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COMMUNITY-IDENTIFIED ENERGY PATHWAYS REPORT

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JUNE 6, 2025



Disclaimer

The Lahaina Energy Partnership is supported in part by the National Renewable Energy Laboratory for the U.S. Department of Energy (DOE) under Contract No. DE-AC36-08GO28308. Support for the work was also provided by the U.S. Department of Energy Office of Energy Efficiency and Renewable Energy under SUB-2024-10381 and SUB-2024-10382. The views expressed in the article do not necessarily represent the views of the DOE or the U.S. Government.

The goals, views, and terminology reflected in this report are directly representative of the facilitated planning process as determined by involved community members and other interested parties and existing policy and regulatory materials created by Hawai'i state agencies.



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Acknowledgements

The authors express our deepest gratitude to the Lahaina community for their guidance, participation, and trust throughout this critical planning process. This report reflects the experiences, insights, and priorities shared by community members during a time of immense recovery and rebuilding.

We extend a special mahalo to the Hui, our trusted group of Lahaina leaders, cultural practitioners, and kūpuna, whose commitment and wisdom grounded this phase of the Lahaina Energy Partnership project. Their leadership helped shape the direction of the engagement process and ensured that the work remained deeply rooted in community values and cultural integrity.

We also acknowledge the contributions of the many organizations and individuals who supported this effort through event hosting, food, keiki services, and wellness support. These partners include Lahainaluna High School, Nā Kūpuna O Lahaina, Maui United Way, Pacific Counseling, Hua Momona, and Kahana Canoe Club. Their generosity made these gatherings possible and meaningful.

We also thank the County of Maui, Hawaiian Electric, the Hawai'i State Energy Office (HSEO), and the Public Utilities Commission (PUC), along with other agencies and regulatory partners who participated in stakeholder meetings, shared valuable technical insights, and helped to ensure alignment between community priorities and broader recovery and planning efforts.

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Community-Identified Energy Pathways Report

1. Executive Summary

The Community-Identified Energy Pathways Report captures the voices, values, and vision of the Lahaina, Hawai'i, community as they chart a course toward a safer, more resilient, and locally defined energy future. Developed by the Lahaina Energy Partnership (LEP), this report is the result of a 9-month engagement process designed to ensure the energy planning and infrastructure rebuilding process after the August 2023 wildfires is led by those most impacted.

1.1. A Community-First Planning Process

Phase 1 of the LEP, conducted between July 2024 and April 2025, centered on deep listening, education, and collaborative planning. The process included a wide range of in-person and virtual engagements: three public co-design workshops, five Hui advisory meetings, multiple stakeholder sessions with regulatory and technical partners, and community-wide surveys.

The LEP operates on a layered structure that centers community leadership while drawing support from technical partners. The Hui, a group of trusted local Lahaina leaders, guided the process alongside subcontracted partners (Hā Sustainability, Shake Energy Collaborative, and Lāhainā Strong). The National Renewable Energy Laboratory (NREL) is coordinating the project and providing technical assistance, with funding from the U.S. Department of Energy.

1.2. Community Energy Vision and Top Energy Priorities

Lahaina residents developed a shared energy vision emphasizing resilient, and community-centered energy systems. Through extensive engagement, the community crafted the following vision statement to reflect their collective aspirations for energy resilience, economic security, and resource use (discussed further in section 4.1 of this report, *Lahaina's Community Energy Vision, Guiding Principles, and Considerations*):

We, the community of Lahaina, envision a strengthened energy system that reflects our values of safety, resilience, affordability, and sustainability. We prioritize the integration of clean renewable energy sources, ensuring that our infrastructure is ready to withstand extreme events. Our energy system will protect our community, diversify our economy, honor our cultural traditions, and build a self-sustaining local energy system that benefits current and future generations.



This vision is grounded in six guiding principles:

- **Community Leadership and Local Control**
- **Resilience and Safety**
- **Affordability, Equity, & Accessibility**
- **Cultural and Environmental Stewardship**
- **Economic and Workforce Development**
- **Collaboration and Transparency.**

Section 4.1, *Lahaina's Community Energy Vision, Guiding Principles, and Considerations*, provides additional insight into how community perspectives and interests shaped the prioritization of energy solutions.

Participants engaged in a multistep prioritization process, using workshop voting, surveys, and Hui and community co-design discussions to rank their top energy priorities. The list of energy topics was developed based on community interests expressed throughout the engagement process, as well as additional topics that had not yet been fully explored but were important to include to ensure a comprehensive discussion. This approach allowed the community to directly shape the areas of focus while also creating space to introduce emerging options for further consideration. The highest-ranked community energy priorities from the co-design and Hui meetings are listed below in order of ranking and are shown in Figure 1. See section 5, *Community Energy Priorities*, for the full list and discussion.

1. **Low-impact hydropower (1st)**, including the use of recycled R-1 wastewater and legacy irrigation systems
2. **Community energy microgrids (tied for 2nd)** for local reliability, self-sufficiency, and safety
2. **Distributed energy and storage technologies (tied for 2nd)**, such as rooftop and parking lot solar paired with batteries
3. **Undergrounding and grid hardening (tied for 3rd)**, especially along evacuation routes
3. **Community ownership models (tied for 3rd)** that retain decision-making and benefits within Lahaina.

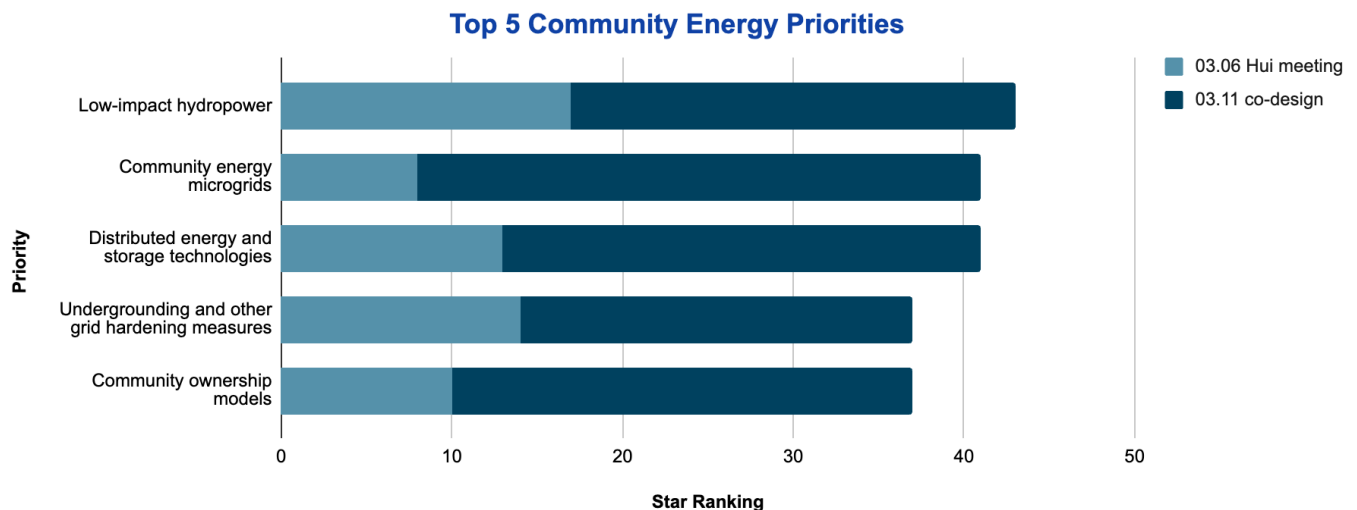


Figure 1: Top 5 energy priorities identified by community (co-design and Hui meeting)

These top priorities reflect a strong community desire to reduce vulnerability to future events, restore a sense of local control, and build a more just and resilient energy system. Together, the full list of priorities, described in section 5, *Community Energy Priorities*, of this report, underscore Lahaina’s commitment to energy options that are not only technically feasible but also rooted in cultural values, aligned with community safety, and designed to keep economic benefits local. Residents consistently expressed a preference for decentralized, small-scale, and locally sited energy solutions over large, utility-controlled projects. They emphasized the importance of minimizing land and water use conflicts, honoring traditional knowledge, and ensuring that Lahaina’s energy future is affordable and enables long-term environmental stewardship.

1.3 Energy Education in a Disaster Recovery Context

Energy education was deeply integrated into Phase 1, helping residents understand regulatory processes, ownership structures, energy technologies, and resilience strategies. Infographics, fact sheets, and presentations were shaped by community feedback, to ensure the community was prepared to engage in conversations about technical topics. See section 3.2, *Community Engagement: Methods, Activities, and Key Takeaways*, for more information, and Appendix D for a link to community energy education materials.

Importantly, this work unfolded in a post-disaster landscape, where many residents faced housing instability, trauma, and meeting fatigue. The LEP prioritized trauma-informed facilitation, shorter engagement sessions, and targeted outreach through trusted community partners. These considerations helped maintain participation and shaped how energy discussions were held.

Although there was strong support for specific technologies, the process also revealed strong community concerns and, in some cases, opposition to certain solutions, including large-scale solar farms, desalination, utility-scale and offshore wind, and geothermal. These concerns were primarily related to environmental, cultural, land use, and equity impacts. Although many participants expressed resistance to large-scale energy projects, some community members recognized potential benefits and prioritized certain technologies, such as utility-scale solar photovoltaics (PV) under specific conditions, including conditions that would allow for community ownership or control of such projects from concept to implementation as well as design considerations that would address environmental, cultural, viewshed, land use, and safety concerns. These nuances and varying perspectives are discussed further in section 4.2, *Community Sentiment and Resistance to Technologies*, of this report.

1.4 Recommended Technical Assistance Focus Areas

In addition to describing the process and outcomes of Phase 1, this report also provides specific guidance for Phase 2 of the LEP, during which NREL will conduct technical assistance in response to the community's priorities. This technical assistance will inform the development of a Community Energy Implementation Plan, a strategic roadmap to guide Lahaina's energy future. To ensure Phase 2 remains responsive to community needs, the following areas have been identified as top priorities for technical assistance (discussed further in section 6 of this report, *Priorities for Technical Assistance*):

- **Hydropower feasibility**, including the use of R-1 recycled water, historic and existing irrigation and water delivery systems, and water-energy nexus integration
- **Distributed solar photovoltaic + storage**, including rooftop and parking lot PV mapping, energy resource potential, and financial modeling
- **Community microgrid design**, including neighborhood-scale load modeling, siting, system sizing, and ownership models
- **Cost and regulatory analysis** of undergrounding and alternative grid-hardening options (e.g., conduit-based systems, partial burying or protected ground laying of transmission and distribution lines, pole setbacks)
- **Community ownership and governance models**, such as energy cooperatives or community-developer partnerships.

These focus areas reflect the community's desire for actionable, place-based solutions that advance community leadership and local control, resilience and safety, affordability and accessibility, cultural and environmental stewardship, economic and workforce development, and collaboration and transparency.

By centering community knowledge, values, and priorities, this report offers more than a list of recommendations; it provides a blueprint for energy planning that is locally rooted, culturally grounded, and designed to guide Lahaina's energy future for generations to come.

2. Introduction

The Lahaina Energy Partnership (LEP) was established in response to the devastating August 2023 wildfires, with the goal of ensuring the Lahaina community plays a central role in shaping and directing its energy future. Recognizing that energy resilience and recovery extend beyond infrastructure repair, the LEP has focused on a collaborative, community-driven approach to defining energy priorities that reflect the needs, values, and long-term vision of Lahaina's residents. Over the past 9 months, the partnership has engaged the community through an iterative process of co-design workshops, Hui meetings (a community leadership advisory group referred to as "the Hui"), stakeholder discussions, and targeted outreach, ensuring every step of the process has been informed by those who will be most impacted by the outcomes.

Over the course of three public co-design workshops, five Hui meetings, and multiple stakeholder sessions with Hawaiian Electric, the Public Utilities Commission (PUC), several County of Maui departments, the Hawai'i State Energy Office (HSEO) and other relevant parties, along with a customized, Lahaina-specific energy education effort, the LEP has worked to build knowledge and empower residents to make informed decisions about their energy future. Discussions have focused on core areas such as grid resilience and hardening, renewable energy integration, community energy ownership, and energy affordability. The insights gained through this process make clear that Lahaina's energy future must be designed in alignment with the community's guiding principles of community leadership and local control, resilience and safety, affordability and accessibility, cultural and environmental stewardship, economic and workforce development and collaboration and transparency, ensuring that local energy systems serve Lahaina's needs both today and in the future.

This Community-Identified Energy Pathways Report synthesizes the findings from Phase 1 of the LEP's work (July 2024–April 2025), providing a comprehensive account of the community's questions, concerns, and energy priorities, as well as providing insight into the challenges and opportunities the people of Lahaina face in their effort to plan and rebuild their energy infrastructure. This report serves as both a record of the LEP planning process and a roadmap for the next phase of work, where technical analysis and feasibility assessments will support translating the Lahaina community's energy vision into actionable solutions. This report is intended to guide the National Renewable Energy Laboratory's (NREL's) technical assistance efforts, ensuring NREL's technical assistance is aligned with community priorities and Lahaina residents remain at the center of decision-making.

With the completion of Phase 1, the LEP now shifts into Phase 2: NREL Technical Assistance, in which Lahaina’s community energy priorities will be further analyzed through feasibility studies, technical modeling, and policy evaluations. The final outcome of Phase 2 will be the development of a Community Energy Implementation Plan, which will serve as a strategic plan for executing Lahaina’s energy transition in alignment with the community’s vision and technical realities.

2.1 LEP Structure

The LEP is built on a community-first model that places Lahaina residents at the center of the energy planning process. This structure was intentionally designed to ensure local voices guide decisions related to energy resilience, recovery, and long-term energy infrastructure planning.

At the core of the LEP are Lahaina community members, who serve as the primary decision makers within the LEP process, helping to define community energy priorities, guide engagement activities, and shape the vision for Lahaina’s energy future. Although other entities also have important roles in regional energy planning and decision-making, the LEP ensures community voices and leadership remain central throughout this process.

Advising and supporting the community is the Hui, a group of respected Lahaina leaders, cultural practitioners, kūpuna (elders), and trusted voices from across sectors. In Hawaiian, a Hui is more than just a group: it signifies a collective united by a shared purpose, working together through mutual trust and collaboration. In the context of the LEP, the Hui serves as both a sounding board and a bridge between the broader community and the planning process. Hui members provided early input on engagement design, reviewed draft materials, and ensured all activities were culturally grounded and reflective by actively communicating with LEP’s supporting project partners (SPPs) if any key perspectives were missing or additional community stakeholders needed to be engaged. In addition, Maui County Councilmembers, the West Maui State Senator, and the West Maui State Representative, along with Hawaiian Electric’s West Maui Community Liaison, participated in several of these Hui and community co-design convenings, bringing additional perspective with broader recovery efforts.

Supporting the community and the Hui are the subcontracted SPPs, who facilitate community engagement:

- Hā Sustainability is a Hawai‘i-based technical consulting firm specializing in island-focused energy planning and analysis. As the lead subcontractor, Hā Sustainability manages project coordination, stakeholder engagement, reporting, and energy education, ensuring the process remains grounded in a local context and centered around community capacity-building.

- Shake Energy Collaborative is a community-centered energy project developer with expertise in participatory planning and co-design. Shake co-leads community engagement and helps to ensure local and Indigenous knowledge informs all aspects of the process.
- Lāhainā Strong, initially formed in 2018 following the Hurricane Lane fire in Lahaina and revitalized after the August 2023 wildfires, leads local outreach and organizing as a subcontractor to Shake. Their deep relationships and on-the-ground knowledge ensure the LEP is rooted in community realities and directly responsive to local needs.

Together, these partners have collaborated to facilitate community engagement for the LEP, center community voices, and to ensure technical pathways align with Lahaina’s lived experience and long-term vision.

NREL coordinates the project and provides technical assistance. NREL is a national laboratory of the U.S. Department of Energy (DOE), which funds the project. NREL is the lead technical partner and will conduct modeling and analysis in response to the community’s priorities. Their role is to support the process and provide technical expertise to inform local decision-making.

This layered structure (see Figure 2) ensures Lahaina’s energy planning process is community led, culturally grounded, and technically supported, with every partner aligned around the central goal of a resilient and locally defined energy future.

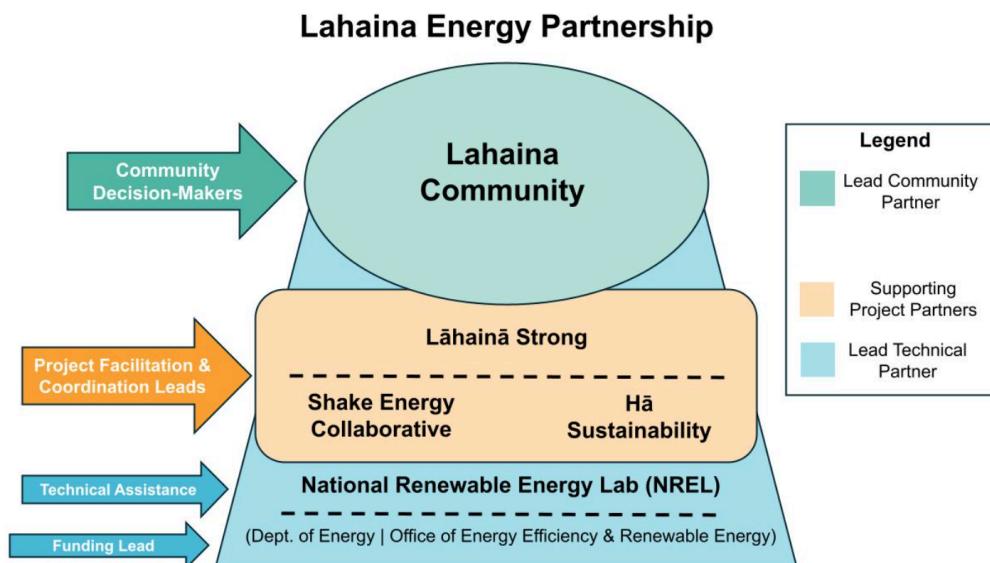


Figure 2: LEP structure: The Lahaina community is at the heart of the planning process, supported by SPPs, with technical assistance from NREL and funding provided by the U.S. Department of Energy



2.2 Defining the Lahaina Community

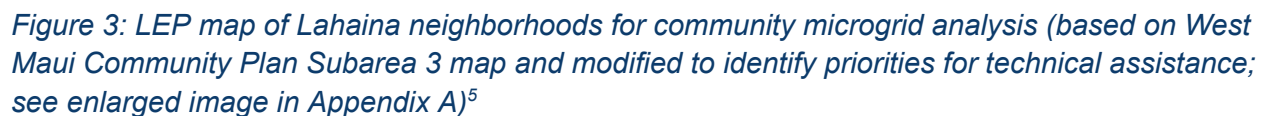
The geographic area of Lahaina includes the historic town of Lahaina and its surrounding neighborhoods (see Figure 3 or Appendix A), consistent with definitions in the County of Maui's Long-Term Recovery Plan,¹ the West Maui Community Plan,² and based on input from the Hui. This area is home to a diverse and intergenerational population, including Native Hawaiian families with ancestral ties to the land, descendants of plantation-era immigrants from Japan, China, Portugal, and the Philippines,³ as well as residents who have most recently made Lahaina their home.⁴ Each contributes to the cultural, historical, and socioeconomic fabric of the region. Lahaina is more than a physical place; it represents deep generational roots, community resilience, and a strong sense of collective identity.

¹ County of Maui. *Lahaina Wildfire Disaster Recovery: Long-Term Recovery Plan*. 2024.
<https://drive.google.com/file/d/14LwN3BbhreeaJo46UzKMAFBTEqhh3RJ3/view>.

² County of Maui. *West Maui Community Plan*. January 2022.
<https://www.mauicounty.gov/DocumentCenter/View/131915/West-Maui-Community-Plan-January-2022>.

³ County of Maui. *History of the County of Maui*.
<https://www.mauicounty.gov/DocumentCenter/View/3231/History>.

⁴ Leonard, Matthew. "Census Data: Lahaina Was a Very Different Place Than the Rest of Maui County." *Honolulu Civil Beat*, January 4, 2024.
<https://www.civilbeat.org/2024/01/census-data-lahaina-was-a-very-different-place-than-the-rest-of-maui-county/>.



⁵ **County of Maui.** *West Maui Community Plan: Subarea 3 Map.* Effective January 31, 2022.
<https://www.mauicounty.gov/DocumentCenter/View/131021/West-Maui-Community-Plan-Subarea-3-effective-01312022?bidId>.

infrastructure disruptions, and economic loss. The West Maui Community Plan Subarea 3 (see Figure 3) has been identified as an appropriate geographic boundary for the core planning area of the LEP.⁶ At the same time, the Hui also emphasized the importance of considering broader connectivity across the West Maui region. Although most community engagement and data collection efforts were centered on core Lahaina neighborhoods, certain areas of technical analysis, such as energy infrastructure, grid connectivity, and water systems, necessitate a regional lens. As such, the LEP has acknowledged opportunities for resilience, renewable energy development, and community benefit must also extend to surrounding areas that make up the greater West Side. The commercial sector, including small businesses, hotels, and other local enterprises, is also a vital part of Lahaina's community fabric. These businesses not only contribute to the local economy but also play a key role in community resilience and recovery. Their needs and perspectives have been considered as a part of the LEP's engagement and planning efforts through consultation and outreach to industry associations and business owners.

⁶ County of Maui. *West Maui Community Plan: Subarea 3 Map*. Effective January 31, 2022.
<https://www.mauicounty.gov/DocumentCenter/View/131021/West-Maui-Community-Plan-Subarea-3-effective-01312022?bidId=>.

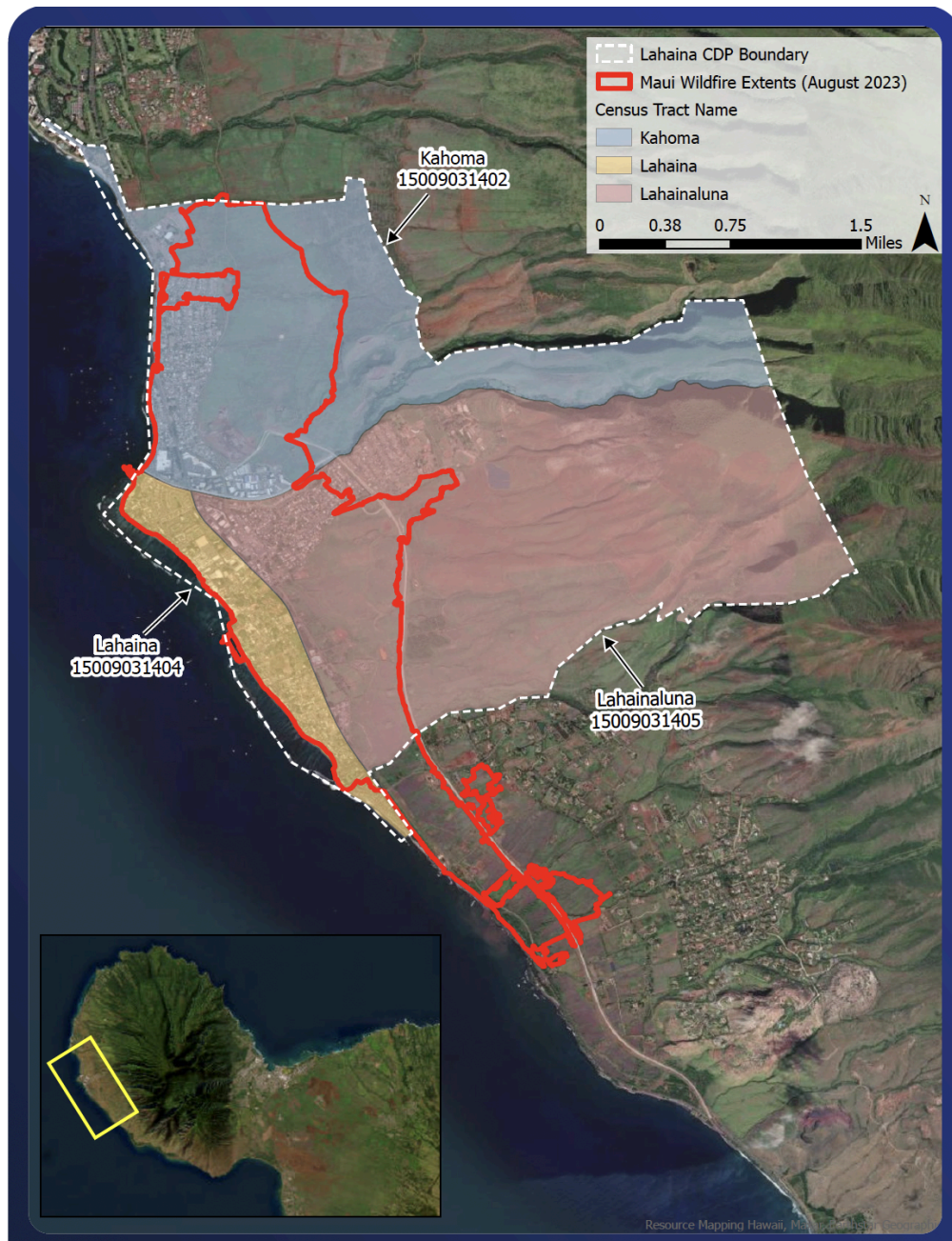


Figure 4: Map identifying the Lahaina burn zone (see enlarged image in Appendix A)⁷

⁷ County of Maui. *Lahaina Long-Term Recovery Plan*. 2024, p. 135. <https://www.mauirecovers.org> (accessed 2025).



