaborates with and provides information and technical reviews to government agencies, professional associations, and educational institutions to reduce energy use and to participate in performance contracting or other methods to finance energy improvements and yield cost savings to agencies, businesses and residents.

Home Electrification and Appliance and Home Efficiency Rebate Programs

HSEO was among the first states to complete its application for the Home Electrification and Appliance Rebate (HEAR) program, securing $68 million in federal funding to design, develop, and implement home energy efficiency and electrification upgrades for low- and moderate-income households in Hawai'i earning less than 150% of the Area Median Income (AMI). At least 40% of the rebates will be provided to households with incomes below 80% AMI.

The rebates provide low- and moderate-income households with the opportunity to install highly efficient appliances and whole home retrofits. A Request for Proposals for Home Energy Rebate Programs Design and Implementation Provider was issued in June as the U.S. Department of Energy (DOE) and the Pacific Northwest National Laboratory developed the software integration tools required for states to implement the program.

HSEO is now working with a program implementor on plans encompassing community benefits, education and outreach, consumer protection, and data privacy and risk assessment — all required by the DOE before rebates can be issued. HEAR rebates are expected to be available early in 2025 and the HOMES Rebate program for whole home retrofits is expected to launch mid-year 2025.

Developing a Commercial Buildings Energy Performance Standard

As part of the Biden-Harris Administration's Investing in America agenda, the U.S. Department of Energy (DOE) announced Hawai'i will receive $18.2 million as one of 19 state and local governments to receive more than $240 million from a competitive grant program to adopt and implement the latest energy efficient or innovative building codes.

In Hawai‘i, the funding will support the development and implementation of a Building Performance Standard (BPS) to improve the energy performance of the state’s largest commercial buildings (50,000 square feet and above) which currently account for approximately 80% of the state’s commercial energy usage and about 78% of total commercial building emissions.

The expected outcomes of the Hawai‘i BPS policy are an overall reduction in energy use and emissions from commercial buildings and lower operational energy costs for building owners and renters, with a commensurate increase in demand for good jobs in the skilled trades and design industry. While primarily tailored to increase energy efficiency in the commercial building sector, large high-rise multifamily buildings (100,000 square feet and above) will be eligible to be included in the later phases of the program.

A significant portion of the funding will be used to implement state and county capacity building and multi-year investments in skilled trades, workforce development, and education. Qualifying building types include hotels and resorts, food services, mercantile (strip malls), offices, education (schools), healthcare (outpatient), and warehouse and storage facilities.

The implementation of the BPS is expected to create a demand for this clean energy workforce. In line with the Biden Administration’s Justice40 initiative, 40% of the grant funds will be allocated for a technical assistance program in low- and moderate-income communities and for the implementation of new trades apprenticeship and education programs.

HSEO developed the proposal in partnership with the City of County of Honolulu’s Office of Climate Change, Sustainability and Resiliency, Kaua‘i County’s Office of Economic Development, Maui County’s Office of Economic Development, Hawai‘i County’s Office of Sustainability, Climate, Equity, and Resilience, the University of Hawai‘i at Mānoa’s School of Architecture and the Sea Grant College Program, as well as private sector consultants from both Hawai‘i and other states

Energy Efficiency for State Agencies

Act 239 (SLH 2022) requires state facilities to implement cost-effective energy efficiency measures. It also requires the design of all new state building construction to maximize energy and water

efficiency, maximize energy generation potential, and use building materials that reduce the carbon footprint of the project. These actions propel state government to lead by example, in reducing energy costs. See Energy Data Portal - Hawai‘i State Energy Office for state agency electricity consumption and expenditure.

In 2024, state buildings consumed a total of 670,465,547 kWh of energy. This reflects a 25,934,754 kWh reduction in energy use from the 2005 baseline. Continuing efforts by HSEO and state agencies to manage energy use have resulted in a long-term reduction in electricity consumption.

In addition to in-house expertise, HSEO contracts with technical and contracting experts and the USDOE's national labs to provide in-depth review, analysis, and efficiency recommendations, requesting federal support for projects to increase these efforts. HSEO is currently in the process of procuring consultants to provide technical assistance to state agencies in energy benchmarking to formulate specific energy savings strategies for selected state facilities. Energy benchmarking will provide high-level energy audits, technical assistance, third-party review and analysis to individual state agencies regarding the facilities in which state agencies operate.

A benchmarking projects contractor will perform comprehensive assessments of the potential for energy and utility cost savings for small and medium state agencies. With larger state agencies focused on Energy Service Performance Contract methods, the contractor will evaluate other options to identify energy and water savings opportunities suitable for small and medium agencies that do not have the capacity to leverage energy performance contracts.

Codes and Standards

The first step in energy efficiency in new construction is design that meets current energy codes and standards. It takes many years for energy-efficient building technologies, processes, and materials to progress through the steps of design, development, testing, evaluation, acceptance, and compliance, before reaching proven levels of cost-effectiveness to be included in the International Energy Conservation Code (IECC). As certain provisions of the IECC become outdated, they are updated in draft form and reviewed by panels of professions until a consensus is reached.

Every three years, the revisions are incorporated into an updated IECC. Once a new code is published by the IECC, the State of Hawai‘i's Building Code Council reviews the new code and discusses what changes, if any, should be made to the code before it is adopted as Hawai'i's unique energy code. As an ex officio voting member and chair of the State Building Code Council (SBCC), HSEO was instrumental in the Council's adoption of the 2018 IECC with Hawai‘i-specific amendments, assisting counties in the development of their codes and developing the proposed Hawai'i amendments to the IECC.

The Governor's emergency proclamations on affordable housing have suspended SBCC activities until further notice. The counties, however, may proceed with code amendment and adoption. HSEO has applied for federal funding for code improvements that will be employed in partnership with counties and code professionals to expedite promulgation, adoption and training on improved energy codes. The Hawai'i State Building Codes currently include the 2021 IECC as the state energy code without amendments by default. Currently, all four counties are following the 2018 IECC.

Energy Efficiency Portfolio Standards

Energy efficiency is extremely cost-effective and resource-efficient; it often costs less to avoid using a kilowatt-hour (kWh) than it does to generate or purchase a kWh. In formal energy efficiency programs, each dollar spent on efficiency generally saves ten times that amount on energy bills. Energy efficiency is also important as a means of reducing the amount of land and resources necessary to supply Hawai‘i’s energy needs.