This integrated approach ensures energy solutions reflect both the immediate recovery needs of fire-affected neighborhoods and the interconnected realities of the broader Lahaina and West Maui region.

The August 2023 fires also caused significant residential displacement. According to an assessment based on state tax filings, of Lahaina residents displaced by the fires, approximately 1,420 (27.9%) relocated elsewhere within the Lahaina ZIP code, 1,058 moved elsewhere on Maui (20.8%), and 369 (7.3%) left the county, relocating to either another Hawaiian island or out of state (see Figure 5).⁸

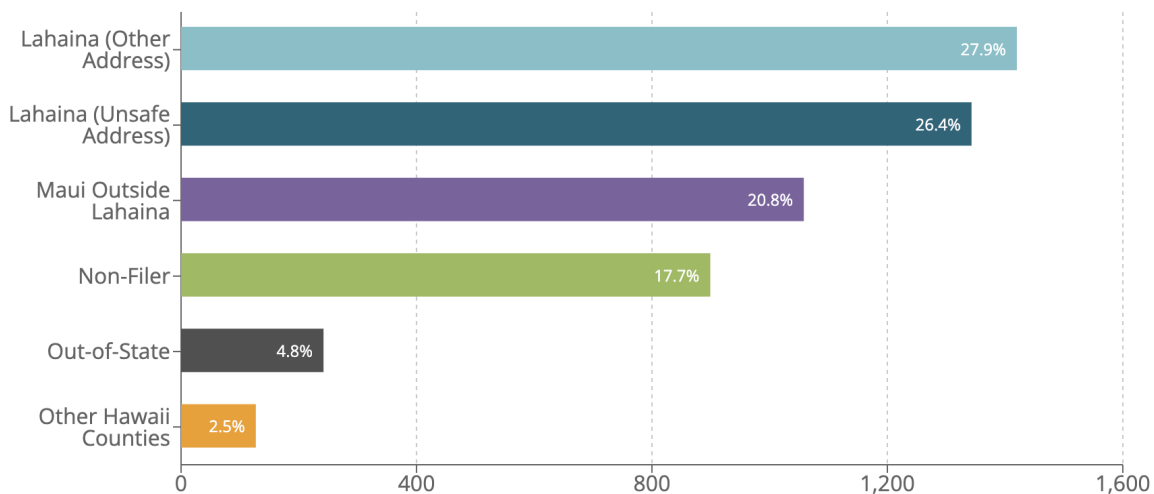


Figure 5: UHERO post-fire tax filing location of displaced residents: this figure, from the University of Hawai'i Economic Research Organization, provides a breakdown of the most recent post-fire tax filing location of residents (primary filers, spouses, and their dependents) whose last pre-fire filing address was rendered unsafe for habitation by the fires⁹

This integrated approach ensures energy solutions reflect both the immediate recovery needs of fire-affected neighborhoods and the interconnected realities of the broader Lahaina and West Maui region. Understanding this multifaceted and community-defined composition is essential for developing energy strategies that are responsive and reflective of those who call Lahaina home.

⁸ University of Hawai'i Economic Research Organization (UHERO). *Migration Effects of the Maui Wildfires: Early Indicators from State Tax Filings*. February 2024. <https://uhero.hawaii.edu/migration-effects-of-the-maui-wildfires-early-indicators-from-state-tax-filings/>.

⁹ University of Hawai'i Economic Research Organization (UHERO). *Migration Effects of the Maui Wildfires: Early Indicators from State Tax Filings*. February 2024. <https://uhero.hawaii.edu/migration-effects-of-the-maui-wildfires-early-indicators-from-state-tax-filings/>.

2.3 Community Context and History

Lahaina holds a significant place in Hawaiian history, having served as the capital of the Hawaiian Kingdom in the early 19th century. Its rich cultural heritage is reflected in its historic sites, traditional practices, and long-standing community values. Over the years, Lahaina has evolved through several defining eras, each layering new complexity onto the land and community.

After its time as a political and cultural center of the kingdom, Lahaina became a hub for plantation agriculture. Sugar and pineapple industries transformed the landscape and economy, introducing large-scale irrigation systems, altering stream flows, and reshaping traditional land use. Although these shifts supported economic growth at the time, they also initiated long-term changes in how natural resources were managed, changes that continue to influence Lahaina's environment today. As plantations declined, vast areas were left fallow and unmanaged, although aging water, land management, and energy infrastructure systems such as irrigation ditches, reservoirs, and utility poles became increasingly vulnerable to modern threats, including wildfire risk, climate-driven drought, and storm impacts.

Lahaina Light and Power Company, Lahaina Ice Company, the Lahaina and Puukolii Stores, and the Pioneer Mill Hospital were associated with the Pioneer Mill plantation, providing services to employees as well as to Lahaina residents.

Lahaina's energy infrastructure evolved over several decades. Lahaina Light and Power Company were owned and operated by Pioneer Mill, until it was purchased for approximately \$1.5 million by Maui Electric Company in 1967. Prior to this purchase, Maui Electric Company built a 69-kilovolt (kV) transmission line from Kahului to Lahaina in 1957.

The "Central Power Station, Power Plant A is one of two adjoining buildings that together housed 1500 KW and 3000 KW generators, boilers, a 5 million gallon water pump, and related equipment. They were erected in 1923-24 on a site near the West Maui coast by a construction crew of the Pioneer Mill Company, Ltd. (PMCo) and commenced operations in the latter year. The Central Power Station Power Plant is significant at the local level for its association with the early twentieth century development of electric and water infrastructure in the Lahaina District."¹⁰

These historical dynamics, combined with contemporary challenges such as centralized utility operations, aging infrastructure, and climate instability, contributed to the conditions that made the 2023 wildfire more destructive. Dry, unmanaged landscapes, prolonged drought, and systemic strain on land and water resources created an environment where wildfire risk was

¹⁰ Library of Congress. <https://www.loc.gov/item/hi1111/>. (Photos from Survey HhydropowerI-144).



high and resilience was low.¹¹ The fire was not caused by any single factor but rather was the result of overlapping historical legacies and modern vulnerabilities, as described in investigations by Maui County and the Hawai'i attorney general's office.¹²

In the decades that followed the plantation era, Lahaina emerged as a major destination for tourism, commerce, and local arts. This transition brought visibility, economic opportunity, and a platform for cultural expression, but it also introduced new pressures. Visitor-driven development has increased demand on land, water, and infrastructure, often outpacing the capacity of local ecosystems and communities to manage these impacts sustainably.¹³ Today, many in the community continue to call for models of growth that are more aligned with Lahaina's cultural values and ecological limits.¹⁴

This layered history underscores the importance of grounding future development, especially those related to land use, energy, and disaster resilience, in a full understanding of Lahaina's past. Acknowledging how historic land management patterns, economic shifts, and ongoing institutional structures have contributed to current vulnerabilities is essential to designing a path forward that is both just and durable.

Lahaina's historical connection to energy offers a powerful lens through which to view this future. During the plantation era, West Maui operated with a notable degree of local energy self-sufficiency. Hydropower systems were developed to support agricultural operations, including the Kaua'ula facility that served the Pioneer Mill Company, making Lahaina one of the first places in Hawai'i to harness renewable energy for industrial purposes.¹⁵

Though these systems primarily served commercial agriculture, they demonstrated the viability of place-based, resource-conscious energy solutions. They offer a valuable precedent as the community now seeks decentralized alternatives to today's centralized grid, alternatives that reflect local knowledge, environmental context, and community control.

Modern interest in microgrids, low-impact hydropower, and solar is not just about innovation, it's about restoration. It reflects a commitment to rebalancing systems that have long been out of alignment with the land and the people. In this way, Lahaina's future is not disconnected from its

¹¹ Maui County Department of Fire and Public Safety. *2023 Maui Wildfire After Action Report and Origin and Cause Report*. <https://www.mauicounty.gov/1460/Fire-Public-Safety>.

¹² Hawai'i Department of the Attorney General. *Lahaina Fire Incident Analysis Report (Phase Two)*. <https://ag.hawaii.gov/maui-wildfire-investigation-resources-page/>.

¹³ Environmental and Energy Study Institute (EESI). *Rethinking Tourism in the Wake of West Maui's Wildfires*. 2023. <https://www.eesi.org/articles/view/rethinking-tourism-in-the-wake-of-west-mauis-wildfires>.

¹⁴ Berkeley Political Review. *After the Fire: Rethinking Tourism Impacts on Hawai'i*. October 25, 2023. <https://bpr.studentorg.berkeley.edu/2023/10/25/after-the-fire-rethinking-tourismhydropowercts-on-hawaii/>.

¹⁵ Hawaiian Electric. "Hydroelectricity." *Hawaiian Electric*. Accessed April 27, 2025. <https://www.hawaiianelectric.com/clean-energy-hawaii/our-clean-hydropowery-portfolio/renewable-energy-sources/hydroelectricity>.

past; it is built on learning from it, healing through it, and ensuring the systems we rebuild now truly serve generations to come.

2.4 Historical and Contemporary Energy Challenges and Opportunities

Energy Baseline

Prior to the August 2023 wildfires, West Maui's energy system was characterized by a high reliance on centralized fossil fuel generation and long-distance transmission.¹⁶ Electricity for Lahaina and the surrounding areas was primarily supplied by three 69-kV transmission lines running from the Ma'alaea Generating Station located on the south side of Maui.¹⁷ The majority of generation came from oil-fired units, contributing to some of the highest electricity costs in the United States.¹⁸ Distributed energy resources, such as rooftop solar PV, existed but were unevenly adopted, with access barriers for many renters, multifamily housing residents, lower-income households, and households located in areas with saturated distribution lines unable to accept additional energy exports onto the Hawaiian Electric electric grid.

Grid infrastructure serving Lahaina included older wooden transmission and distribution poles, particularly vulnerable to fire, wind, and storm damage.¹⁹ Before the fire, Lahaina's energy system had limited local generation capacity, minimal microgrid development, and heavy dependence on centralized systems, resulting in significant vulnerabilities to disruptions and a lack of community control over energy decision-making.²⁰

Challenges

Historically, Lahaina's energy infrastructure has faced persistent challenges because of its geographic isolation and heavy dependence on imported fossil fuels. This reliance has resulted in some of the highest electricity rates in the nation, limited energy independence, as well as environmental and public health concerns tied to air, water, and soil pollution associated with burning oil for electricity generation.

¹⁶ Hawai'i State Energy Office. *Hawai'i Energy Facts and Figures*. 2022.

https://energy.hawaii.gov/wp-content/uploads/2022/06/HSEO_FactsFigures_June2022.pdf.

¹⁷ Hawaiian Electric. *West Maui Transmission Fact Sheet*. 2023.

https://www.hawaiianelectric.com/Documents/clean_energy_facts/West_Maui_Transmission_Fact_Sheet.pdf.

¹⁸ U.S. Energy Information Administration (EIA). *Hawai'i State Profile and Energy Estimates*.

<https://www.eia.gov/state/?sid=HI>.

¹⁹ Hawai'i Department of the Attorney General. *Lahaina Fire Incident Analysis Report (Phase Two)*.

<https://ag.hawaii.gov/maui-wildfire-investigation-resources-page/>.

²⁰ Hawai'i Public Utilities Commission. *Microgrid Services Tariff Docket 2018-0163: Staff Reports and Orders*. <https://puc.hawaii.gov/energy/microgrids/>.

The current energy system in West Maui was not built with resilience or distributed risk in mind, an issue that became devastatingly clear during the August 2023 wildfires. Above-ground transmission and distribution lines, particularly in areas with high winds, dry vegetation, and difficult terrain, were exposed to extreme risk. Infrastructure failures during the fire led to power outages at critical moments, disrupting essential services and emergency response efforts, as well as exacerbating the spread of wildfires as a result of downed power lines that were still live and served as sources of ignition, and downed poles and power lines that blocked safe evacuation.^{21,22}

The West Maui electrical grid is supplied by three primary 69-kV transmission lines that run from the Ma‘alaea Generating Station to West Maui. Although one of these lines is built on more resilient steel poles, the remaining two lines are supported primarily by older wooden poles that are more susceptible to fire and wind damage. The area’s substations, some permanent and others deployed as mobile units, are key nodes in the system, but they remain vulnerable without adequate hardening or redundancy. Mapping the existing transmission and generation infrastructure is essential to understanding Lahaina’s energy vulnerability and identifying opportunities for microgrid development, undergrounding, and other grid-hardening measures, and targeted system upgrades.

These vulnerabilities are compounded by aging infrastructure, limited redundancy, and a lack of local control over energy decision-making. Many community members, particularly renters and residents of multifamily housing, have long faced barriers to accessing affordable, renewable energy as a result of limited viable rooftop space, complex permitting processes, and constraints in existing grid capacity.

Collectively, these challenges underscore the urgent need for a more reliable, resilient, and community-centered energy model. Understanding both the legacy issues and the current condition of Lahaina’s infrastructure is foundational to shaping a reliable and hazard-resilient energy future.

Opportunities

Although the 2023 wildfires and associated red flag high wind conditions exposed the weaknesses of the existing system, they also opened the door for bold, community-led solutions. Lahaina is uniquely positioned to leverage its natural resources and local knowledge to build a more resilient energy future. Key opportunities include:

²¹ Maui County Department of Fire and Public Safety. *2023 Maui Wildfire After Action Report and Origin and Cause Report*. <https://www.mauicounty.gov/1460/Fire-Public-Safety>.

²² Hawai‘i Department of the Attorney General. *Lahaina Fire Incident Analysis Report (Phase Two)*. <https://ag.hawaii.gov/maui-wildfire-investigation-resources-page/>.



- **Abundant solar resource:** Lahaina’s year-round sun exposure makes it an ideal location for distributed solar PV generation and solar hot water deployment. Rooftop solar, parking lot PV, and neighborhood- and community-scale solar installations coupled with energy storage could significantly reduce dependence on imported fuels, increase community resilience, and lower energy costs over time.
- **Historical and existing hydropower infrastructure:** Existing irrigation ditches, reservoirs, and water infrastructure from Lahaina’s plantation era could be evaluated for the feasibility of low-impact hydropower development to support both clean electricity and co-benefits such as backup power for water systems. Notably, the Kaua‘ula (also known as the Makila) hydropower facility, located on the slopes of Kaua‘ula Ridge above Lahaina, was originally constructed more than 75 years ago to supply power to the Pioneer Mill Company.

An example of a relatively recent historical use of hydropower in the Lahaina area is exemplified by Maui Electric Company’s (MECO) purchase of renewable hydropower energy from a small 500-kW plant that once provided power to Pioneer Mill at Lahaina. The original hydropower facility was located on the slopes of Kauaula Ridge above Lahaina and was more than 75 years old at the time of purchase in 2006 by MECO. It once provided power for Pioneer Mill Company, which was founded in 1862 and closed in 1999; the hydropower plant was decommissioned and has remained idle since that time. The Makila Hydro LLC, owned by the principals of Makila Land Company LLC, was repowered and owned and operated by the old Kauaula hydropower facility, including refurbishing the existing approximately 500-kW hydropower generator originally manufactured by Allis-Chalmers, a well-known maker of hydropower generators.²³
- **Available sites for distributed energy projects:** Although large-scale energy farms raise serious community concerns around land use and cultural impact, Lahaina has opportunities for distributed energy projects on existing infrastructure, such as rooftops, parking structures, and public buildings, without further encroaching on undeveloped land.
- **R-1 wastewater infrastructure expansion:** There is strong community interest and emerging county-level planning around expanding R-1 (recycled water) infrastructure in West Maui. Residents have expressed hope this infrastructure could serve multiple functions, supporting fire prevention, reforestation, agricultural revitalization, and even power production through pumped storage hydropower and in-line hydropower. Expanding and leveraging R-1 systems present a unique opportunity to enhance both water and energy resilience.

²³ Maui Electric Company. (2016). *Maui Electric Company Integrated Resource Plan Update*. Retrieved from <https://www.hawaiianelectric.com>.



- **Strong community networks:** Perhaps most important, Lahaina's deeply connected community, including Native Hawaiian leaders, long-standing local families, and local grassroots organizations such as Lāhainā Strong, provides a powerful foundation for community planning, community ownership, education, and long-term stewardship of energy projects.

By building on these place-based opportunities, Lahaina has the potential to not only address long-standing energy challenges but also emerge as a model for community-driven climate resilience and energy leadership in Hawai'i.

3. Community Engagement Process and Methods

The LEP has employed a participatory process in its outreach and engagement strategy to ensure bottom-up decision-making, by which Lahaina residents define their own energy future. This process was designed to identify community energy priorities, refine them through iterative discussions, and ensure alignment with Lahaina's long-term vision for resilience and sustainability.

This section outlines the community's energy vision and guiding principles, followed by a detailed breakdown of engagement methods, including co-design workshops, Hui meetings, stakeholder sessions, and energy education efforts. This section concludes with an overview of the key priorities that emerged from these engagements, which will help to guide NREL's technical assistance in Phase 2.

3.1 Communications and Outreach Strategy

LEP Community Engagement Process

The LEP engagement process was intentionally structured to ensure community participation remained central throughout. Over the course of 9 months, the LEP team facilitated a series of interactive engagements aimed to build trust, share knowledge, and elevate community priorities in a post-disaster context (see Figure 6).

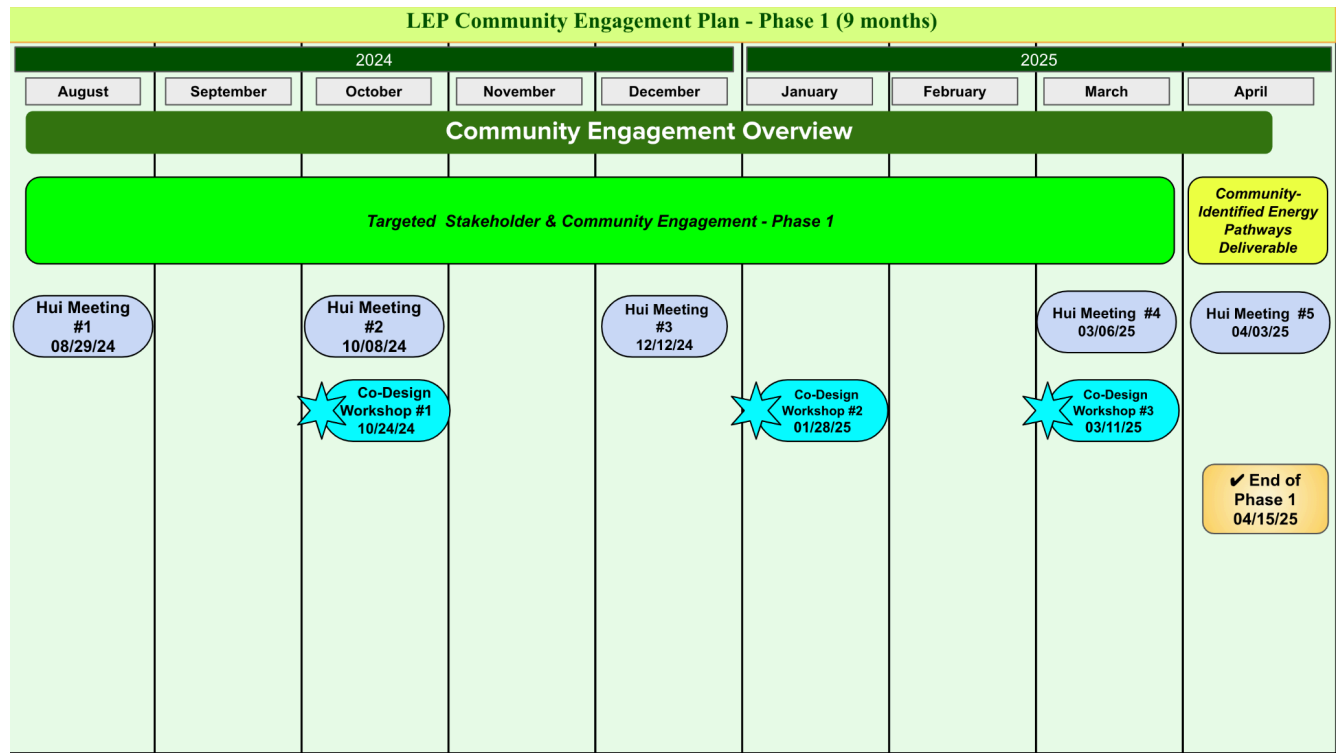


Figure 6: LEP community engagement timeline: highlighting Phase 1 community engagement activities

This process included Hui convenings, co-design workshops, and stakeholder meetings, described here and illustrated in Figures 9 and 10:

- **Five Hui Convenings (August 29, 2024; October 8, 2024; December 1 and 2, 2024; March 6, 2025; and April 3, 2025)**
The Hui, composed of respected Lahaina community leaders, cultural practitioners, kūpuna and trusted local voices, served as a critical advisory group throughout the process. These sessions provided a space for first-pass feedback on concepts, educational content, and engagement plans. Hui members ensured the process remained culturally grounded, community-centered, and responsive to local needs and dynamics.
- **Three Community Co-Design Workshops (October 24, 2024; January 28, 2025; and March 11, 2025)**
These 2-hour workshops were open to all community members and focused on energy education, hands-on planning exercises, and facilitated discussion. Each workshop built upon the previous one, starting with foundational knowledge and priority identification, followed by exploration of energy technologies, and culminating in the co-development of a draft energy vision and ranked community priorities.
- **Supplemental Stakeholder Meetings and Outreach**
The LEP initiated more than a dozen stakeholder sessions with agencies including Hawaiian Electric, the PUC, county departments, the Hawai'i State Energy Office, and other state and local organizations. These meetings allowed for alignment between community priorities and ongoing planning and regulatory efforts. Additional targeted outreach and presentations also reached residents through Rotary Clubs, community events, and virtual meetings.

This layered approach allowed the LEP to root all planning efforts in a deep respect for Lahaina's people and place, ensuring each step reflected not just input but active guidance from the community.