Hawai‘i’s Energy Efficiency Portfolio Standard (EEPS), contained in HRS Section 269-96, requires the reduction of electricity consumption in Hawai‘i by 4,300 gigawatt-hours by 2030. To fund the energy efficiency program, a Public Benefits Fee (PBF) surcharge is collected via utility customers’ electricity bills.

HSEO is involved in ongoing discussions to establish an energy efficiency goal beyond 2030 to 2045, in line with Hawai‘i’s 100% renewable and clean energy economy decarbonization objectives. In an ongoing effort, HSEO participates in the Public Utilities Commission’s Public Benefits Fee Energy Efficiency Technical Assistance Group and Energy Efficiency Performance Standards Technical Working Group, as well in the NASEO-NARUC and Hawai‘i Grid Interactive Efficient Buildings Working Groups, and meets regularly with the Hawai‘i Green Infrastructure Authority and the Public Benefits Fee Administrator to collaborate and coordinate on statewide policies, programs, projects, opportunities, technological updates, and information. HSEO recently presented its progress to these groups on the IRA Section 50121 Home Efficiency Rebates ($68 million in federal grant funds) and Section 50131 Latest and Zero Building Energy Code Adoption ($18 million and $7 million in federal grant funds.)

In 2024, HSEO recruited a federally funded energy efficiency specialist and will continue to apply for, implement, and coordinate state activities that support market transformation with funding from federal energy programs such as the Infrastructure Investment and Jobs Act of 2021, the Energy Efficiency Conservation Block Grant, the 2022 Inflation Reduction Act Sections 50121 Home Efficiency Rebates, 50122 Home Electrification & Appliance Rebates, 50131 Latest and Zero Building Energy Code Adoption, as well as other opportunities as they arise.

Hawai‘i Green Business Program

HSEO coordinates the Hawai‘i Green Business Program (HGBP), which provides technical assistance to businesses and organizations to implement energy and resource-efficient practices and recognizes and promotes the success and value of the practices during an annual statewide award ceremony and green business forums.

In 2024, the Hawai’i Green Business Program recognized its largest annual cohort and expanded to include more small businesses in rural areas across the state. The program also recognized, in a formal, live-streamed awards ceremony at the Governor’s office, a total of 40 businesses, venues, and events for undertaking efficiency and sustainable business practices that will help improve their bottom line while advancing Hawai‘i’s clean energy and sustainability goals. This year, three Hele Imua Interns from the Department of Labor and Industrial Relations were employed at HSEO to work on expanding and enhancing the HGBP and other programs and projects. Their efforts and experience gained, have resulted in positive outcomes and mutually beneficial results.

The program is a 20+ year partnership between the Hawai‘i State Energy Office, the Department of Health, the Board of Water Supply, and hospitality-related associations in Hawai‘i. Continued expansion of the program to include small businesses and organizations in rural areas has been thriving with the participation of the Clean Energy Wayfinders and Hele Imua Interns. Over 150 businesses, organizations, and events have participated in and have been recognized under this program. Business sectors across the state are welcome to participate. This year, the 7th National Green Business Engagement Network Summit was hosted in Hawai‘i.

Photo courtesy of the Governor’s Office. Accepting: Hilton Grand Vacations Club

Renewable Energy

HSEO provides technical, resource availability, permitting, and policy information and support to enable decision-makers, communities, landowners, project developers, and others to identify, as early as possible in the visioning process, both renewable energy resource potential and development restrictions or challenges. In the face of changing energy needs, maturing technologies, environmental requirements, and a diverse assortment of incentives, HSEO provides Hawaii-specific information and online tools. **A full overview of the current status of renewables is considered previously in this report.**

Proposed Energy Projects

Throughout the state, counties and utilities are preparing for the retirement of various fossil fuel-consuming generation facilities. It is important to be aware of how utilities plan to fill these anticipated gaps in production to help ease public concerns. The Proposed Energy Projects webpage serves to inform the public about upcoming projects. This webpage consolidates information regarding proposed and in-development projects across the Hawaiian Islands. The projects listed may have an existing power purchase agreement (PPA) or may still be in the process of negotiating their PPA contract.

Master Schedule

The purpose of the Master Schedule is to track the progress of proposed projects as they move toward achieving commercial operations. This Microsoft Excel table captures information on project task updates, delay notes, and updates on the commercial operations date. This allows the viewer to see both the challenges projects are facing and their successes along the way.

Energy Projects Directory and EnerGIS

HSEO's Hawai'i Statewide Energy Projects Directory provides current information on many of the notable energy projects statewide in several stages of development and operation. It includes projects that will or could contribute to Hawaii's transition away from fossil fuels, as well as those projects utilizing fossil fuels and providing critical electrical energy to the state currently.

Information about energy projects in service, in development, and proposed are scattered across media sources and websites of Hawaiian Electric, KIUC, and the Public Utilities Commission. The purpose of the energy projects directory is to consolidate all this information in one location. Also, incorporating GIS allows those interested in Hawai'i's energy ecosystem to see how projects are distributed.

The purpose of the Renewable EnerGIS tool is to help inform the site selection process. Whether searching for a home parcel using the tax map key (TMK) or filtering various resources and considerations to create a comprehensive list of potential sites for renewable energy projects, Renewable EnerGIS can help. The tool consists of various layers incorporating data managed by state or national-level organizations. Layers can be selected individually or toggled to create "technology-specific" layers, where those most relevant to the decision-making process for a specific technology are grouped together.

Workforce Development

Good Jobs Hawai‘i

Launched in January 2023, Good Jobs Hawai‘i (GJHI) is a $35 million cross-sector public-private workforce development initiative led by Hawai‘i leaders that aims to provide skills training and job placement assistance for high-demand, well-paying positions in four of Hawai‘i’s growing industries: healthcare, information technology, clean energy and skilled trades, and creative media.

GJHI operates as a coalition led by the University of Hawai‘i Community Colleges comprising of educators, businesses, and community partners collectively dedicated to preparing Hawai‘i’s residents here and abroad for high-quality careers in Hawai‘i. GJHI works by convening industry, employers seeking workers, educators, and workforce training providers in dedicated sector partnerships where priorities are identified, and employers directly inform training and education providers of their specific workforce needs.

Over the past year, 628 skilled trades workers have participated in the program and 404 have completed it, exceeding project goals by 157% and 118% respectively. To date, 205 participants have accepted job placements at an average wage of $36 per hour.

Resilient Hawaii: Good Jobs Challenge			
	Goal	Current	Percentage of Goal
Project Total: Participants	400	628	157%
Project Total: Completers	341	404	118%
Project Total: Job Placement	255	205	80%
Average Wage: $36 per hour			

** Most participants come from the skilled trades sector which includes welders, heavy equipment operators, commercial drivers, and other industries that support utilities and the energy sector.*

HSEO supported UHCC’s Resilient Hawai‘i's Good Jobs Challenge award of $16.4 million over three years from the U.S. Economic Development Administration and leads the clean energy and skilled trades sector under GJHI, which includes convening stakeholders through the Clean Energy Sector Partnership.

Clean Energy Sector Partnership

HSEO partnered with the Chamber of Commerce and UHCC to launch the Clean Energy Sector Partnership (CESP) in October 2023 to facilitate the development of workforce education and training programs, pre-job experience, and job placement. The CESP meets quarterly and is a growing partnership of over 120 energy and skilled trades employers and organizations, facilitating recruitment and on-the-job training, and connecting Hawai‘i educators with the energy industry to learn about careers in the field. The CESP has resulted in connections between employers / unions and workforce training providers and the establishment of three priority focus areas: Career Awareness, Student Preparation and Pre-Apprenticeships, and Apprenticeships and Training. HSEO and its partners plan to continue the CESP beyond the GJHI funding period so long as it provides value to Hawai'i's energy sector.

Teacher Externships

On October 7-8, 2024, HSEO hosted a two-day CESP Educator Externship and introduced Hawai‘i’s Department of Education educators to clean energy career pathways through site visits, presentations, and hands-on experiences. On Day 1, participants attended an overview of clean energy sectors and roles at HSEO, followed by a networking lunch and a company presentation by Hawai‘i Energy. On Day 2, the group toured AES Hawaii's Nā Pua Makani wind farm, learning about jobs in AES’s commercial solar and wind sectors. Both days emphasized networking with industry partners, technical skill-building as well as incorporating clean energy concepts into education and career pathways. In partnership with the Chamber of Commerce and other employers, HSEO intends to conduct additional Teacher Externships with the next one scheduled for March 2025.

On October 23, 2024, HSEO hosted James Campbell High School educators from the Energy, Natural Resources, and Business (ENRB) Academy in an externship to identify opportunities for the incorporation of energy topics into broader Academy curricula. This externship was aligned with the ENRB Academy Theme, the Three Pillars of Sustainability, highlighting the role of energy in addressing and uplifting the Environment, the Economy, and Equity.

Training for Residential Energy Contractors

HSEO is poised to implement the Training for Residential Energy Contractors (TREC) program designed to build and strengthen Hawai‘i’s energy efficiency contractor sector industry-standard training, certification, and job placement. HSEO has been allocated $1,194,820 from the U.S. Department of Energy (USDOE) funding for the TREC program with the goal to train and certify at least 200 trainees to help successfully deploy the state’s $68.4 million Home Energy Rebates Program. HSEO is partnering with nationally recognized training organizations and local community and workforce development organizations to implement its TREC program. To address Hawai‘i’s

workforce challenges and economic disparities, HSEO and its partners seek to distribute at least 40% of TREC's benefits (trainings, certifications) to communities in need. As of December 1, 2024, HSEO is still awaiting the award of its TREC funding from USDOE.

HSEO will apply to expand its TREC program with focus on small businesses through a separate applications due to USODE on January 15, 2024. This grant, if awarded, would build upon the original TREC trainings by focusing trainings on Hawai'i's smaller contractor firms, whereas the original TREC program is available to both large and small businesses.

Energy Auditor Training

Energy audits are the foundation of informed energy decisions and savings. HSEO has been selected by USDOE's Office of State and Community Energy Programs (SCEP) as a recipient of the Energy Auditor Training (EAT) Grant Program. This funding will provide HSEO with up to $900,000 to support the training of commercial building energy auditors, marking a significant step in expanding and diversifying Hawai'i's energy auditor workforce. HSEO's proposed Hawai'i Energy Auditor Training (HEAT) program seeks to train and certify ninety (90) commercial energy auditor trainees, as well as employ a significant percentage of these trainees, throughout the State of Hawai'i. HEAT's objective is to expand Hawai'i's energy auditor market.

With this grant, HSEO will collaborate with industry partners to offer standardized education and training opportunities, focusing on workforce inclusion initiatives to help build a qualified and credentialed talent pipeline in energy auditing. The program aims to meet the rising demand for skilled energy auditors in Hawai'i, equipping them to support energy efficiency and sustainability efforts in commercial buildings across the state.

Community Outreach

Clean Energy Wayfinders

In 2024, HSEO completed the second year of the nationally recognized Clean Energy Wayfinders program in partnership with Kupu Hawai'i, sharing information and opportunities for participation in the clean energy transition. Wayfinders, as young energy ambassadors, engage Hawai'i's schools, community organizations, and households, especially those in low- to moderate-income (LMI), asset-limited, income-constrained, employed (ALICE), and under-resourced communities — to help increase energy conservation and efficiencies, lower monthly energy utility bills, increase access to clean transportation and renewable energy resources, promote green career training and employment opportunities, raise awareness of renewable energy policymaking and the regulatory process., and build community capacity for engaging in energy planning and decision-making.

From September 2023 to July 2024 the Clean Energy Wayfinders led or participated in over 70 events and engaged over 2,300 community members and business operators, recruiting 28 Hawai'i Green Business Program awardees. The program was cited in 17 federal grant programs.

HSEO has been awarded six (6) new Wayfinders from Kupu for the third program year to serve from January 2025 to January 2026. Cohort 3 will play key roles in supporting HSEO's outreach and engagement capacity for the following HSEO priorities:

1. Education and distribution of Home Energy Rebates program and other cost-savings programs related to energy efficiency (e.g., rebates) and renewable energy (e.g., tax credits)
2. Recruitment and evaluation for new Hawai'i Green Business Program candidates
3. Equitable outreach for and distribution of federal funds from HSEO or other agencies (i.e., Solar for All), including building community expertise and capacity to apply directly for federal funding
4. Leverage their community relationships to develop accessible informational materials and processes for community applications to federally funded programs, shared solar (CBRE) projects, and Solarize initiatives
5. Support the Clean Energy Sector Partnership and energy career training and employment opportunities
6. Expand the use of HAVEN and data visualization tools for outreach at Hawai'i schools and community events
7. Expand public knowledge of Hawai'i's energy system and its challenges

The Wayfinders will receive introductory-intensive and continued training from industry and community experts in topics including clean energy, community engagement and collaboration, Hawai'i culture and history, and equity topics to succeed in their positions and prepare for their future careers. The Wayfinders program serves as both an outreach and workforce development program for Hawai'i's rising professionals interested in a career in energy and conservation.