Figure 7: Community members engaging at the January 28, 2025, co-design Workshop at Lahainaluna High School

Engaging the Community: Outreach Methods and Participation Strategies

Ensuring broad and meaningful community participation is a cornerstone of the LEP engagement process. Given the diversity of Lahaina’s residents and the varying levels of familiarity with energy issues, the LEP employs a multipronged communications strategy to reach as many community members as possible. This approach combines in-person engagement, digital outreach, media strategies, and collaboration with trusted local organizations to build awareness and encourage participation in the community energy planning process.

Communications and Outreach Strategy

- **Press releases and local media coverage:** To maximize awareness, the LEP distributed press releases ahead of co-design workshops and community surveys, helping to generate interest and reinforce the importance of community participation.
- **Radio engagement:** The LEP partnered with Hawai’i Public Radio to reach a broader island-wide audience through a feature segment highlighting the goals of the project, the



importance of community-led energy planning, and upcoming opportunities for involvement.

- **Newspaper articles:** To further expand visibility, LEP coordinated with local and statewide news platforms, including *Maui Now* and *Honolulu Civil Beat*, to publish informative articles about the project.
- **Social media and digital engagement:** Given the widespread use of social media in the community, the LEP leveraged platforms such as Facebook and Instagram to share updates and to promote events. Additionally, online bulletin boards were used to share information more broadly, allowing residents to access event details, educational materials, and engagement opportunities in real time. Leveraging relationships with other community partners, the LEP also enlisted the help of other organizations to disseminate information about the LEP to their respective members and audiences. This approach allowed for rapid communication and interaction with community members.
- **Bulletin boards and printed materials:** Recognizing not all residents use digital platforms, the LEP ensured printed materials were available in accessible locations throughout Lahaina. These included:
 - **Community centers and schools:** Flyers and posters were distributed at public spaces, including Lahainaluna High School, Lahaina Comprehensive Health Center, and S-Turns Community Hub.
 - **Local businesses:** Information was shared with organizations and small businesses, which helped extend the reach of engagement efforts such as Napili Print Shop, Napili Market, Times Supermarket, Safeway, Dukes Restaurant, Leilani's Restaurant, and Hula Grill Restaurant.
 - **Public bulletin boards:** Flyers were posted at key locations frequented by residents, including Sunset Terrace Apartments, Honokowai Kauhale, Kahekili Beach Park, Hanaka'ō'ō Beach Park, and Kahana Canoe Club Hale bulletin board.
 - **Hotels:** Flyers were shared with Hotel Front Desks for staff rooms, including Honua Kai, Westin Kā'anapali Ocean Resort, Royal Lahaina Resort, Sheraton Maui, Outrigger Kā'anapali Beach Resort, The Westin Maui Resort and Spa, Marriott's Maui Ocean Club, and the Hyatt Regency Maui Resort and Spa.
- **Surveys:** Community input was central to defining Lahaina's energy priorities, ensuring the planning process was informed by the perspectives, needs, and values of local residents. The LEP conducted multiple surveys throughout the engagement process to assess community demographics, energy knowledge, and priority areas. These surveys helped to identify gaps in awareness, refine key discussion topics, and ensure the technical assistance phase aligns with the solutions most valued by the community.
 - **Education and awareness survey:** At the outset of the engagement process, the LEP conducted a survey to understand what aspects of energy planning the community wanted to learn more about. This helped to tailor educational efforts,

ensuring that workshops, materials, and outreach addressed the most relevant topics.

- **Demographic and participation surveys:** To ensure a representative process, the LEP gathered demographic data to understand the diversity of perspectives within the community. These surveys helped track participation across different neighborhoods, age groups, and cultural backgrounds, ensuring that engagement efforts reached all segments of Lahaina's local population.
- **Energy priorities survey:** A key component of the engagement process, this survey allowed residents to rank their top energy priorities based on discussions held during co-design workshops, Hui meetings, and stakeholder engagements. Responses were sorted by ZIP code to separate Lahaina resident input from input from those who were not Lahaina residents, ensuring the results accurately reflect the specific concerns and aspirations of Lahaina residents. The data provided a strong, data-driven foundation for decision-making, ensuring the technical assistance phase focuses on solutions that align with the community's needs.

Collaboration With Community Partners and Key Stakeholders

The success of the LEP's communications strategy was heavily reliant on partnerships with trusted local organizations. By working with groups already embedded in the community, the LEP was able to reach a broader audience, ensure messaging resonated with Lahaina residents, and provide safe and supportive physical spaces and environments for community members to participate in the LEP process.

Community Partners

- **Lāhainā Strong:** A grassroots organization made up of Lahaina residents, served as a vital link between the LEP and the broader community. Their deep relationships and lived experience helped ensure the project remained grounded in local priorities. In addition to supporting outreach and event promotion, members actively participated in all Hui meetings and co-design workshops, both as facilitators and community representatives, bringing critical insight, trust, and continuity to the engagement process.
- **Nā Kūpuna O Lahaina:** Helped secure the Office of Recovery space for Hui convenings and ensured a multigenerational presence and historical perspective were represented in community conversations.
- **Lahainaluna High School:** Served as the trusted host venue for all three community co-design workshops. As a central and well-respected institution within Lahaina, Lahainaluna provided not only the physical space but also a

sense of continuity, comfort, and cultural grounding for participants throughout the planning process.

- **Rotary Club of Lahaina Sunrise:** Hosted a presentation on February 11, 2025, in which members expressed strong interest in rooftop solar, microgrids, and local ownership models. They helped circulate LEP materials through their networks.
- **Rotary Club of Lahaina Sunset:** Helped distribute LEP materials to their membership and expressed support for community engagement efforts.
- **Maui Hotel and Lodging Association (MHLA):** Participated in a stakeholder meeting on January 22, 2025, and hosted a town hall meeting on March 5, 2025. MHLA offered to share LEP information with its member hotels and emphasized the importance of reliable energy systems for Lahaina's economic recovery.
- **Maui United Way:** Partnered to support community outreach and fundraising efforts, helping amplify the LEP's wrap-around services. They played a key role in connecting and financially supporting the LEP with food services, mental health support, and keiki (child) services.
- **Hua Momona:** With financial support from Maui United Way, provided dinners and drinks for LEP events, contributing to the overall support and engagement of participants.
- **Pacific Counseling:** With financial support from Maui United Way, served as a partner in the LEP by providing mental health services and a keiki corner at community events, supporting participant well-being and family-friendly engagement.
- **Kahana Canoe Club:** Served as a partner in the SPP process by providing a gathering space before each community event and hosting the final Hui meeting, offering a familiar place for community members to come together and reflect.

Key Stakeholders

- **Hawaiian Electric:** Actively participated in multiple stakeholder meetings and hosted a Ma'alaea Power Plant tour and Lahaina site visit for the SPPs and NREL to discuss grid infrastructure, resilience hubs, microgrids, undergrounding, and other grid-hardening strategies. Hawaiian Electric has committed to

continued collaboration and open communication with the LEP and with the broader Lahaina community.

- **The County of Maui:** Played a key role in supporting the LEP's alignment with long-term recovery and resilience planning. The County partnered with the LEP to promote engagement opportunities by featuring events on the Maui Recovers community calendar, sharing updates through Maui Nui First's social media channels, and highlighting the LEP during multiple county-led Wednesday Disaster Recovery Community Update meetings. The LEP was also included in the County of Maui Long-Term Recovery Plan as part of the energy resilience strategy. In addition to communications support, the county provided access to the Office of Recovery space for recurring Hui meetings, offering a consistent venue for trusted community dialogue. LEP representatives also met with multiple county departments throughout Phase 1, including the Office of the Mayor, Office of Recovery, Department of Public Works, Department of Water Supply, Department of Environmental Management, Maui Emergency Management Agency, and the Office of Economic Development, to ensure coordination and alignment with broader recovery efforts.

As the Lahaina community moves into Phase 2, these outreach strategies will continue to play a central role in ensuring community voices remain at the forefront of energy decision-making. By refining and expanding these efforts, the LEP can continue to build strong community engagement that leads to effective, community-driven energy solutions.



Figure 8: Community members engaging at the January 28, 2025, co-design Workshop at Lahainaluna High School

3.2 Community Engagement: Methods, Activities, and Key Takeaways

The LEP employed a structured, multitiered community engagement strategy to ensure Lahaina residents play a direct role in shaping their energy future. The engagement process is designed to maximize participation, build local energy literacy, and ensure transparency in decision-making.

This engagement approach is based on key strategies:

Co-Design Workshops

The co-design workshops were the primary structured engagement spaces in which local residents could discuss energy priorities, explore solutions, and refine pathways toward implementation. These interactive workshops empowered participants by increasing energy literacy and awareness, facilitating discussions on key topics such as energy resilience, innovative technologies, ownership models, and affordability, and guiding collaborative decision-making. Each session built upon previous discussions, ensuring that community voices

were consistently integrated into the process. Through hands-on exercises, context setting, and prioritization activities, the workshops helped to identify preferred solutions that align with Lahaina's long-term needs.

Hui Meetings

Hui meetings provided a focused setting for discussions with key community leaders and individuals who hold deep connections and knowledge of Lahaina. These meetings served as a first-pass space to test and refine ideas before introducing them to the broader community through co-design workshops. Participants included recognized local leaders, cultural practitioners, kūpuna, and community advocates, whose insights were invaluable in shaping and strengthening the engagement process. Each Hui meeting allowed the LEP to present initial concepts, gauge reactions, and refine discussion topics based on feedback. These gatherings played a crucial role in identifying gaps, clarifying community concerns, and ensuring workshop activities and materials resonated with the broader Lahaina community.

Stakeholder Engagement Sessions

Stakeholder engagement was a critical component of the project, ensuring that community-driven energy priorities were informed by technical expertise, regulatory considerations, and broader planning efforts. These discussions provided opportunities to align with ongoing infrastructure and policy initiatives, share insights from the community process, and ensure key stakeholders were aware of and engaged in the project's progress. By fostering collaboration with Hawaiian Electric, PUC, the County of Maui, HSEO, and other local partners and landowners, the LEP helped to bridge the gap between community vision and institutional planning, strengthening pathways for implementation and long-term support.

Targeted Community Engagement

To expand participation beyond LEP-hosted events, targeted engagement efforts focused on connecting with groups already active in Lahaina. Rather than hosting separate outreach sessions, the LEP joined existing meetings and gatherings as guest speakers, ensuring community members who might not attend co-design workshops or Hui meetings could still engage in the energy planning process. In addition to in-person engagements, the LEP connected with organizations via email, sharing information about the project, upcoming events, and opportunities for involvement. These efforts helped to broaden awareness of the LEP, gather additional insights, and ensure energy discussions were accessible to a wider range of Lahaina residents and organizations. By meeting people where they were already convening and providing multiple avenues for engagement, the LEP was able to integrate community energy planning discussions into ongoing community efforts while respecting participants' time and priorities.



Figure 9: Community members engaging at the October 24, 2024, and January 28, 2025, co-design workshops at Lahainaluna High School

Energy Education Efforts

A core pillar of the LEP was building community capacity through intentional energy education. From the outset, the LEP prioritized empowering residents with the knowledge needed to make informed decisions about their energy future. Recognizing that technical and regulatory aspects of energy planning can often feel inaccessible, the LEP worked to demystify these concepts and to ensure learning was woven into every phase of the engagement process.

Education Strategy as a Part of the Larger Process

Energy education was not a stand-alone activity; it was embedded within the broader Community Engagement Plan and shaped by a dedicated Energy Education Plan. Rather than relying solely on predetermined topics, the energy education strategy was guided directly by the community. Questions raised and topics flagged for deeper discussion during Hui meetings and co-design workshops served as the foundation for educational content development. These real-time conversations ensured that learning was community directed, responsive, and grounded in local concerns.

Energy Education Survey

To better understand the community's interests and knowledge gaps related to energy, the LEP distributed an energy education survey to participants at both the first Hui convenings and the community co-design workshop. The survey was designed to supplement insights gathered during group discussions by capturing additional topics that residents wanted to learn more about. It asked participants to select energy education topics of interest from a predefined list, while also allowing for open-ended responses. The survey received a total of 24 responses from participants.

Survey findings helped to shape workshop agendas and guided the development of educational materials tailored to community needs. The top five energy education topics identified through survey responses are summarized here (see Figure 10):

1. What is a microgrid, and how does it work? (19 responses)

Participants were highly interested in understanding microgrids (i.e., small, localized energy networks that can operate independently from the main grid). Community members wanted to learn how microgrids can support resilience, provide backup power during emergencies, and help Lahaina move toward greater local energy control.

2. What are Lahaina's energy generation options? (19 responses)

Respondents expressed a strong desire to learn about available energy generation technologies. Topics of interest included solar, hydropower, and other renewable sources, as well as how different technologies might fit Lahaina's environmental conditions, cultural values, and resilience needs.

3. What are Lahaina's energy storage options? (18 responses)

Community members wanted to better understand how energy storage systems could help stabilize Lahaina's future grid. Areas of interest included battery storage, pumped storage hydropower, and other technologies that could store excess renewable energy and provide backup power during outages.

4. Energy × emergency preparedness and disaster resilience (18 responses)

Residents were eager to learn how energy systems can support disaster preparedness and recovery. Participants were interested in how microgrids, distributed energy, and resilient infrastructure could strengthen evacuation capabilities, emergency services, and community safety during future extreme events.

5. Energy × workforce development (18 responses)

Survey responses showed significant interest in connecting energy planning with local job creation. Residents wanted to understand how renewable energy projects could create



opportunities for workforce development, skills training, and economic diversification that benefit Lahaina’s long-term recovery and resilience.

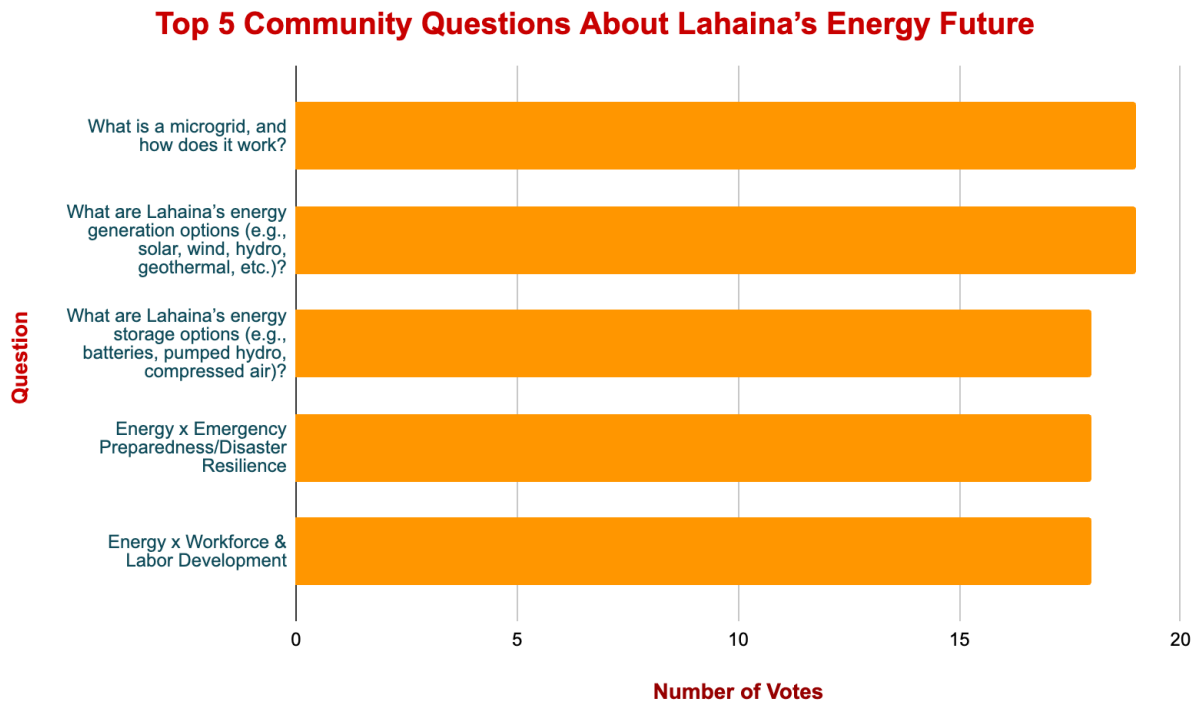


Figure 10: Energy education survey responses: survey responses highlighting the most common topics Lahaina residents want to learn more about through energy education

Educational Content and Materials

To respond to these needs, the LEP created a suite of accessible educational tools that were shared at events and made available upon request (see Appendix D). These included:

- **One-page fact sheets and infographics** on key topics:
 - *Understanding the Regulatory Process in Hawai‘i*
 - *How Microgrids Work*
 - *What Is the Integrated Grid Planning (IGP) Process?*
 - *Introduction to Wheeling*
 - *The Water-Energy Nexus*
 - *Hydropower*
 - *About the LEP.*
- **Short videos** were produced and shared online and at events, offering simplified overviews of energy concepts and technologies. Topics included:



- *About the LEP*
- *Microgrids (in development).*

Workshops as Educational Spaces

Each co-design workshop was structured as both an engagement for co-design and an educational event. Educational topics introduced included:

- Energy generation and storage
- Hydropower
- Energy 101 for Maui
- Energy microgrids
- Energy systems ownership models
- Energy transmission and distribution
- Undergrounding and other grid-hardening.

Interactive exercises and handouts were paired with these presentations to reinforce learning and to encourage questions and feedback. This approach ensured community decisions were informed by shared knowledge rather than assumptions or incomplete information.

Building Long-Term Capacity

The LEP's energy education efforts were designed not only to support this planning process but also to build lasting capacity and expertise within the Lahaina community. Residents gained a deeper understanding of how energy decisions are made, how to participate in regulatory processes, and what options exist for community-led energy planning.

These efforts helped lay the groundwork for the Lahaina community to remain actively involved throughout the upcoming technical assistance phase with NREL, ensuring community voices continue to shape feasibility studies, policy recommendations, and implementation planning.



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Figure 11: Maalaea Power Plant tour and Lahaina site visit with Hawaiian Electric on January 27, 2025

Summary of Activities and Engagement

During Phase 1, the LEP conducted a broad and layered engagement effort to ensure community leadership and alignment with local recovery needs. Activities included co-design workshops, Hui convenings, stakeholder meetings with public agencies and utilities, and targeted outreach presentations to community groups. These efforts helped build community energy literacy, surface priorities for Lahaina's energy future, and foster collaboration across government, nonprofit, and private sectors.

A detailed breakdown of all engagement activities, including dates, attendees, key topics, and major takeaways, is provided in Appendix B.

Demographic Survey

As part of the LEP's commitment to representative community engagement, voluntary demographic surveys were conducted across all three community co-design workshops. These surveys provided valuable insight into who was participating in the process and helped identify gaps in representation that can be addressed in future outreach and education efforts.

Survey results suggest the workshops generally reflected the diversity of Lahaina's pre-fire population, with strong participation from Native Hawaiian, Filipino, Chinese, Japanese, and Pacific Islander residents. This aligns with 2023 Data USA statistics showing Lahaina's population identified primarily as Asian (38%), White (25%), Two or More Races (19%), and Native Hawaiian or Pacific Islander (5%).²⁴

Although ethnic and geographic representation was broad, younger age groups were notably underrepresented. Only 2% of respondents were aged 18 to 24, and no participants were under 18. This highlights an important opportunity to strengthen youth engagement in future phases of the project.

Geographic Representation

Respondents represented a wide geographic spread across Maui, with the majority coming from Lahaina or nearby areas. The most frequently cited locations were North of Lahaina Town, Wahikuli, Ha'ikū, and Makawao. Several participants indicated they were temporarily displaced because of the August 2023 wildfires, underscoring the continued impact on residential stability (see Figure 12).

²⁴ Data USA: Lahaina, HI Profile. <https://datausa.io/profile/geo/lahaina-hi/>.

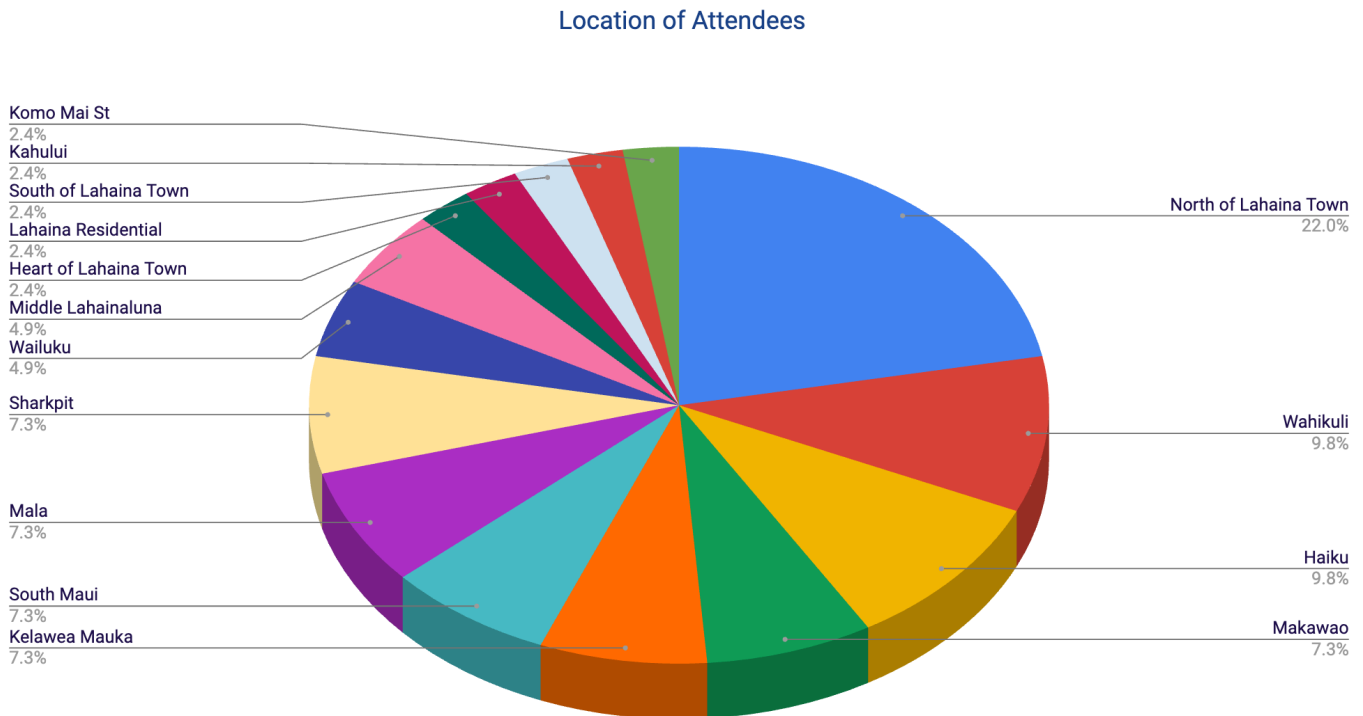


Figure 12: Geographic distribution of co-design workshop participants

Age Distribution

Participants spanned a wide range of ages, with the 45-54 age group making up the largest share at 34.1%, followed by the 65+ group at 22.7%, and the 55-64 group at 15.9%. Younger adults were underrepresented, with only 2.3% in the 18-24 age group, and no participation by individuals under 17 (see figure 13).

This distribution highlights the need for targeted strategies to engage younger residents in future planning and education phases.



Age Group of Attendees

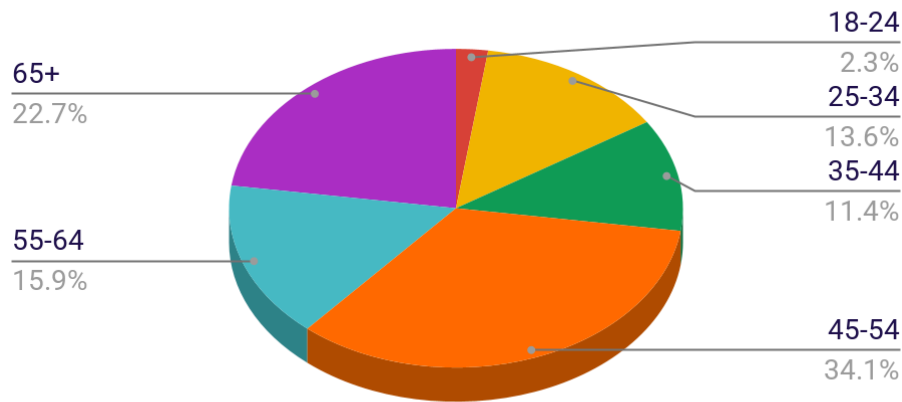


Figure 13: Age distribution of co-design workshop participants

Ethnic and Cultural Representation

Survey responses reflected the multiethnic fabric of Lahaina’s community. Participants identified with a wide range of ethnicities, with many selecting more than one category. The most common self-identified ethnicities were White, Native Hawaiian, Filipino, and Chinese, with additional representation across Pacific Islander, Japanese, and other groups.

This variety in ethnic background underscores the need for culturally responsive planning practices that honor the range of experiences and backgrounds present in Lahaina (see Figure 14).

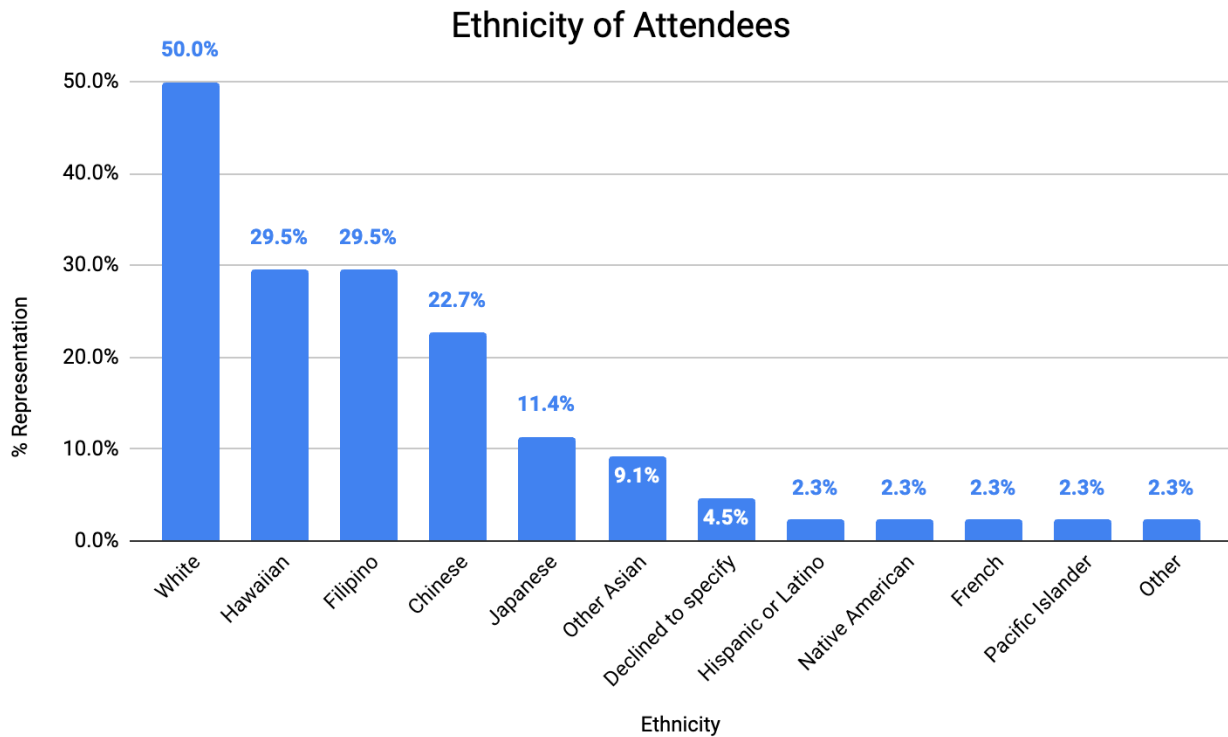


Figure 14: Ethnic and cultural representation of co-design workshop participants

Continued Engagement

A key indicator of community commitment was the high percentage of respondents, 90% or more at every workshop, who expressed interest in staying involved with the LEP. This strong level of interest affirms the value of continued communication, education, and collaborative planning in the next phase of the project.

Challenges and Considerations

Working in a Post-Disaster Context

The LEP took place in a highly sensitive, post-disaster context. Residents are navigating trauma, displacement, housing instability, and overlapping recovery initiatives. These realities

shape not only the logistics of community engagement but also the emotional landscape in which energy planning occurs.

Community Burnout and Overlapping Initiatives

Many residents expressed fatigue from the high volume of recovery-related meetings and initiatives happening simultaneously across Lahaina. This not only created emotional strain but also made it difficult for some community members to attend events consistently. To minimize additional burden, the LEP prioritized limiting session lengths to 2 hours and focused on depth over breadth, ensuring that each session was meaningful and impactful without overwhelming participants.

Community members also shared that, in the midst of housing insecurity, economic pressure, and ongoing trauma, it was challenging to prioritize long-term energy planning. The urgency of immediate needs made it difficult to fully engage with future-oriented conversations, even when participants recognized the importance of the work. The LEP aimed to hold space for this reality by grounding all discussions in care, flexibility, and respect for participants' time, energy, and lived experience.

Emotional Weight of Energy Discussions

For some residents, talking about energy infrastructure evokes the trauma of the wildfire itself, especially when discussing downed lines, poles blocking escape routes, and the push for undergrounding. LEP facilitators approached these conversations with care, and energy safety became a prominent theme in the community vision and priorities.

4. Community Engagement Results

The LEP engagement process was designed to be responsive to community interests and priorities, ensuring discussions, educational materials, and technical exploration were guided by what the community identified as important.

From the outset, the co-design process was structured to listen first and then develop materials, discussions, and engagement strategies based on community input. As key topics and concerns emerged through early Hui meetings and initial outreach, these themes were integrated into subsequent workshops, stakeholder discussions, and educational sessions.

- **Community interests shaped the co-design process:** Each workshop built upon the discussions and priorities identified in previous engagements. Instead of predetermining



the focus areas, the LEP used a community-driven approach to ensure the process reflected the issues most relevant to Lahaina residents.

- **Energy education materials aligned with community needs:** The infographics, fact sheets, and presentations developed for community meetings were based on recurring questions and areas of interest raised by participants. If a topic generated significant discussion, additional educational resources were created to provide clear, accessible explanations.
- **Iterative process for refinement:** Feedback loops were built into the engagement process, ensuring priorities identified in one phase were revisited, refined, and validated in later sessions. Community members were not just consulted once but were engaged throughout the process to continuously refine and build upon their ideas.

Through this approach, the prioritization and ranking exercises were a natural extension of the discussions and materials developed throughout the engagement process. Rather than presenting preset options, the LEP ensured energy priorities were derived from the interests, concerns, and values expressed by the community.

This community-led foundation now informs the technical and feasibility work in Phase 2, ensuring that future efforts remain grounded in local knowledge and community-defined goals.

4.1 Lahaina's Community Energy Vision, Guiding Principles, and Considerations

Over the past 9 months, the LEP has worked closely with the Lahaina community to ensure Lahaina residents define their own energy future in the aftermath of the August 2023 wildfires. Through community co-design workshops, Hui meetings, and extensive outreach, a shared vision for a resilient, community-centered energy system has emerged. This vision is rooted in community leadership, resilience, cultural integrity, sustainability, and local control, ensuring Lahaina's energy transition is not just a technical process but a community-driven movement.

In addition to energy resilience and local control, land use and cultural stewardship emerged as critical themes throughout community engagement. Future energy solutions must not only be technically and economically sound but also aligned with Lahaina's cultural identity, historical traditions, and deep relationship with 'āina (land) and wai (water).

The *community vision, guiding principles, and land use considerations* outlined in this section serve as the foundation for the energy pathways and recommendations presented in this report. They will inform the technical assistance provided by NREL in Phase 2 and guide the development of the final Community Energy Implementation Plan, ensuring Lahaina's energy transition aligns with both community values and technical feasibility.

Community Vision Statement

Through extensive engagement, Lahaina residents have crafted the following vision statement to reflect their collective aspirations for energy resilience, economic security, and sustainability:

We, the community of Lahaina, envision a strengthened energy system that reflects our values of safety, resilience, affordability, and sustainability. We prioritize the integration of clean renewable energy sources, ensuring that our infrastructure is ready to withstand extreme events. Our energy system will protect our community, diversify our economy, honor our cultural traditions, and build a self-sustaining local energy system that benefits current and future generations.

Guiding Principles and Considerations

The guiding principles developed through community engagement serve as the framework for Lahaina’s energy transition. These principles ensure future energy solutions reflect both technical feasibility and community priorities:

1. Community Leadership and Local Control

Energy planning should be community driven, with Lahaina residents actively involved in and directing decision-making processes.

○ Community considerations:

There was broad community support for energy solutions that empower local decision-making and allow Lahaina residents to benefit directly from new projects and guide their development. Priorities included:

- Developing community energy ownership models, such as cooperatives, to keep profits and decision-making local
- Establishing transparent and representative decision-making processes in which residents lead energy planning within their community
- Ensuring that large-scale energy projects prioritize local economic benefits, such as job creation and reinvestment into the local economy
- Integrating energy projects into Lahaina’s existing land use framework to avoid conflicts with farming, cultural sites and practices, and open space conservation efforts.

2. Resilience and Safety

The energy system must be designed to withstand future disasters, ensuring grid stability, emergency preparedness, and climate adaptation.

○ **Community considerations:**

The August 2023 wildfire disaster reinforced the importance of a resilient energy system that can withstand extreme events, provide power when the centralized grid fails, and not pose a hazard to community members when infrastructure damage is sustained (e.g., igniting fires or blocking evacuation routes).

Community members prioritized:

- Undergrounding power lines and hardening the grid to reduce wildfire risks and obstruction of evacuation routes
- Developing microgrids and decentralized energy solutions to enhance local energy resilience
- Deploying energy storage solutions, such as batteries, to ensure backup power availability during emergencies.

3. Affordability and Accessibility

Solutions must lower energy costs, ensure fair access to renewable energy, and address barriers faced by historically underserved communities, renters, and multifamily housing residents.

○ **Community considerations:**

Residents repeatedly highlighted the need for cost-effective energy solutions that reduce household energy burdens while ensuring long-term financial sustainability. Many community members emphasized:

- Ensuring affordable electricity rates, particularly for low- and fixed-income households
- Addressing concerns about the high upfront costs of renewable energy installations and energy efficiency upgrades
- Supporting rate structures that incentivize local energy production and reduce dependency on imported fossil fuels
- Encouraging ownership models that keep financial benefits within Lahaina rather than flowing to outside investors.



4. Cultural and Environmental Stewardship

Energy projects should respect and positively impact Lahaina's land and water resources and cultural heritage, prioritizing environmentally and culturally responsible solutions.

- **Community considerations:**

Energy solutions must align with Lahaina's cultural values and environmental stewardship traditions. Community members prioritized:

- Sacred and culturally important lands and water resources are protected, particularly in discussions around hydropower, geothermal, and large-scale infrastructure projects.
- Large-scale energy projects that conflict with cultural sites or traditional land uses are avoided.
- New energy development respects Native Hawaiian knowledge and values.
- Grid-hardening projects must undergo careful planning to ensure iwi kūpuna (ancestral remains) and sacred lands are not disturbed.
- Energy development must balance environmental protection and water stewardship, supporting efforts to restore mauka-to-makai streamflow and preserving watershed health.
- Community members emphasized a strong preference for using existing built environments such as rooftops, parking lots, and repurposed infrastructure rather than converting agricultural or conservation lands.
- Past negative experiences with projects such as Ku'ia Solar, including safety issues and poor maintenance, have heightened community caution toward large-scale renewable energy projects.
- All future energy projects must be evaluated not only for technical feasibility but also for their alignment with Lahaina's environmental and cultural values.

5. Economic and Workforce Development

Energy projects should create local job opportunities, support economic diversification, and build long-term economic sustainability for Lahaina residents.

- **Community considerations:**

Community members emphasized:

- The importance of energy projects that generate local employment and workforce development opportunities
- Interest in projects that support economic diversification beyond tourism and help build a resilient, locally grounded economy
- Accessibility of skills training and employment pathways to residents, especially those impacted by the 2023 disaster.

6. Collaboration and Transparency

The energy transition should be collaborative, with clear, open communication between community members, government agencies and regulators, energy utilities and developers, and technical experts.

○ **Community considerations:**

Community members emphasized the need for:

- Clear, accessible sharing of information between all stakeholders throughout the planning, development, and implementation phases
- Ensuring that residents have early and meaningful opportunities to engage at every major decision-making point.

These principles and community considerations will guide NREL's technical assistance efforts, ensuring Lahaina's energy priorities are translated into practical, actionable solutions in the Community Energy Implementation Plan. The following section describes the Phase 1 engagement strategies that informed the development of these guiding principles.

4.2 Community Sentiment and Resistance to Technologies

Throughout the LEP's community engagement process, residents shared their perspectives on different energy technologies. Although there was enthusiasm for community-led renewable energy solutions, certain technologies were not supported broadly, and in some cases strongly opposed, by the community because of past experiences, cultural values, and environmental and land use considerations.

1. **Utility-scale solar PV farms:** Many community members expressed opposition to large-scale solar projects because of, among other reasons, the poor performance and visibility of the 2.87-megawatt (MW) Kuia Solar Project near Lahainaluna, as this project has been offline for much of its existence, has had episodes of sparking, and is highly



visible and visually unappealing. There was also concern that centralized solar PV installations take up valuable land without delivering adequate community benefits. Participants strongly preferred distributed solar PV on rooftops and parking lots to maximize energy production, while avoiding additional land use conflicts. In addition, concerns were raised about fire risks associated with utility-scale PV projects, especially in fire-prone areas such as West Maui. Community members also voiced uncertainty about the long-term environmental impact of solar PV and battery storage technologies, specifically the lack of clear strategies for end-of-life disposal and recycling of panels and batteries. Prior utility-scale solar PV projects on Maui have also faced community opposition, including concerns about “potential risks of water pollution, flooding and wildfires sparked by transmission lines” as well as “concerns about glare from solar panels, loss of open, scenic land, noise and dust impacts, the use of herbicides for vegetation management and “spiritual impacts from destruction of land.”²⁵

2. **Utility-scale wind energy:** Some residents were open to small-scale, distributed wind turbines, but there was opposition to large-scale wind farms because of concerns about their environmental impact (including impacts to wildlife such as native bats and bird species), disruption of the landscape and land access, and reliability because of frequent curtailment events at existing wind farms and frequent downtime for repairs or maintenance of installed wind turbines. Specific concerns included aesthetic impacts on Maui’s landscape, risks to wildlife from turbine blades, noise and shadow flicker effects, and questions about the efficiency of existing wind farms, which many residents observed as frequently offline. The 51-MW Kaheawa Wind Power project, located above Ma’alaea, was frequently cited as an example of wind farms that have disrupted native wildlife, particularly endangered bird and bat populations.
3. **Geothermal energy:** There has historically been a high level of opposition by the Native Hawaiian community to geothermal energy development. This strong cultural resistance to geothermal energy includes many Native Hawaiian community members being opposed to drilling into volcanic formations, which are considered sacred. Concerns expressed historically in Hawai’i and reinforced in one-on-one conversations with individual Hui members included the potential desecration of land, groundwater contamination risks, and a lack of trust in geothermal developers resulting from past conflicts over similar projects in Hawai’i. However, this topic did not come up frequently in discussions and was not explored in depth during community engagement sessions,

²⁵ Plug Pulled On Solar Farm Planned For South Maui. Honolulu Civil Beat. November 28, 2023. <https://www.civilbeat.org/beat/plug-pulled-on-solar-farm-planned-for-south-maui/#:~:text=A%20proposed%20solar%20project%20located,powering%20about%206%2C900%20Maui%20households.>
Maui Solar Project Stokes Concerns About Climate-Fueled Fire And Flooding Risks. Honolulu Civil Beat. March 27, 2023. <https://www.civilbeat.org/2023/03/maui-solar-project-stokes-concerns-about-climate-fueled-fire-and-flooding-risks/>



because of both historical community opposition as well as several studies showing limited to no geothermal development potential and extreme topography in West Maui's southern segment, making geothermal development in this area practically unfeasible.^{26,27}

The most concrete example of a Hawai'i-based geothermal project that has received significant local opposition is Puna Geothermal Venture in Puna, Hawai'i. Opponents of the project have cited concerns about the plant's operations and potential impacts on the community, environment, and Native Hawaiian cultural practices. "Opponents argue that the plant's operations have caused health problems, industrial noise, and anxiety about potential accidents. They also point to the plant's proximity to Kilauea Volcano and the possibility of gas leaks, particularly in the wake of the 2018 eruption. Some Native Hawaiians view the plant's operation as a disregard for Pele, the volcano goddess, and a violation of their cultural practices."²⁸ More recently, geothermal-related bills in the Hawai'i legislature did not receive sufficient support to advance in the 2025 Hawai'i state legislative session. SB1269 and HB1307 would have provided significant funding to Department of Hawaiian Home Lands (DHHL) and Department of Business, Economic Development & Tourism to conduct exploratory drilling intended to help identify geothermal potential.

4. **Desalination:** Desalination was broadly discouraged by participants who viewed it as misaligned with Lahaina's values of environmental balance and water resource stewardship. Residents expressed concern that desalination promotes a mindset of living beyond the island's natural carrying capacity, potentially enabling overdevelopment. Specifically, there was opposition to increasing freshwater supply through desalination, when it may support the construction of high-end residential developments, especially those with water-intensive amenities like private pools. The energy intensity of desalination, along with the environmental impacts of brine waste discharge, were also flagged as significant issues. Many worried that even listing

²⁶ Lautze, N.C., Thomas, D.M., Waller, D., Hinz, N., Frazer, N., Ito, G., 2017. Play Fairway Analysis of Geothermal Resources across the State of Hawai'i: 3. Use of Development Viability as one criteria to prioritize future exploration activities. *Geothermics* 70, 406–413. <https://doi.org/10.1016/j.geothermics.2017.07.005>.

²⁷ Nicole Lautze, Garrett Ito, Donald Thomas, Neil Frazer, Stephen J. Martel, Nicholas Hinz, Diamond Tachera, Graham Hill, Herbert A. Pierce, Philip E. Wannamaker, Thomas Martin, 2020. Play Fairway analysis of geothermal resources across the State of Hawai'i: 4. Updates with new groundwater chemistry, subsurface stress analysis, and focused geophysical surveys, *Geothermics*, 86, 101798, ISSN 0375-6505, <https://doi.org/10.1016/j.geothermics.2019.101798>. <https://www.sciencedirect.com/science/article/pii/S0375650519301993>.

²⁸ Longtime Geothermal Critics Refuse to Back Down As Puna Plant Eyes Expansion. Honolulu Civil Beat. June 15, 2023. <https://www.civilbeat.org/2023/06/longtime-geothermal-critics-refuse-to-back-down-as-puna-plant-eyes-expansion/>.



desalination as a potential priority could be misconstrued by policymakers as a justification to pursue or fast-track desalination initiatives. These sentiments were reinforced by recent updates to prior studies, which continued to find that desalination is energy intensive and expensive and poses unresolved challenges around brine waste management. These views were reinforced during Hui meetings and one-on-one conversations with various Hui members.

5. **Waste-to-energy:** Although some Lahaina community members expressed initial interest in waste-to-concrete technologies as a way to provide local building materials and find a solution to dealing with waste materials from the Lahaina 2023 wildfires that were temporarily diverted to Olowalu, the Hui and attendees of the community co-design workshops did not express a high degree of interest in pursuing waste-to-energy solutions for the Lahaina community. As a result, there were not many resources dedicated in Phase 1 to energy education on the topic of waste-to-energy. The community also has experienced past negative experiences in dealing with waste-to-energy projects, including a failed county project with a company called Anaergia, which resulted in significant taxpayer money being spent on legal costs around the failed contract and several county facilities being unable to pursue alternative energy projects while the legal and contractual disputes were being resolved. Another waste-to-energy project with some negative community perception is H-Power on O'ahu, which, although it provides approximately 10% of O'ahu's power, also creates concerns related to air quality pollution and greenhouse gas emissions. However, a relatively large amount of waste is generated by the hotel, resort, and hospitality sector on the West Side and the impact of regularly hauling large volumes of waste from Maui's West Side to the Central Maui Landfill. Further, the Lahaina community is interested in having a firm power source available for backup power and reducing its dependence on power delivered to Lahaina from Hawaiian Electric's Ma'alaea Power Plant. Therefore, additional community education about waste-to-energy technologies and potential solutions is warranted and could also potentially benefit from technical assistance by NREL.

4.3 Recurring Energy Questions

Throughout the engagement process, community members repeatedly raised key questions about energy independence, affordability, technical feasibility, and regulatory processes. These questions reflect ongoing community concerns and highlight areas where further education, policy engagement, and technical assistance are needed.

Energy Independence and Affordability

- How can Lahaina transition toward greater energy independence while maintaining affordability?



- What financial support is available for residents and businesses to adopt renewable energy technologies?

Renewable Energy, Energy Storage, and Microgrids

- How do microgrids work, and what are the regulatory challenges to implementing them?
- What legislative and regulatory changes are needed to facilitate microgrid adoption?
- How will microgrids affect energy rates and affordability?
- Could each subdivision have a microgrid?
- What are the efficiency and cost differences between rooftop and ground-mounted solar?
- How much solar could be installed in the Lahaina Gateway parking lot, and how many households could that system power as a reference for its potential energy generation?
- What is the potential for installing solar on commercial parking lots across Lahaina, and how could this support community energy goals?
- What strategies exist for improving battery recycling on Maui?
- What alternative energy storage concepts, such as gravity-based storage, could be explored?
- Could county or state building codes require all new construction, particularly residential and small commercial buildings, to include solar PV and battery storage, and if so, what strategies could ensure this requirement does not significantly increase upfront construction costs for homeowners or developers?
- Are there county, state, or federal incentives available for homeowners or businesses to install solar and storage?
- What upcoming renewable energy projects are in the pipeline for Maui?
- What end-of-life strategies exist for solar panels, batteries, and other renewable energy technologies, and how can Lahaina ensure these environmental considerations are incorporated into project planning?

Hydropower and Pumped Storage Hydropower

- What are the costs, benefits, and risks of using R-1 (recycled nonpotable) water for pumped storage hydropower or in-line hydropower?
- What are the potential generation levels of a hydropower system on the West Side, and would it be worth the investment?
- Are there legacy hydropower facilities in West Maui that could be restored? Are those systems in balance with instream flow standards, or do they divert water unsustainably?
- What fire prevention measures are necessary for hydropower systems?
- How clean and sustainable is hydropower?
- Could historical hydropower infrastructure in West Maui be restored and modernized to meet current energy needs while honoring environmental and cultural considerations?



- How can hydropower solutions be designed to avoid disrupting mauka-to-makai (mountain to sea) stream flow, and instead support watershed health?
- What are the risks of evaporation and water loss in open-ditch hydropower or pumped storage systems, and how can they be mitigated?
- Are there health regulations associated with open-air hydropower systems, particularly if R-1 wastewater is used?