Wayfinders Expansion (Community Capacity Building)

In June 2024, HSEO was awarded federal congressionally delegated funds through the U.S. Department of Energy to expand the Wayfinders program, engage Hawai'i communities on priority energy issues, and build community capacity by partnering with community-based organizations (CBOs). In August 2024, HSEO contracted Pa'akai Communications to serve as the outreach lead for the next two years, with plans to partner with select CBOs throughout the islands. This funding supports not only rigorous engagement between HSEO and communities, but also serves as a capacity-building mechanism for local CBOs. In coordination with USDOE, this project will also develop and share lessons learned to help inform energy conversations in other communities around the country.

HSEO believes this initiative is key to engaging Hawai'i's communities on energy topics that are important to them and the state, including thorough discussions of each island's viable options to reach 100% renewable energy generation. This project will also provide a genesis for communities to inform state planning, utilities, and decision-makers on energy topics they feel should be prioritized for their community. By engaging community members on issues important to them,

HSEO and its CBO partners can expand that discussion to consider broader statewide energy transition priorities.

Education

HSEO serves on the Hawai‘i Department of Education’s Career and Technical Education Energy Pathway Advisory Council, providing guidance on the development and implementation of newly developed energy curriculum. HSEO provides support to students and educators through curriculum development and lesson planning, in-class engagement, educator externships, and connections to additional support and workforce training opportunities with other government agencies and energy industry employers.

HSEO supported the launch of the Energy Pathway pilot in the 2022-2023 school year with James Campbell High School, Kapolei High School, and Kealakehe High School, and continues supporting its implementation in the 2024-2025 school year. Wai‘anae High School also participates in the pilot project team, along with several schools building capacity for Hawai‘i‘s developing energy curriculum.

HAVEN is a valuable resource in these discussions, demonstrating its visualization capabilities and potential as a classroom and community engagement tool. As stated earlier in this Report, HSEO is now in the process of purchasing up to six complete HAVEN setups and one new virtual reality headset to be used by select Hawai‘i Department of Education K-12 schools, starting with those utilizing the Energy Pathway curriculum.

Community Energy Resilience Action Plan (CERAP) – Moloka‘i

HSEO serves as a Resource Advisor to the Moloka‘i Clean Energy Hui (MCEH) to support the continued development and implementation of the Moloka‘i Community Energy Resilience Action Plan (CERAP). HSEO support includes development a bill impact tool for economic analysis, continued development of the Moloka‘i HAVEN tool, alignment with statewide energy transition planning, and dedicated capacity from the Moloka‘i Wayfinder. HSEO has participated in numerous MCEH planning sessions and will continue its active involvement. While Moloka‘i is unique, CERAP and MCEH’s work serves as an example of what’s possible statewide as far as community-lead planning in the energy sector.

UH Sea Grant Energy Transition Engagement

Funded entirely through UH Sea Grant, HSEO is partnering with UH Sea Grant on an initiative that seeks to partner with CBOs to help lead coastal community resilience discussions and support the professional development of HSEO’s Clean Energy Wayfinders. UH Sea Grant is executing contracts with CBOs on O‘ahu and Moloka‘i and looking for additional CBO partners on other islands, to build community capacity, lead climate impact discussions impacting their communities and Hawai‘i, and help support resident education and resource opportunities. This project complements and is being executed alongside HSEO’s Wayfinders Expansion work, which leverages the reach of both projects and expands the network of CBO partners.

As part of this project, UH Sea Grant supports the professional development of HSEO's Clean Energy Wayfinders by providing them training on community engagement through multiple workshops and team building sessions.

Sponsorships

In 2024, HSEO provided $60,000 to seven competitively selected programs, events and exhibits to expand public awareness and engage a wider audience on the state energy agenda. Included were sponsorships of Hawai'i Green Growth's UN Local 2030 Islands Network Clean Energy Transformation Working Groups and 2024 Conference; five KHON2 Living 808 segments on clean energy; a Kupu Youth Corps Environmental Fair and Summer Trainings, a Hawai'i Keiki Museum hydrogen exhibit, the Pacific International Center for High Technology Research (PICHTR) Partnerships in Climate / Dual-Use Technology (PaCT) 2024 Conference; and a Blue Planet educator professional development and webinar series on clean energy.

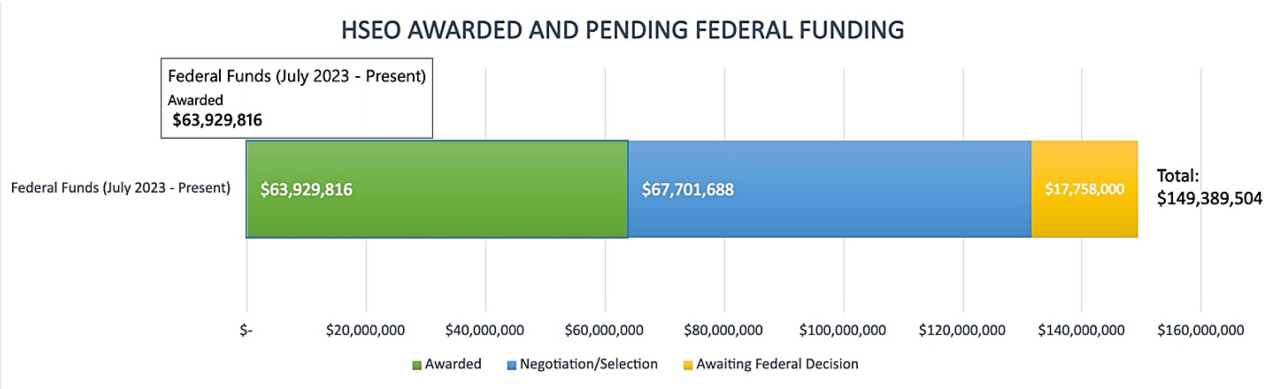
Energy Equity Coordinator

HSEO Hired an Energy Equity Coordinator in April 2024 focused on ingraining equity in HSEO programs and identifying ways to meaningfully address energy inequities in Hawai'i and lead efforts to include community benefits plans in federal grant projects. HSEO's Energy Equity Framework and Implementation Plan will be built on five pillars: affordability, siting, participation, a healthy climate, and resilience and reliability with aloha 'āina as a guiding principle.

The emerging Energy Equity Framework sees communities as equal partners, values local knowledge, builds community capacity, welcomes participation and leadership, and is responsive and transparent. HSEO's Energy Equity Coordinator will track all equity metrics related to ongoing programs and introduce new metrics as a fundamental program component as new projects come on stream.

HSEO continues to play a central role in guiding and developing Hawai'i's Energy Equity Hui, facilitated by the Hawai'i Alliance for Community Based Economic Development (HACBED.) Members of the Jobs and Outreach team participate in steering committee, resource procurement Pilina building and member education working groups. HSEO also participates in the Climate Justice Hui led by the Climate Commission Mitigation and Adaptation Committee.

Federal Funds Secured



$	315,512	USDOE	IRA SECTION 50121 – HOME ENERGY EFFICIENCY REBATE PROGRAM (HOMES)
$	1,639,120	USDOE	Energy Efficiency and Conservation Block Grant (EECBG) IIJA - FY22
$	1,000,000	USDOE SCEP	Hawai‘i Clean Energy Wayfinders Program
$	458,560	USDOE SCEP	SEP (Program Funding)
$	4,500,000	EPA	2022-2023 Diesel Emissions Reduction Act (DERA) National Grants
$	450,000	FEMA/HIEMA	BRIC - Advance Assistance 2.0 - Kauai, Maui, and Hawaii Counties Energy System Resiliency Assessment
$	2,547,724	U.S. DOE/GDO	BIL – Preventing outages and enhancing the resilience of the electric grid formula grants to states and Indian tribes (fy24)
$	1,675,000	U.S. DOE/GDO/OCED	GRIP - Enabling High Penetration of Renewables with Synchronous Condenser Conversion Technology (KIUC)
$	16,250,000	U.S. DOE/GDO/OCED	GRIP - Utility Solar Grid Forming Technology (KIUC)
$	1,000,000	U.S. DOE/Joint Office	Ride and Drive Electric
$	**63,929,816**		**Awarded**
$	8,329,318	FEMA/HIEMA	BRIC - Critical Customer Hubs

$	1,194,820	U.S. DOE	State-Based Home Energy Efficiency Training for Residential Energy Contractors (TREC)
$	499,446	U.S. DOE	Energy Future Grants (EFG) Creating a Community-Led Energy Future
$	18,169,099	DOE	(Round 1) Assistance for Latest and Zero Building Energy Code Adoption (BPS)
$	376,907	U.S. DOE	Resilient and Efficient Codes Implementation (RECI)
$	33,909,441	DOE	Home Efficiency Rebates Allocation (50121)
$	900,000	DOE	Energy Auditor Training - Commercial
$	4,322,657	DOE	Assistance for Latest and Zero Building Energy Code Adoption (Sec. 50131) (FORMULA)
$	**67,701,688**		**Selected/In Negotiation**
$	3,500,000	DOE	Pacific Resilient Energy Security Transition Accelerator (PRESTA) - FY25 Earmark
$	1,980,000	DOE	WASTE: Waste Analysis and Strategies for Transportation End-uses - Hawai‘i Waste-To-Renewable Natural Gas Project (WTR)
$	5,078,000	FEMA/HIEMA	HMGP - CCH
$	1,000,000	FEMA/HIEMA	HMGP - DER Insights
$	1,000,000	FEMA/HIEMA	HMGP - Climate and Wildfire Risk Assessment
$	5,000,000	FEMA/HIEMA	HMGP - SP7
$	200,000	DOE	GTO GRID (Planning and Simulating Geothermal Energy in Hawai‘i’s Decarbonized Future)
$	**17,758,000**		**Applications Submitted**
$	**149,389,504**		**Total**

Administratively Established Accounts or Funds
As of June 30, 2024

APPROPRIATION ACCOUNT/TITLE	MOF	REVENUE	EXPENDITURES	ENCUMBRANCES	ENDING BALANCE	
S-17-216						
STATE ENERGY PROGRAM-ARRA REPURPOSE	N	1,948,580	1,397,730	88,767	550,850	✓
S-17-518						
EECBG - ARRA REPURPOSE	P	2,840,225	930,692	80,569	1,932,132	✓
S-18-255						
STATE ENERGY PROGRAM	N	1,154,287	1,154,287	1,698	-	✓
S-22-235						
CC ENERGY CODE TRAINING PROGRAM	P	22,600	-	-	-	TRANSFER OUT
S-22-502						
FEMA ADVANCE ASSISTANCE	P	-	-	-	-	✓
S-23-226						
SEP BIL - Hawai'i	N	270,455	269,758	95,160	698	✓
S-23-503						
POWERING PAST COAL TASK FORCE	V	-	120,912	251,673	179,088	✓
S-23-551						
HAWAII GOOD JOBS CHALLENGE	P	45,076	68,338	-	(23,261)	✓
S-24-276						
STATE ENERGY RESILIENCE PROJECT		-	-	820,763	6,000,000	TRANSFER IN
S-24-295						
HIGH-EFFICIENCY ELECTRIC HOME REBATE PRO		64,144	-	-	64,144	✓
S-24-296						
HOME ENERGY EFFICIENCY REBATE PROGRAM		-	63,780	-	(63,780)	
S-24-557						
40104D FORMULA BIL		47,140	47,140	-	(1)	✓
S-24-563						
BIL- EECBG PROGRAM - HAWAII		3,066	-	78	3,066	✓
S-24-567						
HAWAII CLEAN ENERGY WAYFINDERS PROGRAM		-	-	-	-	✓
T-20-910/T-21-910/T-22-910/T-23-910						
VW DIESEL EMISSIONS ENVIRONMENTAL MITIGATION TRUST-NON-ADMIN EXP	T	7,260,992	844,589	-	6,416,402	✓
T-23-922						
US CLIMATE ALLIANCE GRANT PGM-VMT	T	310,520	145,627	1,588	164,893	✓

MOF = Means of Financing
N = Federal Funds
P = Other Federal Funds
T = Trust Funds

Pursuant to Section 37-52.5, HRS

Energy Security Special Fund

Expenditures from the Energy Security Special Fund

ENERGY SECURITY SPECIAL FUND

	Actual FY2024	Projected FY2025
BEGINNING FUND BALANCE	**3,223,320**	**3,820,943**
REVENUES		
Environmental Response, Energy and Food Security Tax	1,173,846	1,040,000
Investment Pool Interest	115,492	10,000
Solar Water Heater Variance Fees	16,493	10,000
Other		-
TOTAL REVENUES	**1,305,830**	**1,060,000**
EXPENDITURES		
Hawaii State Energy Office Operations:		
Administrative cost	17,473	-
Special Fund Assessments	38,366	65,000
Programs	652,369	37,344
TOTAL EXPENDITURES	**708,208**	**102,344**
TRANSFERS		
State Energy Office Decarbonization (Act 238, SLH 2022)	-	-
NET TRANSFERS	**-**	**-**
ENERGY SECURITY SPECIAL FUND BALANCE	**3,820,943**	**4,778,599**