Grid Hardening and Undergrounding

- What are the cost implications and feasibility of undergrounding power lines, especially in areas with blue rock and/or high water tables?
- Are there cost-sharing models or funding mechanisms that could help lower the financial burden of undergrounding?
- How can we ensure the protection of iwi kūpuna (ancestral remains) during undergrounding?
- Does undergrounding significantly reduce fire risks compared to other options?
- What alternative safety measures could be implemented if undergrounding is not feasible?
- Which neighborhoods had underground circuits prior to the fire, and how can we better understand the patchwork nature of existing underground infrastructure?
- What is the potential for strategic undergrounding along key evacuation routes, and how can those routes be identified and prioritized?
- Could there be a case made for greater connectivity of underground circuits, especially given the opportunity to rebuild the entire town?

Regulatory and Utility Role

- What role do Hawaiian Electric and the Public Utilities Commission play in supporting community-driven energy projects?
- Which policies need updating to support community-driven energy projects?
- What steps ensure renewable energy access for all?
- How can community members be more engaged in shaping energy policy and regulatory decisions?
- What are the limitations or rules around sharing energy between properties, particularly when parcels have different tax map keys (TMKs, which are unique identifiers assigned to individual parcels of land in Hawai'i), and how might this affect community microgrids or shared energy systems?

Wildfire Recovery and Rebuilding

- Are there immediate solutions that can support homeowners and business owners who are rebuilding their structures that were lost during the 2023 wildfires?



- Could the grid reopen to Net Energy Metering to encourage more residential solar adoption in Lahaina?
- What were the limitations of the grid before the fire, and if every rooftop had solar, could the current grid infrastructure support that level of distributed generation?

5. Community Energy Priorities

The second-to-last Hui convening and the final co-design workshop for Phase 1 were dedicated to hands-on energy prioritization activities. The partners developed a list of energy topics for community input based on two sources: topics that had emerged organically through community discussions over the course of Phase 1, and topics that the partners believed were important for the community to consider and respond to. Community members were invited to identify which energy topics mattered most to them by placing stars next to their top priorities. Participants could place all of their stars on a single issue or distribute them across multiple areas. For broader categories such as “Low-Impact hydropower” or “Exploring Emerging Energy Technologies,” participants could also check specific subcategories, such as R-1 wastewater reuse, distributed energy storage, or agrivoltaics, to clarify what specific aspects of those broader categories were most important to them.

To ensure a broader range of voices and experiences were captured, this process was supplemented by a community-wide online survey, which asked residents to rank all 12 energy topics in order of importance. This approach provided more structured, comparable data, especially from individuals who may not have been able to participate in person. A key limitation of the online survey was that the SPPs could not control the degree to which online survey takers took advantage of the prepared energy education resources to make a more fully informed opinion. Online survey responses were weighted lighter than in-person responses since respondents who participated in person had engaged in a deeper level of information sharing prior to responding. Further discussion of the online survey’s limitations can be found in section 5.4, *Limitations and Considerations for Future Work*.

Together, these methods offer a comprehensive and community-driven foundation for the LEP’s planning efforts. The following section presents the results of each engagement method: Hui meeting, co-design workshop, and online feedback form, and provides an integrated overview of the highest-ranked priorities guiding Lahaina’s pathway forward.

5.1 Ranked Community Energy Priorities

Lahaina’s community members identified a diverse set of priorities, with some solutions ranking significantly higher because of widespread support and perceived impact. Below is a breakdown of the most highly ranked energy priorities, along with specific areas of interest within each



category. Please note not all votes included a specific area of interest being selected, as participants were guided to only place checkmarks for subtopics that were of particular interest, if any. As a result, the total number of area-of-interest checkboxes marked may not match the overall number of star votes received for each priority.

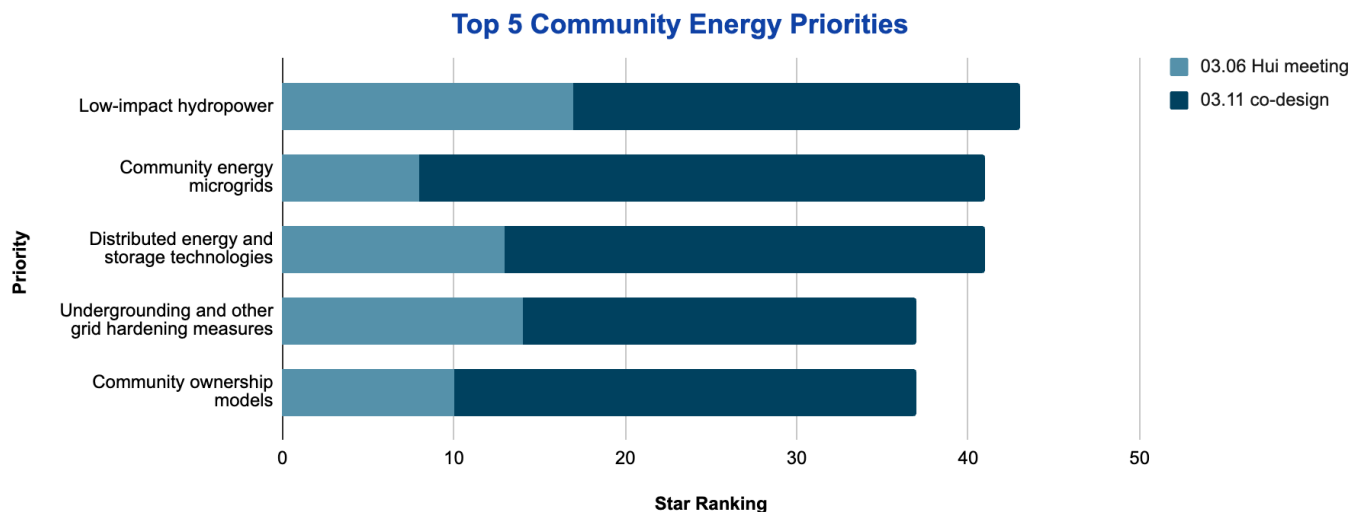


Figure 15: Top 5 community energy priorities identified at the co-design and Hui meeting

Top-Ranked Community Energy Priorities

1. Low-Impact Hydropower (★ 43 votes)

Hydropower was the highest-ranked priority, with the community expressing strong interest in utilizing existing water infrastructure to generate and store energy. Specific areas of focus included (see Figure 16):

- **R-1 wastewater as an energy storage or power generation resource** (16 votes)
- **Hydropower for electricity power generation** (9 votes)
- **Backup power for water and wastewater infrastructure** (4 votes)
- **Hydropower as a power source for desalination for water supply** (2 votes).

Despite the strong interest, community members emphasized the need for further feasibility studies to ensure sustainable water management and to identify power generation potential.

Community Considerations

Community members ranked low-impact hydropower as their top energy priority, reflecting a strong desire to reconnect with Lahaina's historical self-sufficiency while addressing today's urgent energy and water challenges. Hydropower was seen not only as an energy source but also as a reflection of traditional, place-based resource management practices.

There was particular interest in repurposing existing irrigation ditches and historic water infrastructure, minimizing new environmental impacts that could result from new large-scale infrastructure projects, and building on knowledge systems rooted in local land and water management. Many residents expressed enthusiasm for exploring the use of R-1 recycled water as a means to support both energy generation and storage, as well as water resilience and security. R-1 was seen as especially desirable because it avoids further strain on streams or aquifers, helping to maintain ecological balance and protect mauka-to-makai connectivity.

Maui County is in the process of designing a system to distribute R-1 recycled water in West Maui, and the Lahaina community wants to ensure the water is made available to Lahaina town located south of existing wastewater treatment plants and not only to resorts and golf courses located north of existing water treatment plants. The expansion of the R-1 system was seen as a promising opportunity to power small hydropower systems or pumped storage projects, while also contributing to broader goals such as fire prevention, reforestation, and sustainable water reuse. R-1 recycled water was viewed as particularly desirable because it does not require the diversion of natural stream flows or additional extraction from existing aquifers, reducing ecological impacts and aligning with community values around protecting mauka-to-makai connectivity.

At the same time, the community voiced concerns around the ecological impacts of stream diversions and the overpumping of aquifers. Participants emphasized the importance of preserving mauka-to-makai connectivity, particularly for native species and traditional practices. There was caution about legacy infrastructure that may have altered stream flows or failed to return water properly, and a desire to avoid any hydropower systems that would perpetuate harmful diversion practices. This concern was raised explicitly in opposition to the Makila hydropower proposal, which was viewed as potentially disrupting natural flow patterns and ecosystem health. There was strong concern that any disruption of mauka-to-makai flow could impact native species and cultural practices, especially where legacy hydropower systems fail to reintroduce water properly. Concerns were also expressed regarding overpumping of aquifers, which has led to increased salinity of local groundwater resources.

In addition to stream health concerns, participants raised questions about the regulatory and legal complexities of water rights and how permitting or compliance challenges might affect the feasibility of hydropower projects. Many noted that, although repurposing existing infrastructure

was appealing, detailed mapping, environmental review, and community involvement would be necessary to ensure responsible development.

Additionally, there were questions about how hydropower systems might perform during drought or wildfire conditions, including risks related to evaporation, system reliability, and fire resilience. Evaporation and water loss, especially in open-ditch systems exposed to heat and wind, were flagged as areas of concern. Questions were also raised about potential health regulations tied to the open-air use of R-1 water in energy systems.

This vision for hydropower is not just about energy, it is about aligning with Lahaina’s cultural values, history, and land-based practices. Community members see the integration of water and energy systems as a chance to model a more resilient, circular approach that serves multiple needs and benefits residents now and for future generations.

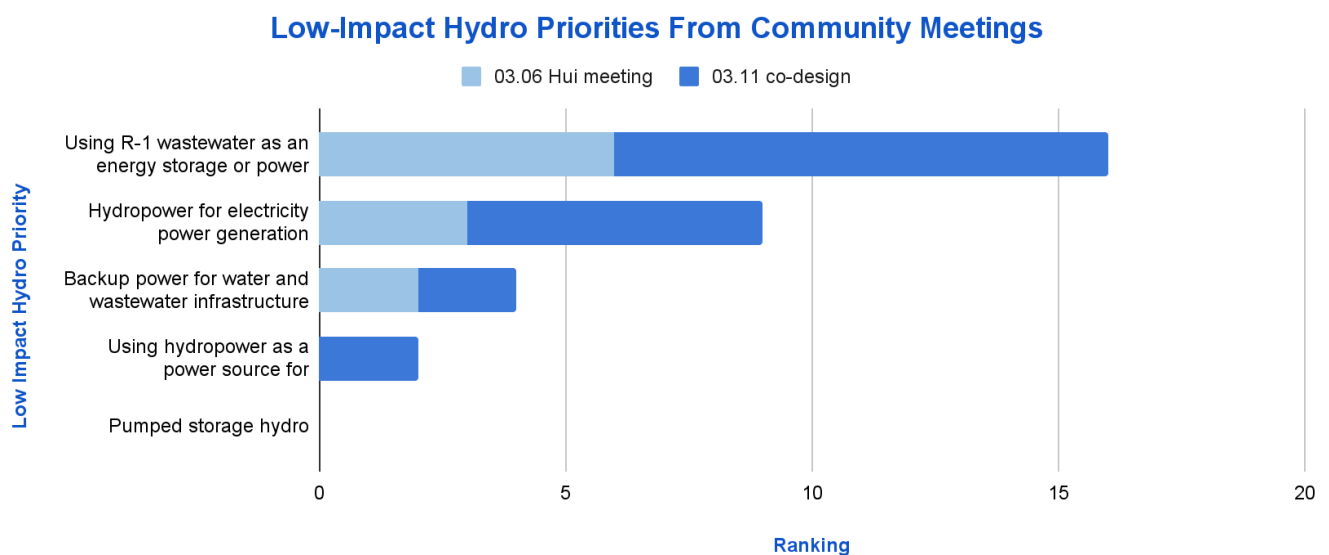


Figure 16: Low-impact hydropower priorities identified at the co-design and Hui meeting

2. Community Energy Microgrids (★ 41 votes) (tied for 2nd)

Energy microgrids were seen as essential for local energy independence and resilience, particularly in the wake of grid failures caused by wildfires and other disasters. Community members were eager to :

- **Explore pilot energy microgrid sites** to test feasibility
- **Understand cost-sharing models** to ensure affordability
- **Navigate regulatory barriers** to enable widespread implementation, including energy sharing between neighboring properties and across TMK boundaries.

The community strongly favored locally controlled energy microgrid solutions that integrate renewable energy sources, ensuring long-term sustainability, resilience, and cost savings.

Community Considerations

Microgrids are viewed as a critical strategy for increasing local energy independence and resilience, especially after the August 2023 fires, which left many Lahaina residents without power during evacuation and in the immediate wildfire response and recovery period. Participants envision a network of smaller, community-run energy systems that could continue functioning during broader outages and keep essential services online.

Residents emphasized the importance of affordability and equity in how microgrids are financed, with interest in cost-sharing mechanisms or pilot sites to test feasibility. There was also a strong desire for clear cost-sharing and maintenance models, particularly for shared infrastructure in neighborhoods, and for solutions that remain financially viable during normal conditions ("blue sky" days). Community members expressed interest in exploring financial compensation programs for microgrid energy exported to the larger grid.

Maps of West Maui Sub Area 3 were reviewed, and neighborhoods were identified that would benefit from neighborhood-scale microgrids and that could also benefit from load estimates to better understand power generation needs for each neighborhood. See Appendix C.2 for the community-defined neighborhoods map.

Community members expressed particular interest in how microgrids could support both traditional subdivisions and other dense residential settings, such as affordable housing projects or multifamily complexes, ensuring all types of communities can benefit from localized energy resilience. However, there was uncertainty about what types of buildings or communities could realistically be part of a microgrid, particularly mixed-use areas or condominiums, and how regulatory structures would affect those decisions.

Community members are eager for NREL to help clarify regulatory pathways, ownership models, localized load profiles, generation potential, and energy cost impacts. Concerns were also raised about whether current regulatory structures allow for community ownership or shared operation of microgrids, especially when energy must be shared across TMK boundaries.

The emphasis is on community-led microgrids that integrate renewable energy, avoid burdensome permitting, avoid environmental and cultural impacts, and deliver long-term energy



savings and reliability. See Appendix C.2 for more specific community guidance on desired resilience that could be provided by a microgrid.

2. Exploring Power Generation, Storage, and Cooling Technologies (★ 41 votes) (tied for 2nd)

Lahaina residents ranked energy technologies as a high priority, particularly solutions that complement existing infrastructure, such as rooftop and parking lot solar PV. Subcategories with strong support included (see Figure 17):

- Distributed energy resources (e.g., rooftop solar PV and battery storage for homes and businesses, parking lot solar PV plus energy storage, distributed energy storage) (19 votes)
- Agrivoltaics (co-locating ground-mounted solar or land-based wind with agricultural activities such as growing crops, grazing animals, or cultivating pollinator-friendly vegetation) (6 votes)
- Waste-to-energy (6 votes)
- Community solar PV (e.g., community-based renewable energy [CBRE]) (5 votes)
- Utility-scale solar PV (4 votes)
- Geothermal energy (3 votes)
- Small- to medium-scale (distributed) wind energy (2 votes)
- Ground-source heat pumps for cooling (2 votes)
- Utility-scale energy storage (1 vote)
- Wave/tidal energy (1 vote)
- Hydrogen (1 vote).

Community members expressed interest in learning more about these technologies and conducting technical feasibility assessments to determine which options best suit Lahaina's energy landscape and community needs.

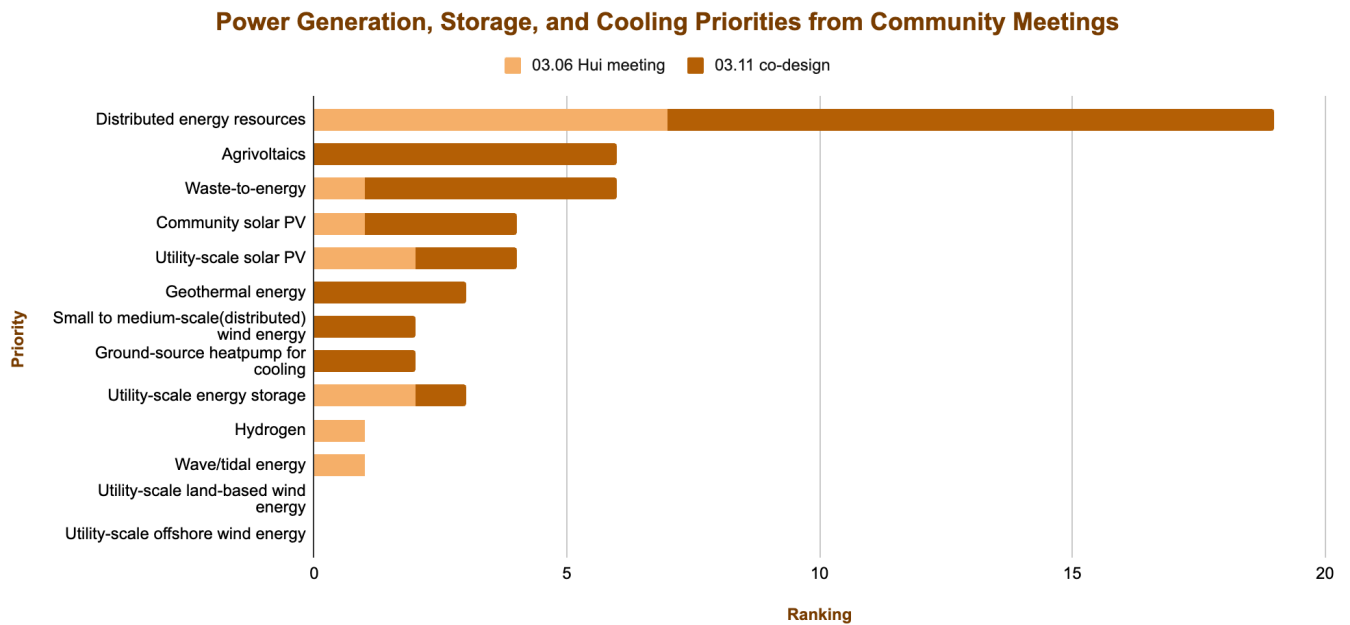


Figure 17: Power generation, storage, and cooling technologies priorities identified at the co-design and Hui meeting

Community Considerations

Community members overwhelmingly prioritized distributed energy solutions, which received significantly more support than any other power generation subcategory. Within this category, the Lahaina community prioritized distributed energy solutions, especially rooftop and parking lot solar paired with energy storage, as the most promising path forward. This reflects a desire to make the most of existing built environments while minimizing land use conflicts and environmental disruption. Preserving open land, particularly culturally significant or ecologically sensitive areas, is a clear priority, and community members strongly favored renewable energy systems that do not require the conversion of undeveloped or agricultural land.

There was particular enthusiasm for solar PV installations on commercial parking lots, schools, and other public or underutilized spaces, with participants noting the dual value of energy generation and shaded community benefit. These systems are seen as tangible, near-term opportunities to expand renewable energy access while honoring Lahaina's landscape and values. Rooftop and parking lot solar were viewed as practical ways to harness Lahaina's ample sunlight in a way that aligns with the town's character and community needs. These solutions were especially appealing when paired with community ownership models that keep economic benefits local.

Community members favored solar projects that support dual land use, such as agrivoltaics, compared to solar farms that convert undeveloped land without additional benefits. However, agrivoltaics received significantly fewer votes than rooftop and parking lot solar, reflecting a more cautious level of support. In fact, distributed energy resources received more than twice as many votes as any other power generation subcategory, with all other technologies, including waste-to-energy, utility-scale solar, and agrivoltaics, trailing far behind. This approach aligns with local values of stewardship and self-sufficiency. The community was wary, though, of the possibility of inauthentic agriculture or restricted land access that might result from private companies pursuing agrivoltaics. Although agrivoltaics were discussed, there were concerns about this being used as a justification for utility-scale solar PV installations, as well as concerns about limiting land access by community members. See Appendix C.3 for additional community guidance on solar development.

There was also notable skepticism about utility-scale renewables because of past underperformance (e.g., Ku‘ia Solar), and ongoing concerns around land use and cultural impacts. Residents emphasized that renewable energy projects should not compete with agriculture, cultural sites, or open space.

Community members raised questions about long-term recycling and end-of-life disposal for batteries and generation equipment such as solar panels and wind turbines, especially considering the fire risks and durability of such technologies in humid and marine environments.

There were requests for more clarity on how much solar capacity could realistically be installed on public spaces such as parking lots, what kinds of permitting would be required, and how those decisions would be made.

Many residents expressed concern over the high upfront costs of adopting technologies such as rooftop solar and storage, heat pumps, or home cooling upgrades. As a result, there was strong interest in potential financing models, utility programs, and on-bill repayment options to make these technologies more accessible to local families.

Ultimately, the community is looking for an energy system that reflects Lahaina’s scale, geography, and values, one that is modular, regenerative, and community controlled, supporting resilience, affordability, and long-term sustainability without compromising the integrity of the land.

3. Undergrounding and Other Grid-Hardening Measures (★ 37 votes) (tied for 3rd)

Grid resilience remains a major concern, particularly in preventing fire-related outages and ensuring safer infrastructure. Within this priority, key areas of focus included (see Figure 18):



- **Undergrounding power lines** (26 votes): Community members strongly supported prioritizing undergrounding in areas that serve as primary evacuation corridors and recognizing the importance of maintaining power reliability during emergencies.
- **Other grid-hardening measures** (12 votes): Examples include fire-resistant poles, pole placement, and vegetation management.

Undergrounding and Other Grid Hardening Measures Priorities from Community Meetings

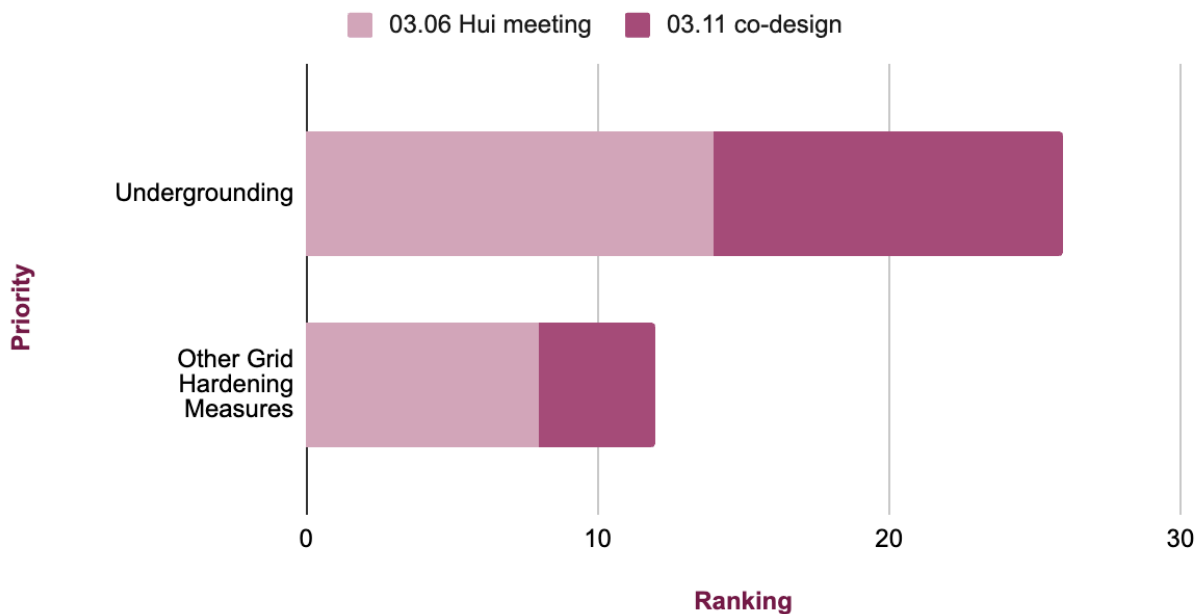


Figure 18: Undergrounding and other grid-hardening measures priorities identified at the co-design and Hui meeting

Community Considerations

Community members emphasized undergrounding is not just a technical preference but a deeply personal and safety-driven priority shaped by lived experience. During the August 2023 wildfires, downed poles and wires blocked key evacuation routes, contributing to the trauma and danger experienced during the crisis. As a result, undergrounding has become a symbolic and practical cornerstone of a safer, more resilient future for Lahaina. Downed power lines that were still energized also caused ignition points for fires to ignite.