Pursuant to Section 201-12.8, HRS

Hawaii Clean Energy Initiative Program
Fiscal Year 2025 Spending Plan

ANNUAL SPENDING PLAN

	State Funds	Other Funds	Total
Hawaii State Energy Office Operations	2,567,296	1,994,274	4,561,570
Programs and Projects	795,000	12,947,061	13,742,061
	3,362,296	14,941,335	18,303,631

Spending plan is based on anticipated spending levels for FY25

FUNDING SOURCES:

State Funds			
General Funds	2,567,296		2,567,296
Energy Security Special Fund	4,457,946		4,457,946
Federal Funds			
DOE - State Energy Program - Program Years 21/22/23		405,755	405,755
DOE - State Energy Program - Program Years 24/25/26		458,560	458,560
DOE - SEP BIL		850,000	850,000
DOE - Energy Efficiency & Conservation Block Grant *		410,000	410,000
DOE - SEP American Recovery & Reinvestment Act *		150,000	150,000
FEMA - Advance Assistance		300,000	300,000
Coronavirus State Fiscal Recovery Funds		5,179,088	5,179,088
DOC - Hawai'i Good Jobs Challenge		181,662	181,662
DOE - 40101D		1,581,505	1,581,505
DOE - High-Efficiency Electric Home Rebate Program		1,664,144	1,664,144
DOE - Home Energy Efficiency Rebate Program		117,000	117,000
DOE - EECGB		500,000	500,000
Congrestional - Wayfinders Program		1,000,000	1,000,000
Trust Funds			
VW Settlement Trust Funds		2,100,000	2,100,000
US Climate Alliance Grant		43,621	43,621
	7,025,242	14,941,335	21,966,577

* Repurposed ARRA Funds

Value of Contracts

$69,379	UNIVERSITY OF HAWAIʻI	DESIGN,DEVELOP & DELIVER 3D VISUALIZATION OF RENEWABLE ENERGY BUILDOUTAS THE STATE APPROACHES 100% RPS IN THE ELECTRIC SECTOR
$62,206	DUNCAN, WEINBERG, GENZER & PEMBROKE, P.C.	PROV HSEO W/EXPERT WITNESS RELATED TECHNICAL SUPPORT IN ITS PARTICIPATIO IN REGULATORY PROCEEDINGS THAT EFFECT ENERGY POLICIES
$292,738	ICF INCORPORATED, LLC	PROV HSEO W/EXPERT WITNESS-RELATED TECHNICAL SUPPORT IN ITS PARTICIPATIO IN REGULATORY PROCEEDINGS THAT AFFECT STATE ENERGY POLICIES
$4,084	HUA NANI PARTNERS LLC	SPECIALIZED FACILITATOR SVCS F/STATEWIDE FOCUS GROUP SESSIONS F/THE DECARBONIZATION STRATEGY REPORT AS REQUIRED PURSUANT ACT
$242,544	HDR ENGINEERING, INC.	ACCELERATING ENERGY TRANSITIONS& FUEL SWITCHING STDY-ANALYSS POTENTIAL DECARBONIZATION PATHWAYS TOWARDS HAWAII'S CLEAN ENERGY
$795,615	PA'AKAI COMMUNICATIONS LLC	CONRACTOR WILL CONDUCT STRATEGIC COMMUNICATIONS RELATED TO NATURAL RESOURCES,PRIORITY ENERGY ISSUES & COMMUNITY PLNG
$5,000,000	UNIVERSITY OF HAWAIʻI	CONTRACTOR TO PROVIDE SLIM-HOLE TESTING & GEOLOGIC CHARACTERIZATION SVCS
$ 6,566,565		

Summary

Hawai‘i is a national and global leader in energy transition policy and deployment. The state was the first in the nation to establish a legally binding commitment to produce all its electricity by renewable resources and has long been a leader in distributed renewable energy resources (rooftop solar) and inverter-based resources to reliably connect those resources to the grid. Using inefficient oil-fired units for electricity keeps Hawai‘i residents vulnerable to the full brunt of oil price volatility, and keeps the state committed to purchase and use of the second-worst carbon emitting fuel—despite the state's vision for decarbonization.

The understanding and consensus of stakeholders and policymakers on renewable energy resource adequacy and scenarios to realize the state's 100% RPS and decarbonization policies by 2045 is critical and warrants much discussion in dockets currently before the PUC and during the 2025 legislative session.

"He Wa‘a He Moku He Moku He Wa‘a—The Canoe is an Island, the Island is a Canoe"

‘Ōlelo No‘eau, Mary Kawena Pukui

Appendix A Nameplate Capacity of Existing, In-Development, and Proposed Facilities

Existing Facilities			
Project Name	Nameplate Capacity	Technology Type	In-service date
O‘ahu			
Kapolei Energy Storage	185 MW/ 565 MWh	BESS	Dec-2023
Schofield Generating Station	50 MW	Biodiesel	May-2018
Airport Emergency Power Facility	8 MW	Biodiesel	6/1/2017
Kahe Power Plant	650 MW	Oil	Feb-1963
Campbell Industrial Park Generating Station	130 MW	Oil	Jun-2009
Par Hawai‘i	18.5 MW	Oil	Apr-1972
Waiau Power Plant	500 MW	Oil	Nov-1947
Kalaeloa Partners	208 MW	Oil	Sep-1989
Kawailoa Solar	49 MW	Solar	Oct-2019
Lanikuhana Solar	14.7 MW	Solar	Aug-2019
Wai‘anae Solar	27.6 MW	Solar	Dec-2016
Aloha Solar Energy Fund I	5 MW	Solar	Feb-2017
Kapolei Sustainable Energy Park	1 MW	Solar	Jan-2012
Aloha Solar Energy Fund II	5 MW	Solar	Feb-2017
Waipio PV	45.9 MW	Solar	Aug-2019
Waihonu North and South	5 MW, 1.5 MW	Solar	Jun-2016
Mauka FIT I	3.5 MW	Solar	
West Loch Solar	20 MW	Solar	Oct-2019
Kalaeloa Renewable Energy Park	5 MW	Solar	Dec-2013
Kalaeloa Solar Two	5 MW	Solar	Nov-2012
AES West Oahu Solar	12.5MW/50 MWh	Solar + BESS	Mar-2024
Mililani I Solar	39 MW/156 MWh	Solar + BESS	Jul-2022
Kūpono Solar	42 MW/168 MWh	Solar + BESS	Jun-2024
Waiawa Solar Power LLC	36 MW/144MWh	Solar + BESS	Jan-2023
H-POWER	68.5 MW	Waste-to-Energy	Oct-1989
Kawailoa Wind	69 MW	Wind	Oct-2012
Kahuku Wind	30 MW	Wind	Feb-2011
Nā Pua Makani Wind Project	24 MW	Wind	Nov-2020
Hawai‘i Island			