Participants were especially vocal about the need to prioritize undergrounding in strategic locations, particularly along evacuation routes and in areas with critical infrastructure. Several noted this could be an opportunity to create a more cohesive underground system, as much of

Lahaina's pre-fire underground infrastructure was patchwork and disconnected. The idea of rebuilding from scratch prompted hopes that more intentional planning could lead to a more connected and fire-resilient energy system.

Residents acknowledged that undergrounding may not be feasible in all areas because of cost, technical challenges, and geographic constraints. However, they emphasized undergrounding should, at the very least, be prioritized along evacuation routes and other critical infrastructure areas to enhance overall disaster resilience.

In addition to undergrounding, many residents expressed a desire for more transparency and public communication from Hawaiian Electric regarding the criteria used to determine where undergrounding and other grid-hardening measures will be implemented, as well as the lack of publicly available maps showing which areas were already undergrounded prior to the fire. Community members emphasized this information is critical to public understanding, planning, and trust in ongoing utility decisions.

Community members requested additional education on the options and trade-offs between different hardening strategies, including partial bury and ground-mounted protected power lines, steel and fire-resistant poles, strategic pole placement, and vegetation management. Specific questions were raised about the trade-offs between steel poles (valued for durability) and wooden poles (valued for their lighter weight and aesthetic considerations). Residents wondered: if a steel pole falls, could it pose a greater safety risk by being harder to cut and remove during emergencies?

Vegetation management was also raised as a recurring concern, with questions about who holds responsibility—the utility, state, county, or private landowners—for keeping areas around poles and lines clear of wildfire hazards.

Residents also emphasized the importance of visual tools, such as maps that clearly show existing underground infrastructure, areas prioritized for future undergrounding, and other planned grid-hardening measures, to better understand and track progress. They expressed that this level of transparency is critical for building trust and ensuring community alignment with utility planning. There was clear interest in better understanding all potential options in situations where full undergrounding may not be feasible. This includes options such as partially burying lines to avoid having to trench too deep, encasing power lines in raised sidewalks, and laying power lines in protective conduit directly on the ground.

Some participants supported the continued use of poles in certain areas, provided they are placed far enough away from roadways to avoid blocking evacuation routes if they fall. This “setback” approach was seen as being a part of a practical safety compromise in areas where undergrounding may not be feasible.



In addition to undergrounding, residents raised questions about funding and implementation, expressing interest in cost-sharing models, federal or state infrastructure funds, and other financial mechanisms to reduce the burden on those who pay local rates. Community members also noted physical and geological challenges, such as blue rock and high water tables, may limit the feasibility of undergrounding in certain areas, requiring creative or site-specific solutions.

The protection of iwi kūpuna (ancestral remains) was emphasized as a critical consideration, with community members urging that trenching activities be approached with the utmost cultural sensitivity, care, and consultation. Participants emphasized this concern must be addressed proactively through archaeological surveys and cultural protocols.

Additional concerns included narrow street rights-of-way and landowner easement requirements, both of which may pose logistical and legal challenges in implementing undergrounding projects.

There were also concerns about landowner easements, especially in areas with narrow street rights-of-way. Relocating poles or trenching on private property may raise issues around consent, compensation, and feasibility, especially in cases in which residents are still recovering from the fire and may be hesitant or unable to navigate additional legal processes.

This emphasis on undergrounding aligns with findings from the County of Maui's Lahaina Community Engagement Summary Report, which engaged 3,833 residents across five Lahaina neighborhoods. In that outreach effort, 85% of respondents ranked moving utilities underground as a top priority for fire resilience and disaster recovery.²⁹ The West Maui County Council Member also communicated to the LEP that undergrounding of energy infrastructure remains one of the top energy-related concerns being expressed by constituents.

Together, these insights point to strong community support for strategic undergrounding as both a public safety measure and an investment in long-term resilience, one that should be explored thoroughly in the next phase of technical assistance.

3. Community Ownership Models for Energy System Infrastructure (★ 37 votes) (tied for 3rd)

Residents expressed a strong desire for local control over Lahaina's energy system, ensuring that economic benefits and decision-making stay within the community. Discussions focused on:

- Learning from best practices and lessons learned from community ownership models such as Kaua'i Island Utility Cooperative and the Ho'ahu Energy Cooperative on Molokai

²⁹ County of Maui Planning Department. (2024). *Lahaina Community Engagement Summary Report*. <https://pitch.com/v/lahaina-community-engagement-nwuife/5348162f-b9db-4bd1-a63f-71a60e979a68>.



- Exploring regulatory pathways to establish community-owned energy infrastructure
- Ensuring affordable access to community-run energy projects.

Many participants saw community ownership as a way to reinvest in Lahaina, rather than relying on outside investors or large utility-controlled projects.

Community Considerations

Community ownership was consistently described as a pathway to long-term self-determination and local resilience. Residents emphasized that owning and operating energy infrastructure would allow Lahaina to reinvest revenues back into the community, keep decision-making power local, lower energy costs, and ensure future developments align with community values. This was seen as especially important in the wake of the wildfire recovery, when many felt decisions were being made without adequate local input.

There was particular interest in learning from best practices and lessons learned from community ownership models such as the Kaua'i Island Utility Cooperative and the Ho'ahu Energy Cooperative on Molokai. At the same time, some participants raised practical concerns about what it would take to launch and manage a cooperative or other community-owned utility. Residents discussed the need for a governing board, transparent by-laws, internal capacity and expertise, and sustained community participation, all of which were seen as a significant undertaking, given the immense demands of rebuilding an entire town. Starting with a smaller community-owned project and scaling up over time was discussed as a possible approach to overcoming these challenges.

Others were curious about community-developed energy projects that could later be sold to Hawaiian Electric or operated through a power purchase agreement as a way to retain community control during project development while offloading long-term management. This approach was seen as a more feasible first step while still keeping early project benefits within the community.

Additional Community Energy Priorities

Beyond the **top-ranked solutions**, Lahaina residents identified other **critical priorities** that remain important for future planning (see Figure 19):

- Technical guidance for rebuilding homes and businesses with renewable energy and efficiency measures (★ 27 votes)
- Workforce development and job training (★ 25 votes)
- Grid modernization, grid-interactive technologies, and demand response (★ 22 votes)
- Addressing energy access and affordability (★ 17 votes)
- Energy efficiency programs (★ 16 votes).



We ultimately decided to remove "Electrification of Transportation (EOT)" and "Regulatory & Policy" as stand-alone categories from the online survey. Community interest in EOT was limited to 5 stars, and further discussion revealed that regulatory and policy considerations are inherently embedded across all energy topics.

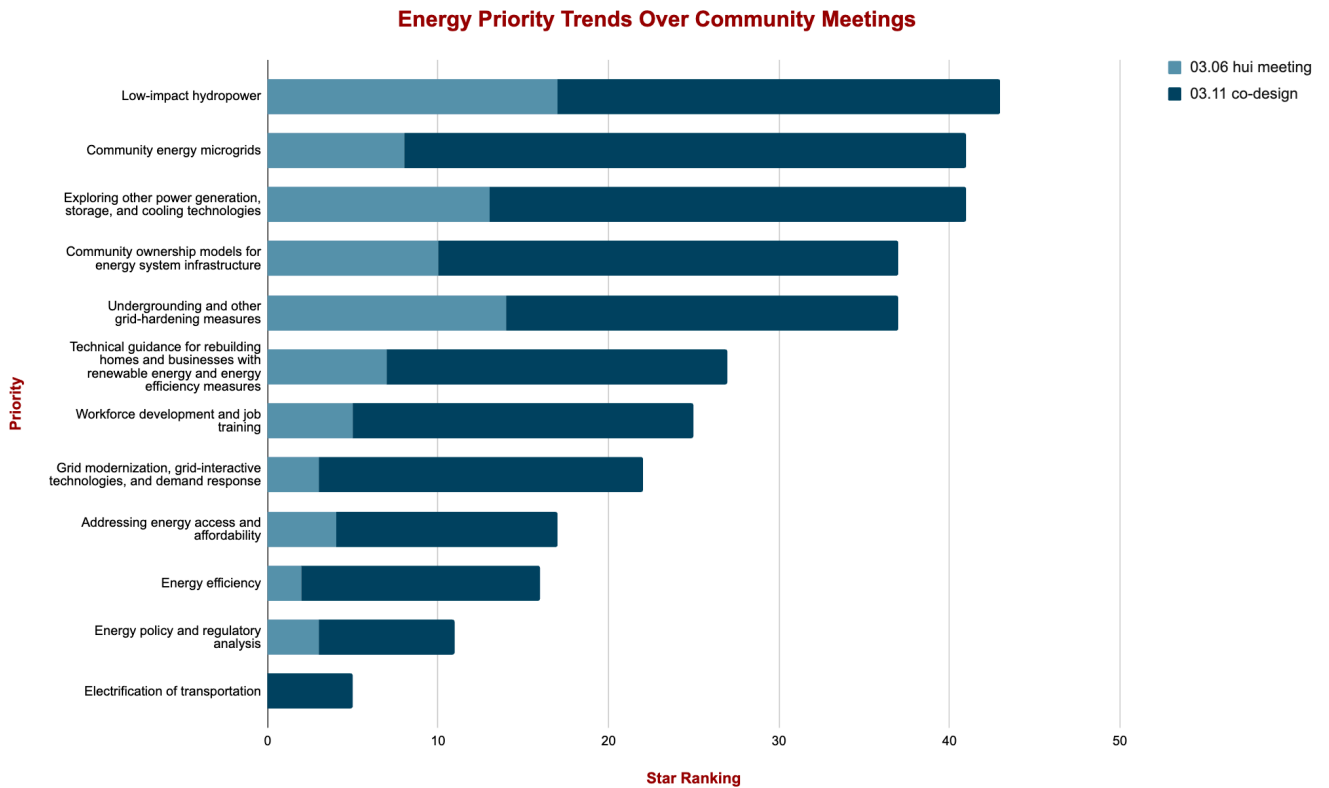


Figure 19: Overall community energy priorities identified at the co-design and Hui meeting ranking

5.2 Ranked Community Energy Priorities-Online Survey Results

To supplement the findings from the Hui meetings and co-design workshops, the LEP distributed a community-wide online survey to broaden participation and reach individuals who may not have been able to attend in-person events. The online survey provided an opportunity for residents to rank their top energy priorities, identify preferred technologies, and share perspectives on resilience, affordability, and local control.

The goal of the online survey was to gather input from a wider cross-section of the community, ensuring voices from all neighborhoods and demographics were reflected in the planning

process. The online survey was made available online. Responses were collected from both Lahaina and non-Lahaina residents and then sorted by ZIP code to allow for separate analysis of Lahaina-specific feedback. Of the 81 total respondents, 78.75% were from West Maui ZIP codes and 21.25% were from outside Lahaina, reinforcing that the majority of online survey input came directly from the local community.

Overall Online Survey Rankings (All Responses)

Based on total responses across all ZIP codes, the top-ranked community energy priorities were:

1. **Undergrounding and other grid-hardening measures:** The highest-ranked priority, reflecting strong public support for safer, more fire-resilient infrastructure
2. **Community energy microgrids:** A close second, highlighting interest in decentralized, neighborhood-scale solutions
3. **Low-impact hydropower:** Participants saw value in small-scale hydropower tied to existing infrastructure
4. **Technical guidance for rebuilding with renewable energy and efficiency:** Reflects the community's desire for practical support in recovery
5. **Community ownership models:** Support for local control and keeping energy revenues in the community.

Lahaina-Only Online Survey Rankings

When isolating responses from Lahaina residents, the top priorities shifted slightly but continued to reflect strong alignment with safety, resilience, and local empowerment:

1. **Undergrounding and other grid-hardening measures**
2. **Community energy microgrids**
3. **Technical guidance for rebuilding with renewable energy and efficiency**
4. **Low-impact hydropower**
5. **Community ownership models for energy infrastructure.**

These rankings closely mirror what was heard in workshops and Hui discussions, further reinforcing the themes of local resilience, self-determination, and post-fire rebuilding with safer, smarter systems.

In addition to ranking top-level priorities, online survey participants were invited to provide more detailed input on subcategories related to energy generation, hydropower, and grid improvements.

Grid-Hardening Priorities

Lahaina respondents overwhelmingly favored undergrounding (52 votes) and grid hardening (41 votes), confirming the strong desire to reduce wildfire risk, increase evacuation safety, and rebuild infrastructure with resilience at the forefront (see Figure 20).

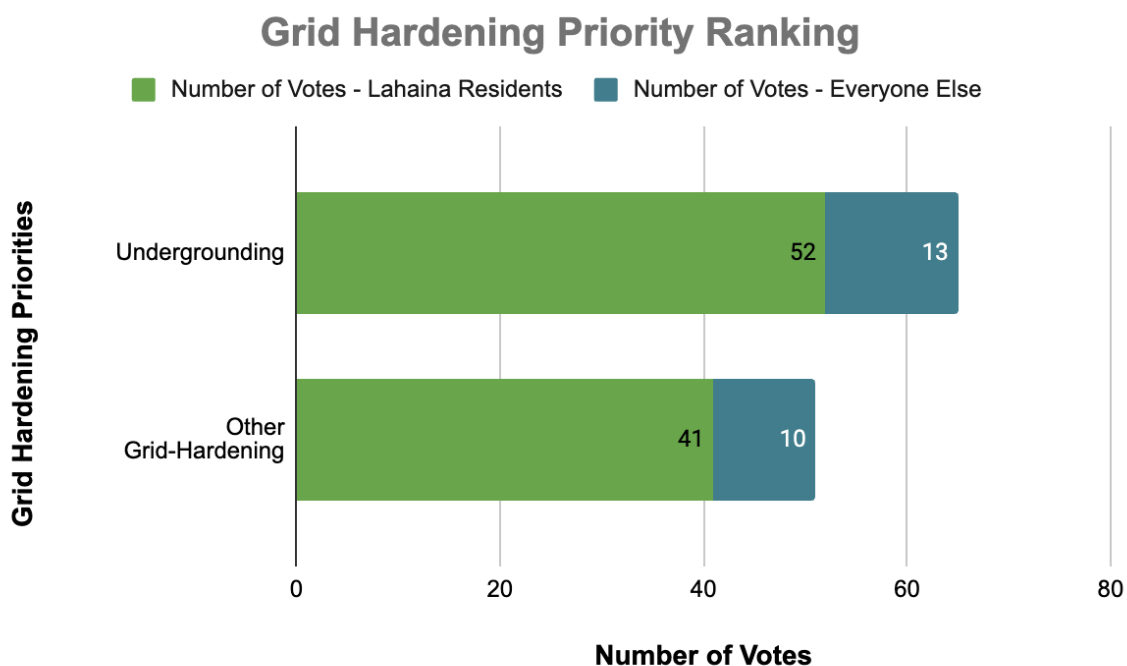


Figure 20: Online survey results: grid-hardening priorities

Power Generation, Storage, and Cooling Technologies Priorities

Among energy generation strategies, distributed energy resources, such as rooftop solar and home battery systems, received the strongest support from Lahaina respondents, with 45 votes (see Figure 21). The second-highest category, waste-to-energy, received 31 votes, a notable drop of 14 votes from the top-ranked option (see Figure 21). This suggests a clear preference for localized, renewable systems that can be deployed on existing rooftops and other

hardscapes. Community solar PV followed closely behind, while technologies such as agrivoltaics, wave/tidal, and small- to medium-scale wind also generated moderate interest. Larger-scale or emerging technologies such as geothermal, offshore wind, and hydrogen ranked lowest, indicating the need for additional education or a lack of alignment with cultural and environmental values.

One key takeaway is the contrast between the online survey data and the rankings that emerged from the Hui and co-design workshops. Exploring Other Power Generation, Storage, and Cooling Technologies, a broad category that included many of the options listed previously, ranked significantly lower in the online survey results than it did during in-person workshops. This discrepancy suggests that, although the broader community may not yet be fully familiar or comfortable with emerging technologies, those who participated more deeply in the LEP process were more supportive of exploring a wide range of innovative solutions and likely understood these technologies better than those who did not participate in the LEP process. This insight reinforces the value of continued education and dialogue in Phase 2 to ensure community members are equipped to evaluate both familiar and emerging technologies.

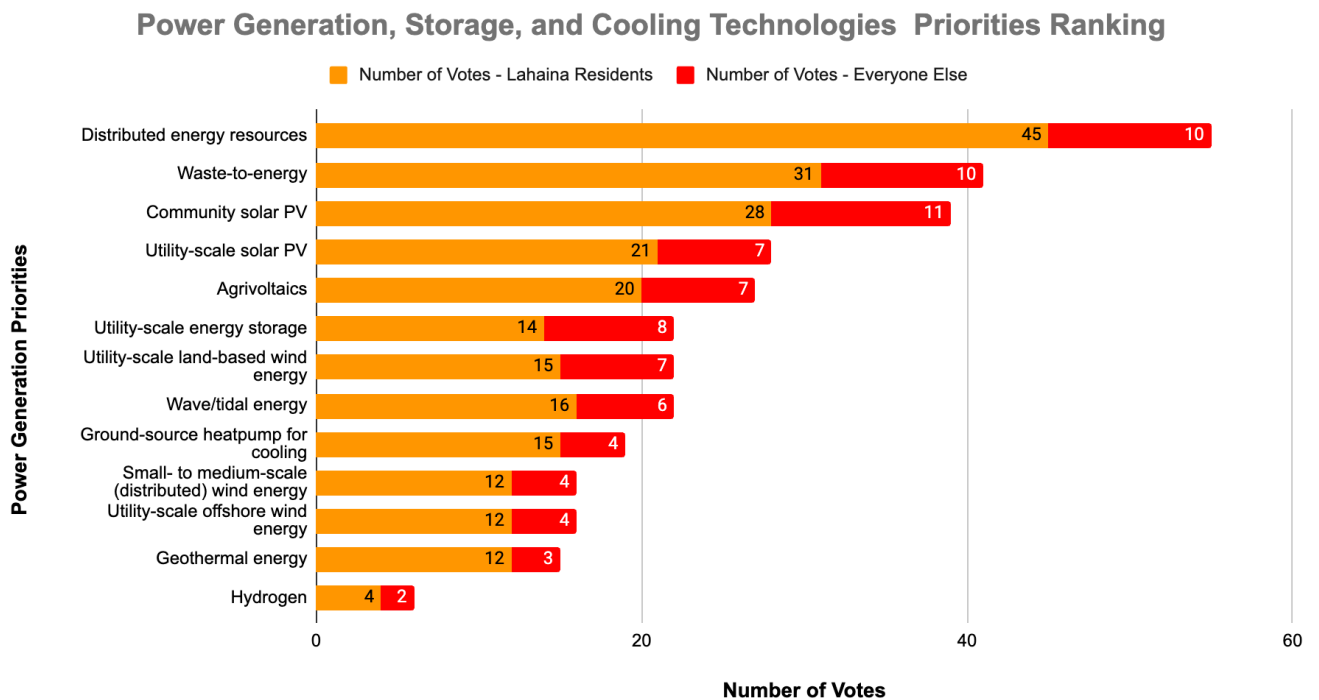


Figure 21: Online survey results: power generation, storage, and cooling technologies priorities

Hydropower Priorities

Hydropower also received strong support from Lahaina respondents, especially for options that leveraged existing or nontraditional infrastructure. The top subcategory was hydropower for electricity generation (32 Lahaina votes), followed closely by backup power for water and wastewater infrastructure (33 votes), and using R-1 wastewater as a power generation or storage resource (30 votes) (see Figure 22). Community members expressed lower interest in hydropower for desalination, which was perceived as either costly or less compatible with Lahaina’s values and needs.

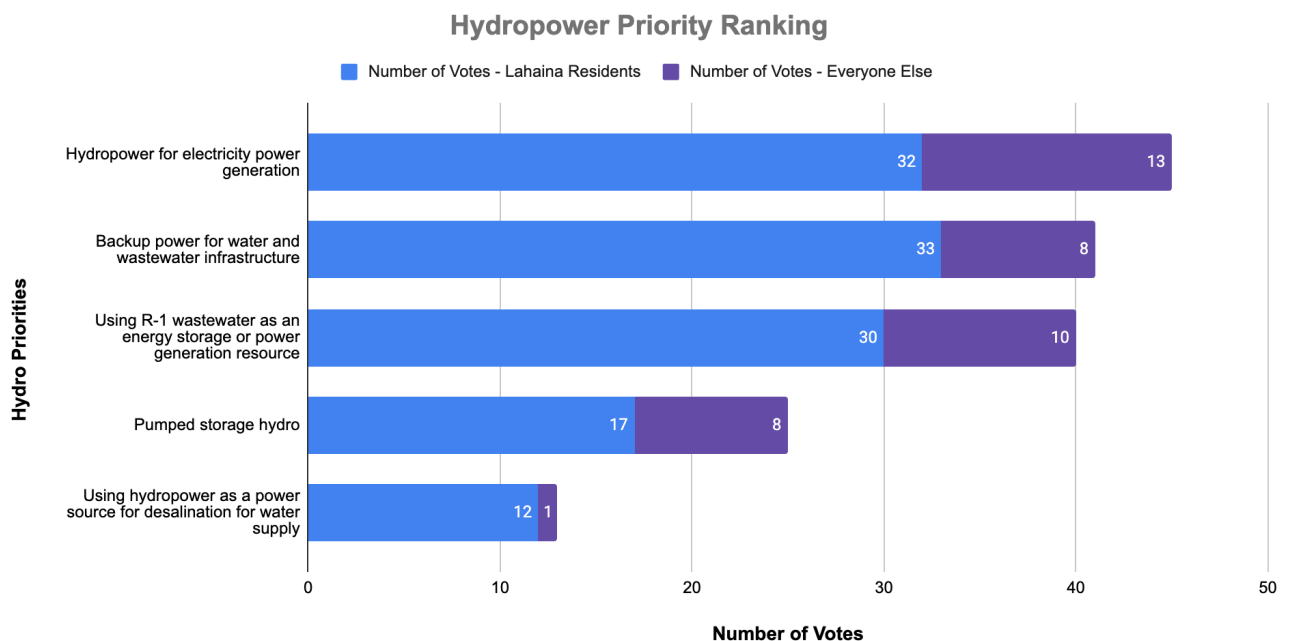


Figure 22: Online survey results: hydropower priorities

These online survey results further validate the themes raised through in-person engagement and provide additional detail to help shape the scope of technical assistance in Phase 2. Although online survey input is important, it serves as a supplement to the deeper learning, dialogue, and priority setting that occurred through the co-design workshops and Hui meetings. The LEP continues to prioritize the mana’o of those who committed their time to this multimonth process.

5.3 About the Prioritization Process

The energy priorities outlined in this report reflect the collective mana’o (knowledge, insight, and perspective) of community members who participated deeply in the LEP process. Hui members

and co-design workshop participants were involved throughout the project from early education sessions to facilitate design activities and interactive Q&A discussions. Their voices were shaped by a deeper understanding of the energy system and by months of iterative engagement, reflection, and dialogue.

Although online survey responses also provide valuable input, these data were treated as a supplemental source to help affirm or highlight emerging trends. To honor the depth of engagement and lived experience shared by those who participated in the workshops and Hui convenings, their rankings were considered primary. Combining all votes into a single dataset would have risked diluting the weight of their informed contributions, especially given the higher number of responses from the broader public online survey. As such, this report presents the priorities based on the direct input of those who were closely involved in the LEP's community-driven energy planning process, while using the community online survey data as a triangulation reference point.

5.4 Limitations and Considerations for Future Work

Although the LEP made strong progress in Phase 1 to center community voice in energy planning, it's important to recognize the limitations of this process and to view these findings as a foundation for continued dialogue and deeper engagement in the phases ahead.

1. Inclusion of non-Lahaina participants

Although the LEP focused on engaging Lahaina residents, including full-time residents, displaced residents, and those with strong family ties to Lahaina, some individuals from other parts of Maui and neighboring islands also participated in the Hui convenings and co-design workshops. As a result, their perspectives were captured in the final priority rankings. Although these voices offer valuable insight, it is important to recognize the rankings may reflect some input from individuals who are not part of the core Lahaina community. Future efforts should consider ways to clearly distinguish Lahaina resident input to ensure prioritization exercises are grounded in the perspectives of those most directly impacted.

2. Short timeline for education and engagement

Phase 1 was conducted over a condensed 9-month timeline, which limited the extent of in-depth education that could be provided across all energy topics. The LEP focused its efforts on subjects of greatest interest to the community, such as hydropower, microgrids, and rooftop solar, but was not able to fully cover all topics relevant to the broader energy landscape. As a result, some technologies and policy mechanisms that may be important for Lahaina's long-term energy future were not explored in depth or ranked as highly because of a lack of familiarity. Additional time and resources will be

critical in future phases to support deeper community education and more informed decision-making.

3. Topics that did not emerge organically

Some topics that appeared in the final list of energy priorities, such as desalination, electrification of transportation, agrivoltaics, and geothermal energy, did not arise organically through co-design workshops or Hui discussions. Members of the Hui expressed concern about how these topics ended up in the final list, as they were not widely discussed or prioritized during the community engagement process.

The Hui emphasized including these topics in the final documentation could give the impression to decision makers, including the county and other external partners, that there is broad community support, when in fact these topics were not generated or prioritized by the community. There is a strong desire to ensure community-driven priorities remain distinct and are not conflated with online survey responses or externally introduced ideas.

Although these topics may have technical relevance or align with broader state and federal energy goals, their inclusion without deeper community discussion highlights a need for transparency and community control over how priorities are identified and presented. This also reinforces the importance of expanding education and engagement in future phases to ensure all energy options are evaluated in a way that honors community knowledge, interest, and lived experience.

4. Online survey limitations

Although the online survey was valuable in expanding participation, it presented some limitations. One key issue was the phrasing of certain categories, particularly “Exploring Other Power Generation, Storage, and Cooling Technologies,” which some participants may have found confusing or overly broad. If this category had been more clearly described, such as specifying rooftop solar, batteries, or parking lot PV, it may have been ranked higher, especially given how strongly those specific technologies were supported in other forums. This highlights the importance of language clarity and visual examples in future online surveys to ensure all participants are able to engage with the material fully and confidently.

Looking Ahead

Despite these limitations, the LEP’s Phase 1 process successfully surfaced key community priorities and created a strong foundation for collaboration. The work reflects a genuine effort to elevate local knowledge, integrate culturally grounded engagement, and begin shaping an

energy transition that reflects Lahaina’s values. As Phase 2 begins, there is an opportunity to continue building trust, expanding community capacity, and ensuring that Lahaina’s energy future remains in community hands, fully informed, fully empowered, and fully supported.

6. Priorities for Technical Assistance

The following technical assistance requests have been developed based on priorities identified through community engagement. These requests focus on providing the information and analysis needed to implement energy projects that align with community goals. By addressing these key technical questions, LEP partners can help the Lahaina community develop energy solutions that enhance resilience, create economic opportunities, and establish pathways to energy sovereignty while honoring local values and needs. The technical assistance areas span renewable energy technologies, community ownership models, grid improvements, and workforce development opportunities tailored to Lahaina’s specific circumstances and recovery journey.

The following technical assistance priorities are listed in order of highest to lowest priority based on community input.

6.1 Low-Impact Hydropower

The community has expressed a high degree of interest in exploring hydropower opportunities that could leverage existing water infrastructure, particularly the R-1 recycled water system. This interest recognizes the potential to generate energy while maximizing the utility of water resources already being managed. For further community guidance on hydropower that would be relevant to all the following requests, please see Appendix C.4.

Technical Assistance Requests:

- Assess the feasibility of leveraging R-1 water distribution for energy generation and storage, recognizing that R-1 is deeply entangled with a variety of different stakeholders (including County of Maui DEM, R-1 users such as hotels and resorts and golf courses, State Department of Health, and U.S. Environmental Protection Agency, and so on).
- Conduct a feasibility study and economic analysis of community-owned hydropower (and/or pumped storage hydropower) in the R-1 distribution to Lahaina.
 - Determine how many homes could be powered by that generation/storage system.
 - Take into account future residential expansion (e.g., DHHL, Kamehameha Schools) in Lahaina.
 - Evaluate whether it could be part of a microgrid for the Lahaina community.



- Provide economic and legal/regulatory case study examples of recycled water (or water distribution generally) and in-line hydropower and pumped storage hydropower, taking into account both municipal and private ownership of water infrastructure.
- Explore in-line hydropower and pumped storage hydropower technical viability (e.g., need to identify pressure valves, tanks, and any other design considerations) to provide as consideration to the County in the R-1 expansion plans, and what downstream uses are considered.
- Analyze what the impact would be on downstream users if R-1 were used for energy purposes.
- Investigate other viable water resources and existing water systems that could support hydroelectric/pumped storage hydropower/in-line hydropower applications:
 - Leverage existing research and Commission on Water Resource Management data to assess if any locations in West Maui could support a water-based power generation or storage facility.
 - Provide generation projections, economic viability, and environmental impacts of those possible locations.

6.2 Community Energy Microgrids

Developing microgrids could allow portions of Lahaina to maintain power during grid outages and potentially reduce dependence on power transmitted from other parts of Maui.

Understanding the community's energy profile and exploring technical and policy options for microgrids would inform effective planning. For further community guidance on neighborhood level analysis that could help to inform community microgrids that would be relevant to all the below requests, please see Appendix C.2. The neighborhoods in the burn zone should be prioritized for this technical assistance, with critical facilities and future developments also being prioritized, but only after technical assistance has been provided for the burn zone areas identified for rebuilding.

Technical Assistance Requests:

- Develop a detailed energy profile of Lahaina for use in planning generation needs for a community microgrid(s) as well as for general improved understanding of localized community energy demand. This analysis should include:
 - Quantifying how much electrical energy is used by the Lahaina community as a whole (see Appendix A, West Maui Sub Area 3 map)
 - Determining how much is used by specific target neighborhoods/sites for microgrids (see annotated map in Appendix C.2)
 - Showing breakdown by sector (residential, commercial [split by visitor industry and nonvisitor]), wastewater, water, and other relevant categories)
 - Including how much Maui County spends on water in West Maui (e.g., pumping, treatment)



- Including annual GWh, peak load, average load profiles, and other relevant metrics as they pertain to relevant distribution circuits and/or critical infrastructure.
- Conduct the same energy profile analysis for West Maui as a whole.
- Study and identify threats to the grid, specifying threat type, likelihood, severity, and vulnerable locations, in Lahaina, to inform specific hardening or islanding strategies.
- Analyze policies regarding microgrids that operate on blue sky days:
 - What policies would need to change to allow for that, and does anyone else allow for it elsewhere?
 - What policies would need to change to make it viable from a financial and regulatory standpoint so that Lahaina can power itself and possibly export energy?
- Explore the technical feasibility of a West Maui microgrid so that power would not have to come over the ridge from Ma'alaea:
 - How much generation would it need?
 - What other cost implications would there be?
 - What would the policy implications be?
 - Are there any physical grid constraints that would limit it?
- Investigate what technical solutions allow Hana, Maui to isolate itself if the rest of the grid goes down, and whether a similar solution could be implemented for West Maui.
- Explore the technical feasibility of microgrids for smaller neighborhoods (see Figure 23 and Appendix C.2), including possible financing plans for community ownership.
 - One neighborhood to examine is Mill Camp.
- Based on results from microgrid activity, develop recommendations for NREL on what configurations of a microgrid they should analyze (e.g., critical infrastructure, residential).

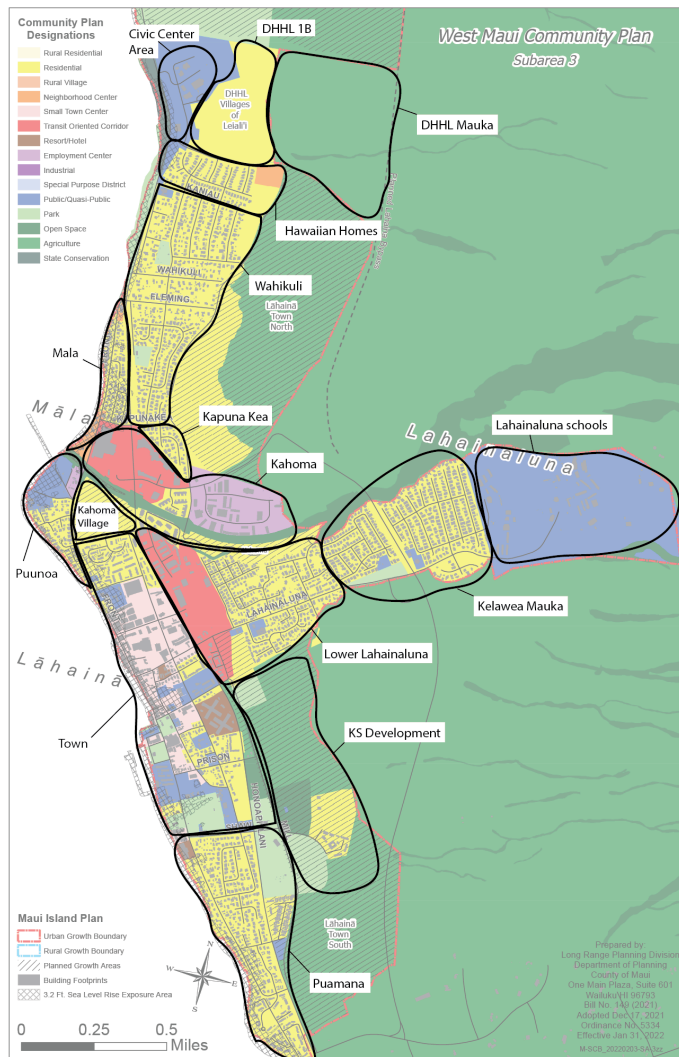


Figure 23: Map of Lahaina neighborhoods for community microgrid analysis³⁰

³⁰ County of Maui. *West Maui Community Plan: Subarea 3 Map*. Effective January 31, 2022.
<https://www.mauicounty.gov/DocumentCenter/View/131021/West-Maui-Community-Plan-Subarea-3-effective-01312022?bidId>.

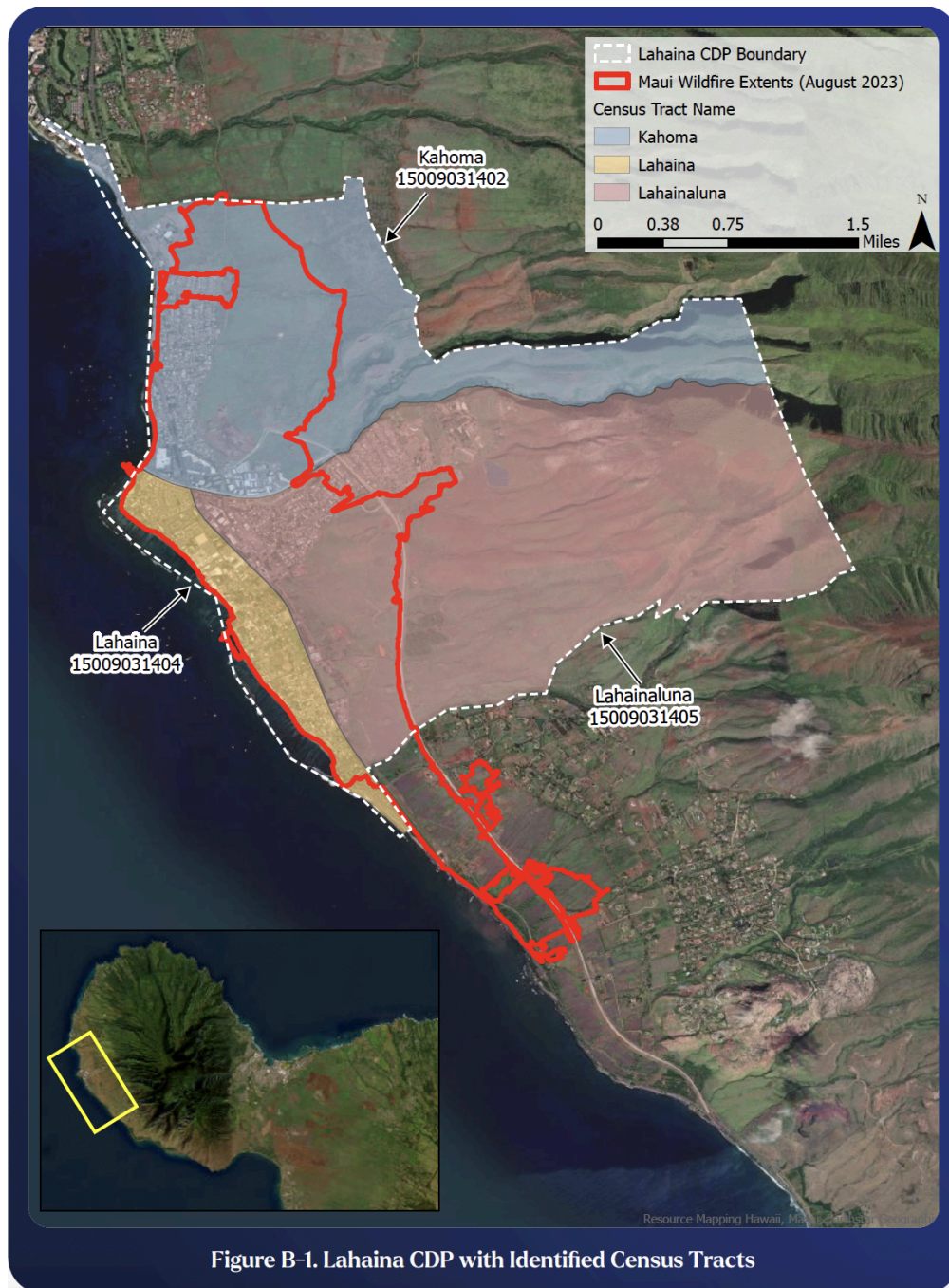


Figure 24: Map identifying Lahaina Burn Zone³¹

³¹ County of Maui. *Lahaina Long-Term Recovery Plan*. 2024, p. 135. <https://www.mauirecovers.org> or <https://www.mauicounty.gov> (accessed 2025).



6.3 Undergrounding and Other Grid Hardening

Undergrounding and other grid-hardening measures are critical elements for rebuilding a more resilient electrical system in Lahaina. Understanding the costs, benefits, and best practices from other communities will inform the most effective approaches. For further community guidance on undergrounding and grid hardening that would be relevant to all the below requests, please see Appendix C.1.

Technical Assistance Requests:

- Provide a detailed breakdown of undergrounding and grid-hardening cost factors.
- Track progress of where the evacuation routes are going to be located to identify any grid-related considerations.
- Compare various grid-hardening methods, such as steel poles, undergrounding, and ground-level distribution systems, evaluating:
 - Efficacy
 - Safety
 - Cost factors
 - Environmental and cultural aspects.
- Compile case studies of other locations that have implemented undergrounding and hardening of key parts of the grid:
 - Include case studies where counties received funding to do the undergrounding
 - Include cost-sharing opportunities (utility and county) case studies.
- Research strategies to improve the impact of public safety power shutoff events on Lahaina, focusing on reducing outage duration after shutoff and before re-energizing.

6.4 Distributed Energy Resources

As Lahaina rebuilds, incorporating distributed energy resources such as rooftop solar and battery storage from the start could create more sustainable, resilient, and affordable energy systems for homes and businesses. For further community guidance on solar and energy storage that would be relevant to all the below requests, please see Appendices C.2 and C.3.

Technical Assistance Requests:

- Conduct technical analysis for how Hawaiian Electric could rebuild the distribution grid to better accommodate additional rooftop solar PV and batteries, including higher hosting capacity and the ability to have virtual power plants.
- Assess the maximum generation potential of rooftop solar if all residential and commercial roofs installed solar:
 - How does that compare to the load of the area?
 - Is there a possibility to overproduce and export to the grid?



- Would there still be unmet demand and a need for additional generation in this scenario? If so, how much unmet demand would there be? How much additional generation would be required to meet this additional demand? What would be viable technologies and projects that could help meet this unmet demand, if any?
- Develop an energy audit tool/guide for sizing solar PV and batteries for new homes that don't have an existing bill to size solar to.
- Research possible funding sources for subsidizing rooftop solar PV and battery storage for homeowners in Lahaina.
- Identify design/engineering recommendations for rebuilt homes going off grid (either immediately or at some point in the future).
- Create mock-up solar layouts for all county parking lots in Lahaina (including possible new plans for Front Street) and produce feasibility/business models for community ownership of those solar arrays.
 - Also, examine church parking lots and property owners who might be value-aligned with hosting community-owned solar.
- Develop design/engineering recommendations for maximizing energy efficiency and integration of renewable energy and energy storage in fire recovery rebuilds.

6.5 Community Solar (also known as Shared Solar or CBRE)

Community solar provides an opportunity for residents who cannot install rooftop solar to access renewable energy, potentially offering economic benefits while advancing energy goals.

Technical Assistance Requests:

- Assess appropriate sizing for community solar projects serving Lahaina:
 - Residential only or residential and commercial together.
- Research possible sites based on:
 - Size requirements for the project
 - Zoning considerations
 - Grid interconnection capabilities
 - Community preference/guidance.
- Using community guidance regarding previously identified concerns of larger PV installations, develop design guidelines for such projects that eliminate or at least minimize negative impacts such as view plane disruptions, land use conflicts, fire risk, and so on.
- Incorporate community-informed considerations for solar and storage siting from the January workshop.
- Research ways of building renewables that don't lose space.
- Address considerations for not triggering Homeland Security concerns.
- Explore possibilities for siting brightfields on identified brownfields.



6.6 Community Ownership Models for Energy System Infrastructure

Community ownership of energy infrastructure could provide economic benefits while ensuring local control and alignment with community values and priorities.

Technical Assistance Requests:

- Develop more in-depth case studies of cooperative and municipal ownership of:
 - A generation project
 - A grid-tied microgrid
 - The West Maui grid.
- Provide technical guidance for steps or approaches the Lahaina community could take to pursue community ownership of energy infrastructure.

6.7 Additional Lower-Priority Technical Assistance

The following technical assistance priorities have also been identified as high priorities but as lower priorities than those identified in the above section.

6.8 Workforce Development and Job Training

Building local capacity to install, maintain, and operate new energy systems will be essential for long-term sustainability and will create economic opportunities for Lahaina residents.

Technical Assistance Requests:

- Identify the jobs most in need to meet Lahaina's energy workforce needs.
- Determine what type of training and experience would be needed by a local workforce to meet these needs.
- Assess whether there are existing training resources available to train the required local workforce:
 - If yes, identify what they are.
 - If no, recommend how these could be developed/offered to the community to develop its local energy workforce.

6.9 Grid Modernization, Grid-Interactive Technologies, and Demand Response

A modernized grid with advanced demand response capabilities will be essential to maximize the benefits of distributed energy resources and enable a more flexible, resilient energy system.

Technical Assistance Requests:



- Develop recommendations for infrastructure or operation of the rebuilding of the distribution grid in Lahaina to allow for rooftop solar and possible aggregation (e.g., virtual power plants)

6.10 Waste-to-Energy

Converting waste to energy could provide Lahaina with a renewable energy source while addressing waste management challenges, but it requires careful analysis of environmental impacts and appropriate technologies. The community did not express strong interest in this topic, so the following waste-to-energy (WTE) requests are of lower priority and therefore should only be addressed after other requests are pursued.

Technical Assistance Requests:

- Analyze pros and cons of various WTE technologies compared to other possible generation options, considering:
 - Environmental impacts
 - Economic factors
 - Resilience benefits.
- Determine which WTE technologies would be most appropriate for Lahaina.
- Assess available feedstocks for WTE in Lahaina and their associated power generation potential.
- Identify regulatory considerations for implementing WTE in Lahaina.
- Identify if hydrogen production would be a viable output of WTE for Lahaina.

6.11 Agrivoltaics

Agrivoltaics presents an opportunity to simultaneously produce energy and agricultural products, making efficient use of limited land resources in Lahaina while supporting local food production. Although residents felt favorably toward dual land use strategies, such as agrivoltaics (as well as rooftop solar and solar parking lot canopies), residents emphasized a preference for preserving land for traditional agriculture, cultural uses, or open space over large-scale solar development. Interest in agrivoltaics was generally limited to smaller-scale projects that could be integrated thoughtfully without displacing existing land uses. Community members also raised concerns about how agrivoltaics might impact access to the land, the risk of agriculture being used as a label in projects that are not actually agriculturally productive, fire risks, and the visual impacts of this energy infrastructure on Lahaina's landscape. As a result, the below agrivoltaics requests are considered lower priority and should be addressed only after higher-priority community requests are pursued.

Technical Assistance Requests:



- Conduct an economic analysis of agrivoltaics, including:
 - What would be viable crops to integrate with PV arrays in Lahaina?
 - How much land would be needed compared to regular spacing?
 - How much water would be needed, and are there water efficiencies to having partial shade?
 - What would farm management best practices look like in an agrivoltaic setting? How do these differ from regular farming practices?
- Perform a Lahaina-specific shading study to determine how the spacing of the rows of solar panels would impact the productivity of crops.
- Identify various types of panels and racking systems that would be appropriate for specific crops.
- How would access to land in an agrivoltaic project be impacted?

7. Key Factors Informing Technical Assistance and Implementation

As the Lahaina community moves toward implementation planning, several broader energy factors must be considered to ensure community-identified priorities align with policy, regulatory, and land use realities. This section provides additional context on factors that can shape NREL's technical assistance and the Community Energy Implementation Plan.

7.1 Policy and Regulatory Considerations

The LEP has identified several policy and regulatory barriers that will need to be addressed for the successful implementation of the community's energy priorities.

- **Grid hardening, undergrounding, and resilience**
 - Grid resilience is a major concern for Lahaina, particularly in disaster-prone areas. The community has identified undergrounding power lines along evacuation routes as a top priority, alongside other grid-hardening measures such as fire-resistant poles and vegetation management. However, cost constraints and existing utility investment policies create challenges. Further analysis is needed to explore funding mechanisms, technical feasibility, and integration into broader grid modernization efforts.
 - **Relevant policies:**
 - **Hawai'i Clean Energy Initiative:** A state policy aiming for 100% renewable energy by 2045, which includes considerations for grid modernization and resilience



- **Instituting a proceeding to review Hawaiian Electric's wildfire mitigation plan (PUC Docket No. 2025-0156):** “Opened in January 2025, the Commission instituted a proceeding to review Hawaiian Electric's Wildfire Mitigation Plan (WMP) filed on January 2025, in Non-Docketed Case No. 2023-04661. On August 8, 2023, wildfires broke out on the island of Maui, resulting in catastrophic loss of life and property damage. On November 21, 2023, the Commission issued Order No. 40396 directing public utilities to submit natural hazard mitigation reports related to their ongoing efforts and future plans to address natural hazards. In view of the August 2023 wildfires, the Commission finds that opening a docket to evaluate Hawaiian Electric's WMP is reasonable and in the public interest. This docket provides members of the public an opportunity to provide input, as well as help promote safer utility operations.”³²
- **Instituting a proceeding to investigate integrated grid planning (PUC Docket No. 2018-0165):** “Opened in July 2018, the Commission initiated this docket to establish an integrated grid planning (IGP) process for Hawaiian Electric. This docket aims to align resource, transmission, and distribution planning to support a more resilient, cost-effective, and clean energy grid. Under IGP, there is also the grid modernization strategy, which includes smart grid enhancements: Through Order No. 34281, the Hawai'i Public Utilities Commission (PUC) directed Hawaiian Electric to develop a detailed Grid Modernization Strategy that will provide the comprehensive and holistic vision and context to inform subsequent review of discrete grid modernization project applications submitted by the company.”³³
- **Key considerations:**
 - **Funding mechanisms:** Identifying financial resources for infrastructure improvements, such as undergrounding power lines
 - **Policy support:** Ensuring existing regulations facilitate investments in grid resilience
 - **Innovative and emerging solutions:** Understanding the full range of grid-hardening measures available, including direct bury, on-ground conduit, partial bury with conduit, raised sidewalks, and other viable alternatives when complete undergrounding of power lines is not feasible.