Existing Facilities			
Project Name	Nameplate Capacity	Technology Type	In-service date
Hāmākua Energy	60 MW	Biofuels + Oil	Jul-2000
Puna Geothermal Venture	38 MW	Geothermal	Feb-1993
Wailuku River Hydroelectric Plant	12.1 MW	Hydro	May-1993
Hydroelectric Plant	3.4 MW	Hydro	Dec-1918
Waiau Hydroelectric Plant	1.1 MW	Hydro	Nov-1921
Hill Steam Plant/Kanoelehua Plant	55.7 MW	Oil	Dec-1961
Puna Steam Plant	36.7 MW	Oil	Jul-1988
Panaʻewa Substation	1.25 MW	Oil	-
Punaluʻu Substation	1.25 MW	Oil	-
Waimea Plant	7.5 MW	Oil	Nov-1970
Keāhole Power Plant	77.6 MW	Oil	Jun-1905
AES Waikoloa Solar, LLC	30 MW/120MWh	Solar + BESS	Apr-2023
Hawi Renewable Development	10.5 MW	Wind	May-2021
S Nui Wind Farm	20.5 MW	Wind	Apr-2007
Maui			
Māʻalaea Generating Station	212.1 MW	Biofuels + Oil	May-1905
Hāna Substation	2 MW	Oil	Mar-2001
Kuihelani Substation	2 MW	Oil	-
Kahului Power Plant	37.6 MW	Oil	May-1905
Kuʻia Solar	2.87 MW	Solar	Sep-2018
South Maui Renewable Resources	2.87 MW	Solar	Apr-2018
AES Kuihelani Solar	60 MW/240 MWh	Solar + BESS	May-2024
Kaheawa Wind Power	30 MW	Wind	Dec-2005
Kaheawa Wind Power II	21 MW, 10 MW/20 MWh	Wind + BESS	May-2012
Auwahi Wind	21 MW, 11 MW/4.4 MWh	Wind + BESS	Nov-2012
Lānaʻi			
Miki Basin Power Plant	9.4 MW	Oil	Mar-1990
Lanaʻi Sustainability Research, LLC	1.2 MW	Solar	Nov-2008
Molokaʻi			
Pālāʻau Plant	12 MW	Oil	Mar-1982
Molokaʻi BESS	1 MW/0.397 MWh	BESS	-
Kauaʻi			
Mahipapa	6.7 MW	Biomass	Apr-2014
KIUC, Kapaia	27.5 MW	Fossil	Jun-1905
KIUC, Port Allen	83 MW	Fossil	May-1905

Existing Facilities			
Project Name	Nameplate Capacity	Technology Type	In-service date
BBCP, Wainiha/Kalaheo	6 MW	Hydro	Jan-1906
KIUC, Waiahi	1.5 MW	Hydro	-
Gay & Robinson, Olokele	7.3 MW	Hydro	Feb-1982
KAA, Waimea/Kekaha	1.5 MW	Hydro	-
KIUC, Koloa	12 MW	Solar	Jul-2014
KIUC, Anahola	12 MW	Solar	Oct-2015
Ka'ie'ie, Port Allen	6 MW	Solar	Dec-2012
Kapaa Solar	1 MW	Solar	-
Tesla Solar + Storage	13 MW/52 MWh	Solar	Jul-1905
AES Lawai Solar + Storage	20 MW/100 MWh	Solar	Nov-2018
AES PMRF Solar + Storage	14 MW/70 MWh	Solar	Nov-2019

Facilities in Development			
Project Name	Nameplate Capacity	Technology Type	Planned In-service Date
Hawai'i Island			
Hale Kuawehi Solar LLC	30 MW/ 120 MWh	Solar + BESS	March 2025
O'ahu			
Mountain View Solar	7 MW/ 35 MWh	Solar + BESS	May 2025
Ho'ohana Solar I	52 MW/ 208 MWh	Solar + BESS	November 2024
Waiawa Phase 2 Solar	30 MW/240 MWh	Solar + BESS	June 2025
Maui			
Waena BESS	40 MW/160 MWh	BESS	November 2026

Proposed Facilities			
Project Name	Nameplate Capacity	Technology Type	Planned In-service year
Hawai'i Island			
Keamuku Solar	86 MW/344 MWh	Solar + BESS	2030
Hamakua Firm Renewable Energy	60 MW/30 MWh	Biofuels + BESS	2030
Oah'u			
Mahi Solar and Storage	120 MW/480 MWh	Solar + BESS	2026
Waiau Repower	253 MW	Biofuels	2026
Pu'uloa Solar	6.4 MW/30 MWh	Solar + BESS	2026
Pu'uloa Energy	99 MW	Biofuels	2027
Kalaeloa Partners Repowering	208 MW	Biofuels	2033
Maui			
Kaheawa Wind 1	30 MW	Wind	2026
Kuihelani Phase 2 Solar	40 MW/160 MWh	Solar + BESS	2027
'Ūkiu Energy	40 MW	Biofuels	2027
Pūlehu Solar & Storage	20 MW/80 MWh	Solar + BESS	2027

Appendix B: Energy Dockets Before the Public Utilities Commission

There are currently 65 open electric industry dockets and 16 open gas industry dockets with the Hawai‘i Public Utilities Commission (PUC). Of these, HSEO is tracking 20 relevant dockets including:

1. Docket 2024-0276 Hawaiian Electric Fuels Supply Contract: This docket opened 8/21/2024 as an application for approval of second amendment to the 2023 Fuels Supply Contract with Par Hawai‘i Refining, LLC, and to include the contract’s costs in the companies’ energy cost recovery clause.
2. Docket 2024-0258 IGP RFP: A proceeding related to competitive procurement of grid-scale resources, non-wires alternatives, and grid services. This docket opened on 8/19/2024.
3. Docket 2024-0200 Electricity Wheeling: Docket to investigate electricity wheeling for Hawaiian Electric Companies (HECO) and Kauai Island Utility Cooperative (KIUC). The aim is to explore whether electricity wheeling will work in Hawaii. The first three phases will be fully intragovernmental, which includes stakeholder outreach, docket proceeding, and commission decision making and will be completed by November 2025.
4. Docket 2024-0158: Hawai‘i Gas Rate Increase
5. Docket 2024-01930 Hawaiian Electric Docket Status Updates: Docket directing Hawaiian Electric to Provide Status Updates in All Open and Suspended Dockets and filed on 3/18/24.
6. Docket 2024-01872 Hawaiian Electric Fires Investigation: Investigation regarding HECO and 2023 Fires. Filed on 1/22/24.
7. Docket 2024-0057 Target Heat Rate Implementation: For approval to modify the target heat rates in its Energy Cost Recovery Clause Tariff. Filed on 2/29/24.
8. Docket 2023-0390 Community Based Renewable Energy (CBRE) Tariff Approval: Application for renewable dispatchable generation with Ho’ahu CBRE 2 Kualapu’u LLC
9. Docket 2022-0250 Equity Docket: This docket investigates how to better integrate equity and justice considerations across PUC proceedings and PUC work more broadly. HSEO is tracking this docket to ensure that the state is able to advocate for policies (through regulatory orders, rulemaking, or other means) that support renewable energy deployment and energy efficiency, and support more venues for participation, more education, increased affordability, and equitable siting, when appropriate.
10. Docket 2022-0009 Hawai‘i Gas Integrated Resource Planning (IRP): This docket examines the IRP Report and Action Plan for Hawai‘i Gas to be submitted to the PUC for review and approval.
11. Docket 2021-0024 HECO’s Interconnection: This docket reviews the status and interconnection progress of various HECO renewable projects and the AES Plant and Kahului Plant Transition Plans, and other fossil fuel power plant transition plans, as needed.

12. Docket 2019-0323 Distributed Energy Resources (DER): This docket investigates the technical, economic, and policy issues associated with DER as they pertain specifically to HECO. HSEO tracks this docket to be prepared to provide public comment on the effectiveness of the following programs on equity and emissions reductions: Smart DER program, CER Credit Donation Pilot program, BYOD tariffs, etc., if necessary.
13. Docket 2019-0178 Competitive Bidding for Variable Renewable Dispatchable Generation on Molokaʻi and Lanaʻi: The PUC opened this docket to receive filings, review approval requests, and resolve disputes related to HECO requests to proceed with competitive procurement of dispatchable firm generation and new renewable energy generation on Oʻahu, Hawaiʻi, Maui, Molokaʻi, and Lānaʻi.
14. Docket 2018-0165 Integrated Grid Planning (IGP): Investigates the IGP process proposed by HECO.
15. Docket 2018-0088 Performance-based Regulation (PBR): Docket investigating PBR for HECO.
16. Docket 2017-0352 Stage 3 RFP: The PUC opened this docket to receive filings, review approval requests, and resolve disputes related to HECO requests to proceed with competitive procurement of dispatchable firm generation and new renewable energy generation on Oʻahu, Hawaiʻi, Maui, Molokaʻi, and .
17. Docket 2014-0135 Green Infrastructure Loan Program: Application for issuance of a Loan Program Order authorizing the allocation, use, expenditure, or other disposition of any amounts deposited or held in the Hawai‘i Green Infrastructure Special Fund. This application was submitted concurrently with the application for a financing order authorizing the issuance of the Green Infrastructure Bonds and requests that the Commission issue its decision simultaneously for the two applications.
18. Docket 2014-0134: Bonds and Green Infrastructure Fee: Application for a financing order authorizing the issuance of the green infrastructure bonds in a principal amount not to exceed $250 million.
19. Docket 2013-0194: Feed-In Tariff for HECO
20. Docket 2007-0341 HECO’s Demand-Side Management (DSM): This proceeding reviews HECO’s DSM reports and requests for program modifications.

In addition to tracking Docket 2007-0008 (the state RPS), HSEO is tracking one closed docket, Docket 2011-0206: Reliability Standards; and one suspended docket, Docket 2021-0173: EV Charger Expansion Project. Of these, HSEO is involved, in some capacity, with the following:

1. Docket 2024-0158: Hawai‘i Gas Rate Case: HSEO submitted a Motion to Participate without Intervention on 11/7/24. HSEO is interested in ensuring that the State's objectives of decarbonization and energy assurance are met. HSEO would like due consideration to be given to the implications of the Application including potential alternatives and ramifications on energy supply in Hawaii.
2. Docket 2021-0173 EV Charger Expansion Project: HSEO was an Intervenor
3. Docket 2014-0135 Green Infrastructure Loan Program: DBEDT was an Applicant
4. Docket 2014-0134 Bonds and Green Infrastructure Fee: DBEDT was an Applicant
5. Docket 2013-0194 Feed-In Tariff for HECO: DBEDT was an Applicant
6. Docket 2024-0200 Electricity Wheeling

7. Docket 2024-0258 IGP RFP: HSEO presented at a technical conference on November 19, 2024, and subsequently provided written comments to the docket in response to the discussions held during the event.
8. Docket 2019-0323: Distributed Energy Resources (DER)
    a. Summary: This docket investigates the technical, economic, and policy issues associated with DER as they pertain specifically to HECO. The DER docket was having monthly Advanced Rate Design working group meetings, and the PUC released an order on 10/31 approving, in part, HECO's proposal to continue Advanced Rate Design (ARD) Time of Use (TOU) rates, allowing customers who enrolled as of Jan 31, 2025, to remain in the program and denying new customers to enroll in ARD TOU rates. This docket consists of frequent reporting on the different programs mentioned below.
    b. HSEO will attend relevant working group meetings, in listen-only mode and provide public comment and input on the following topics addressed in this docket: Smart DER, CER Credit Donation Pilot program and BYOD tariffs, based on the reports filed in the docket. HSEO's input will consider the effectiveness of programs on equity and emissions reductions, with representation from each branch, and the involvement of HSEO‘s Equity Coordinator.
9. Docket 2018-0088 Performance-based Regulation (PBR): Docket investigating PBR for HECO.
10. Docket 2022-0250 Equity Docket: This docket investigates how to better integrate equity and justice considerations across PUC proceedings and PUC work more broadly. HSEO is tracking this docket to ensure the state can advocate for policies (through regulatory orders, rulemaking, or otherwise) that support renewable energy deployment and energy efficiency, and support more venues for participation, more education, increased affordability, and equitable siting, when appropriate.