³² ORDER NO. 41531 INSTITUTING A PROCEEDING TO REVIEW HAWAIIAN ELECTRIC'S WILDFIRE MITIGATION PLAN.

<https://hpuc.my.site.com/cdms/s/puc-case/a2Gcs000001LRvtEAG/pc199013?tabset-431dc=3>

³³ ORDER NO. 35569 INSTITUTING A PROCEEDING TO INVESTIGATE INTEGRATED GRID PLANNING; Public Utilities Commission; Docket No. 2018-0165

<https://hpuc.my.site.com/cdms/s/puc-case/a2G8z0000007fkBEAY/pc21504?tabset-a3299=1>



- **Water and permitting considerations for low-impact hydropower**

- Lahaina has identified hydropower as one of its top priorities, with community interest particularly focused on using existing and planned infrastructure such as reservoirs, ditches, and wastewater systems. Challenges to implementing these types of solutions exist, including those related to state water regulations and environmental permits. To advance feasibility studies for these projects, alignment with Hawai'i's Instream Flow Standards (IFS) and securing appropriate environmental permits will be crucial. Both municipal and private water purveyors will need to be significantly involved in this process.
- **Relevant policies:**
 - **IFS and other regulatory compliance:** Regulations that protect water resources, which hydropower projects must comply with. These regulations fall under the purview of regulatory bodies, including the State of Hawai'i Commission on Water Resources Management, the U.S. Environmental Protection Agency, and the County of Maui.
- **Key considerations:**
 - **Permitting pathways:** Understanding the county, state, and federal permits required for hydropower projects
 - **Environmental compliance:** Aligning hydropower development with regulatory standards to protect aquatic ecosystems and water resources.

- **Energy affordability and rate structures**

- Ensuring accessible and affordable energy access is a top priority for Lahaina. The community is concerned about rising electricity rates and wants to ensure new energy investments do not create additional cost burdens. The PUC plays a major role in rate-setting, community solar programs, and energy equity policies. Exploring policy mechanisms for affordability, including incentive programs and equitable rate structures, will be critical to ensuring that Lahaina's energy transition is accessible to all residents.
- **Relevant policies:**
 - **Application for approval to establish a rule to implement a community-based renewable energy program, and other related matters (PUC Docket No. 2015-0389):** Opened in October 2015 to create and adopt a tariff and framework for establishing a CBRE program, allowing customers without on-site renewable energy options to participate in off-site projects through bill credits.
 - **Performance-based Regulation (PBR) for the Hawaiian Electric Companies (PUC Docket No. 2018-0088):** Opened in March 2018, PBR includes a set of alternative regulatory mechanisms intended to focus utilities on performance and desired outcomes, such as increased renewable energy, lower cost, and improved customer service. PBR frameworks, including performance incentives, are intended to further



enhance the alignment between the utilities' financial interests and those of customers.

- **Instituting a proceeding to investigate distributed energy resource (DER) policies pertaining to the Hawaiian Electric Companies (PUC Docket No. 2019-0323):** “Opened in September 2019, this docket is intended to investigate the technical, economic, and policy issues associated with distributed energy resources. This includes the approval of DER customer options for the Hawaiian Electric Companies, including exporting and nonexporting DER programs, Time-of-Use programs, energy efficiency, demand response, electric vehicles, and distributed energy storage.”³⁴
- **Instituting a proceeding to investigate energy equity (PUC Docket No. 2022-0250):** “Opened in December 2022, institutes a proceeding to investigate how to better integrate equity and justice considerations across cCommission proceedings and the commission's work more broadly, including in its role overseeing and regulating the functions of public utilities. In this docket, the commission considers efforts to mitigate high energy costs for low- and moderate-income customers and to investigate how to integrate considerations of energy equity and justice across commission work. The commission intends to further the state's policy goals, to improve energy affordability and reduce energy burdens for vulnerable customers, to ensure the burdens and benefits of energy infrastructure and the renewable energy transition are equitably distributed, including increasing accessibility of commission proceedings among vulnerable and/or underrepresented customers.”³⁵
- **Instituting a proceeding to investigate integrated grid planning (PUC Docket No. 2018-0165):** “Opened in July 2018, the commission initiated this docket to establish an IGP process for Hawaiian Electric. This docket aims to align resource, transmission, and distribution planning to support a more resilient, cost-effective, and clean energy grid. Under IGP, there is also the grid modernization strategy, which includes smart grid enhancements: Through Order No. 34281, the Hawai'i Public Utilities Commission (PUC) directed Hawaiian Electric to develop "a detailed Grid Modernization Strategy that will provide the comprehensive and holistic

³⁴ORDER NO. 36538 OPENING THE DOCKET; Public Utilities Commission; Docket No. 2019-0323
<https://hpuc.my.site.com/cdms/s/puc-case/a2G8z0000007fBFEAY/pc20950>

³⁵ORDER NO. 38759 INSTITUTING A PROCEEDING TO INVESTIGATE ENERGY EQUITY; Public Utilities Commission; Docket No. 2022-0250
<https://hpuc.my.site.com/cdms/s/puc-case/a2G8z0000007ezIEAQ/pc20209>



vision and context to inform subsequent review of discrete grid modernization project applications submitted by the company."³⁶

- **Key considerations:**
 - **Rate design:** Developing rate structures that promote affordability and access to renewable energy
 - **Energy programs:** Implementing initiatives to ensure all community members benefit from renewable energy developments.
- **Zoning, land use, and cultural considerations for energy development**
 - Hawai'i's strict land use policies will impact the feasibility of Lahaina's energy transition. State Land Use Commission (LUC) regulations, conservation and agricultural land designations, and cultural resource protections must be considered when siting energy infrastructure. Future energy projects will need to navigate zoning restrictions, permitting requirements, and community stewardship principles to ensure alignment with Lahaina's cultural, land use, and environmental values.
 - **Relevant policies:**
 - **State LUC regulations:** Governs land use classifications and permitting processes that impact energy project siting.
 - **Key considerations:**
 - **Permitting requirements:** Navigating the approval processes for renewable energy projects in various land use zones.
 - **Cultural preservation:** Ensuring energy developments respect and integrate cultural and environmental protections.
- **Wheeling and energy market access**
 - Wheeling, the ability to transmit electricity across utility-owned infrastructure to offset electricity usage by off-site customers, has been identified as a potential tool to support community energy projects in Lahaina. However, Hawai'i's current regulatory framework does not fully accommodate community-scale or retail wheeling. Further exploration is needed to assess the potential for policy updates or pilot programs that would allow community-generated electricity to be shared across different locations.
 - **Relevant policies:**
 - **Instituting a proceeding to investigate establishment of electricity wheeling (PUC Docket No. 2024-0200):** "Opened in July 2024, the commission opened this docket to investigate establishment of intragovernmental wheeling in Hawai'i, with the intent of using lessons learned in the initial three docket phases to explore implementation of an

³⁶ORDER NO. 35569 INSTITUTING A PROCEEDING TO INVESTIGATE INTEGRATED GRID PLANNING; Public Utilities Commission; Docket No. 2018-0165
<https://hpuc.my.site.com/cdms/s/puc-case/a2G8z0000007fkBEAY/pc21504?tabset-a3299=1>



intragovernmental wheeling policy and an evaluation of retail wheeling in subsequent phases, as appropriate.

The U.S. Energy Information Administration defines wheeling service as “[t]he movement of electricity from one system to another over transmission facilities of interconnecting systems.” Wheeling service contracts can be established between two or more systems. The commission notes that there are specific types of “wheeling,” which include, among others, “intragovernmental wheeling,” which is wheeling between governmental entities over existing transmission and distribution lines, and “retail wheeling,” defined as “the process of moving electric power from a point of generation across third-party-owned transmission and distribution systems to a retail customer.”

Electricity wheeling is the process by which: (1) a customer of an incumbent electric utility exports electricity generated from renewable sources – either through a partnership with a private developer or through self-generation or co-ownership of generation, and (2) such exported electricity is transmitted via the infrastructure owned by the incumbent utility for the benefit of a geographically separate, designated utility customer or customers.”³⁷

○ **Key considerations:**

- **Policy frameworks:** Developing regulations that allow community-based wheeling while maintaining grid reliability.
- **Financial implications:** Assessing the economic impact of retail wheeling on community energy projects and utility operations, as well as the impact of intragovernmental wheeling. As an example, the County of Maui Department of Environmental Management (DEM) is the second-largest consumer of electricity provided by Hawaiian Electric in the County of Maui, behind the Department of Water Supply (DWS). In FY23, DEM’s Wastewater Reclamation Division spent approximately \$7.2M on electricity, and in FY24, they spent approximately \$6.4M on electricity. DEM has the ability to produce electricity at several of their facilities, but they do not have the demand or need to utilize all of the electricity they are able to produce at those same facilities. The greatest consumption of electricity by DEM is at their wastewater treatment plants, which are located on different parcels or TMKs than where the electricity could be generated.

³⁷ORDER NO. 40879 OPENING THE DOCKET; Public Utilities Commission; Docket No. 2024-0200
<https://hpuc.my.site.com/cdms/s/puc-case/a2Gcs00000001P7EAI/pc191021>



- **Microgrid development, localized power distribution, and system interconnection**
 - Community members strongly support locally controlled and customer-sited energy microgrids to enhance resilience and energy independence. However, Hawai'i's regulatory framework presents barriers related to interconnection approval, ownership models, and rate structures. Existing regulations do not fully support community-based microgrids, making it necessary to explore alternative ownership and financing models, as well as policy updates to facilitate interconnection and integration with Hawaiian Electric's infrastructure. Additionally, current regulations do not allow for the distribution of power generated by customer-sited microgrids across TMK property boundaries, without those generators being regulated as an electric utility. Critical to unleashing the full potential of community-scale energy microgrids will be finding ways to allow and support the deployment of localized customer-sited microgrids that can support neighborhoods comprising multiple TMKs by providing them with backup power during grid outages. While also providing financial benefit to those communities during blue sky conditions by allowing for financial compensation for power exported to the larger electric utility grid.
 - **Relevant policies:**
 - **Instituting a proceeding to investigate establishment of a microgrid services tariff (PUC Docket No. 2018-0163):** "Opened in July 2018, the Commission opened this docket to establish a Microgrid Services Tariff for Hawaiian Electric, as mandated by Act 200, Session Laws of Hawai'i 2018. This tariff aims to facilitate the development and integration of microgrids within the state's energy framework. The Hawai'i State Legislature concluded that (1) microgrids can provide valuable services to the public utility electricity grid, including energy storage and demand response, to support load shifting, frequency response, and voltage control, among other ancillary services, and (2) the use of microgrids would build energy resiliency into our communities, thereby increasing public safety and security."³⁸
 - **Key considerations:**
 - **Interconnection processes:** Streamlining approvals for community microgrids
 - **Ownership models:** Exploring regulatory pathways for community energy cooperatives
 - **Rate structures:** Addressing fair compensation mechanisms for energy microgrid participants
 - **Transmission and distribution:** Understanding what the current limits are with regard to transmission/distribution of generation systems across

³⁸ORDER NO. 35566 OPENING THE DOCKET; Public Utilities Commission; Docket No. 2018-0163
<https://hpuc.my.site.com/cdms/s/puc-case/a2G8z0000007fkDEAY/pc21506>



property boundaries, and what regulatory/permitting changes would need to be implemented to better accommodate neighborhood-scale energy microgrid deployment.

- **Incentives and financing for Lahaina’s energy transition**

- To make energy projects feasible, Lahaina will need to leverage a combination of federal, state, and utility incentives. Available funding sources include:
 - Federal clean energy grants and financial mechanisms
 - State incentive programs for renewable energy and grid resilience
 - On-bill financing and low-cost loans for residents and businesses; identifying viable financing pathways will be essential for implementing Lahaina’s microgrids, hydropower projects, grid-hardening measures, and community energy infrastructure.

7.2 Alignment With Ongoing Recovery Efforts in Lahaina

Lahaina’s energy transition cannot happen in isolation; it must be integrated with broader rebuilding and recovery efforts. Understanding ongoing and planned recovery initiatives will be essential for ensuring energy projects are coordinated with other infrastructure investments, land use planning, and disaster resilience strategies. Several key recovery plans and funding programs will shape the landscape of Lahaina’s future, providing opportunities for energy resilience and sustainability:

Lahaina Long-Term Recovery Plan

The Lahaina Long-Term Recovery Plan, developed by the County of Maui, serves as a blueprint for rebuilding a stronger and more resilient Lahaina. The plan is shaped by extensive community engagement, with more than 3,800 residents and stakeholders contributing through public meetings, events, and online surveys. The plan describes 40 projects relating to infrastructure, housing, economic recovery, planning, health and social services, and natural and cultural resources. Leads and partners are listed for each project, along with the purpose, description, cost, timing, and other details.

Energy Integration Considerations:

- The infrastructure project related to energy, “Energy Resilience and Redundancy,” is described as including “studies and assessments to provide data about the current state of energy infrastructure and evaluate opportunities to improve resilience, redundancy, and independence.”³⁹

³⁹ County of Maui. (2024). *Lahaina Long-Term Recovery Plan*. Maui Recovers. <https://www.mauirecovers.org/lahaina>



- The funding sources listed for this project are Federal Emergency Management Agency (FEMA) and DOE; project leads are listed as DOE, NREL, Hawai'i State Energy Office, and Hawaiian Electric; and project partners are the County Department of Public Works and Lahaina Energy Partnership. Although there is some lack of clarity around this project, the inclusion of DOE, NREL, and the LEP indicates the county is looking to this effort to actively support energy system recovery for Lahaina.
- Projects detailed in the plan provide information on organizations with which to coordinate, such as those related to rebuilding multifamily housing, community centers, and commercial facilities on energy resilience, with other infrastructure projects on interdependencies, and with community and agricultural planning projects on overlapping efforts and interests.

Community Development Block Grant-Disaster Recovery (CDBG-DR) Funding

Following the 2023 Maui wildfires, the U.S. Congress appropriated more than \$1.6 billion in CDBG-DR funds to support rebuilding efforts. The County of Maui is currently finalizing its action plan for distributing these funds, including potential allocations for renewable energy projects and community resilience initiatives.

Energy Integration Considerations:

- CDBG-DR funds could support solar PV installations, energy storage, energy microgrids, and energy efficiency programs in Lahaina.
- CDBG-DR funds could ensure alignment between federal recovery funding and community energy priorities.
- CDBG-DR funds could provide an opportunity to integrate energy resilience with affordable housing and infrastructure redevelopment.

The LEP also submitted comments on the County's Draft Action Plan (see [comments here](#)) to highlight the importance of aligning energy resilience investments with community priorities.

Hawaiian Electric's Integrated Grid Plan

Hawaiian Electric's Integrated Grid Plan (IGP) outlines the utility's strategy for achieving a clean, resilient, and modernized energy system by 2045. The plan includes provisions for grid hardening, renewable energy integration, and improved energy storage capabilities.

Energy Integration Considerations:



- Aligning Lahaina’s energy microgrid development with Hawaiian Electric’s long-term grid modernization plans
- Identifying pathways for integrating distributed renewable energy into the island-wide grid.
- Leveraging planned grid upgrades to enhance community energy resilience and reliability.

West Maui Community Plan

The West Maui Community Plan is a guiding document for land use, development, and environmental stewardship in the region. The plan supports sustainable growth, cultural preservation, and infrastructure improvements that align with community needs and environmental protections.

Energy Integration:

- Land use policies that influence the siting of renewable energy projects, ensuring minimal environmental and cultural impact
- The West Maui Community Planning process encourages community involvement to ensure energy development aligns with Lahaina’s long-term vision.
- Promote sustainable practices in rebuilding efforts, including energy efficiency and low-impact infrastructure.
- Align with West Maui Community Plan Goal 2.4, Economic opportunity through innovation and collaboration; Policy 2.4.8, Support expansion of renewable energy that is broadly supported throughout the community, including small-scale community options, all of which include plans for disposal that does not burden county landfills and decommissioning at the end of the project’s intended use.

County of Maui Climate Action and Resiliency Plan

The County of Maui Climate Action and Resiliency Plan (CARP) provides a framework for reducing greenhouse gas emissions, enhancing community resilience, and preparing for climate impacts across Maui County. The plan emphasizes renewable energy adoption, energy efficiency, and disaster preparedness, making it a key guiding document for Lahaina’s recovery.

Energy Integration:

- Aligning Lahaina’s renewable energy priorities with countywide climate action goals
- Ensuring that grid resilience investments support broader climate adaptation strategies
- Exploring energy efficiency incentives to reduce costs for Lahaina residents.

County of Maui Countywide Climate Change Vulnerability Assessment

The County of Maui's Countywide Climate Change Vulnerability Assessment offers a critical evaluation of climate-related risks and social vulnerabilities across the island, including specific risks to Lahaina. It identifies areas at heightened risk for sea level rise, flooding, wildfire, and extreme heat, many of which intersect with energy infrastructure and planning.

Energy Integration:

- Informs siting of energy infrastructure by identifying geographic areas at greatest risk from climate impacts
- Highlights the need for redundancy and resilience in energy systems serving vulnerable populations
- Provides data to support equity-centered energy investments that prioritize areas facing compounded environmental and social stressors
- Reinforces the importance of integrating climate vulnerability data into the design of energy microgrids, renewable energy siting, and grid-hardening strategies.

Maui Island Plan

The Maui Island Plan provides a comprehensive framework for the island's growth and development. It focuses on infrastructure improvements, disaster resilience, and sustainability initiatives.

Energy Integration:

- Supports the adoption of renewable energy technologies to reduce dependency on imported fossil fuels
- Encourages coordination between energy, housing, and transportation planning to ensure an integrated and efficient rebuilding effort
- Prioritizes infrastructure investments that enhance Lahaina's climate resilience and energy security.

By aligning energy initiatives with these comprehensive recovery plans and funding opportunities, the Lahaina community can ensure its energy transition is coordinated, resilient, and community driven. The intersection of energy planning with housing development, water system upgrades, and disaster preparedness provides an opportunity for Lahaina to rebuild stronger and more sustainably than before.

As the Lahaina community moves into Phase 2 of the LEP, technical assistance from NREL can help to bridge the gaps between these recovery efforts and the community's identified energy

priorities, ensuring energy solutions are effectively integrated into the rebuilding, recovery, and long-term community energy planning process.

8. Conclusion

The LEP was created to ensure Lahaina's energy future is shaped by the community and for the community. Over the past 9 months, Lahaina residents have actively participated in co-design workshops, Hui meetings, stakeholder discussions, and energy education efforts, resulting in a clear set of priorities that reflect the community's vision, needs, and long-term energy resilience goals.

This Community-Identified Energy Pathways Report marks a significant milestone in that process, capturing the priorities that have emerged through engagement and laying the foundation for the next phase of work. The community has expressed a strong desire for energy independence, affordability, and resilience, with a focus on grid hardening, energy microgrid development, renewable energy integration, and community ownership models.

As Lahaina moves into Phase 2 of the LEP, these priorities will be further refined through technical feasibility assessments, policy analysis, economic analysis, and implementation planning. The next steps will focus on turning these community-driven priorities into tangible, actionable solutions that align with the Lahaina community's long-term recovery and sustainability efforts.

This report is not the end of the process. It is a starting point for deeper analysis, continued collaboration, and informed decision-making. The LEP remains committed to ensuring Lahaina residents are at the center of this transition and the energy solutions developed reflect local community values, cultural integrity, and local economic opportunity.

By working together, the Lahaina community can rebuild stronger, creating an energy future that is not only resilient and sustainable but also community driven and locally controlled for generations to come.



Appendix A: West Maui Maps

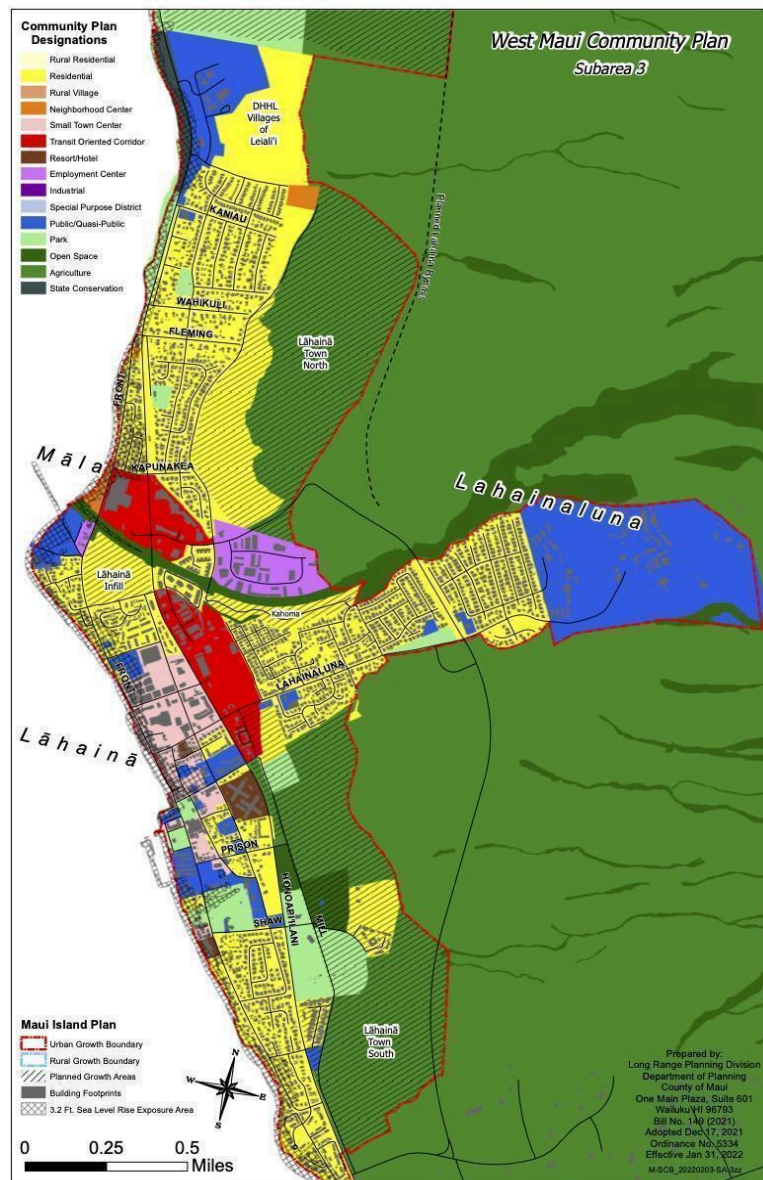


Figure A.1: West Maui Community Plan Subarea 3 Map⁴⁰

⁴⁰ **County of Maui.** *West Maui Community Plan: Subarea 3 Map.* Effective January 31, 2022.
<https://www.mauicounty.gov/DocumentCenter/View/131021/West-Maui-Community-Plan-Subarea-3-effective-01312022?bidId>.

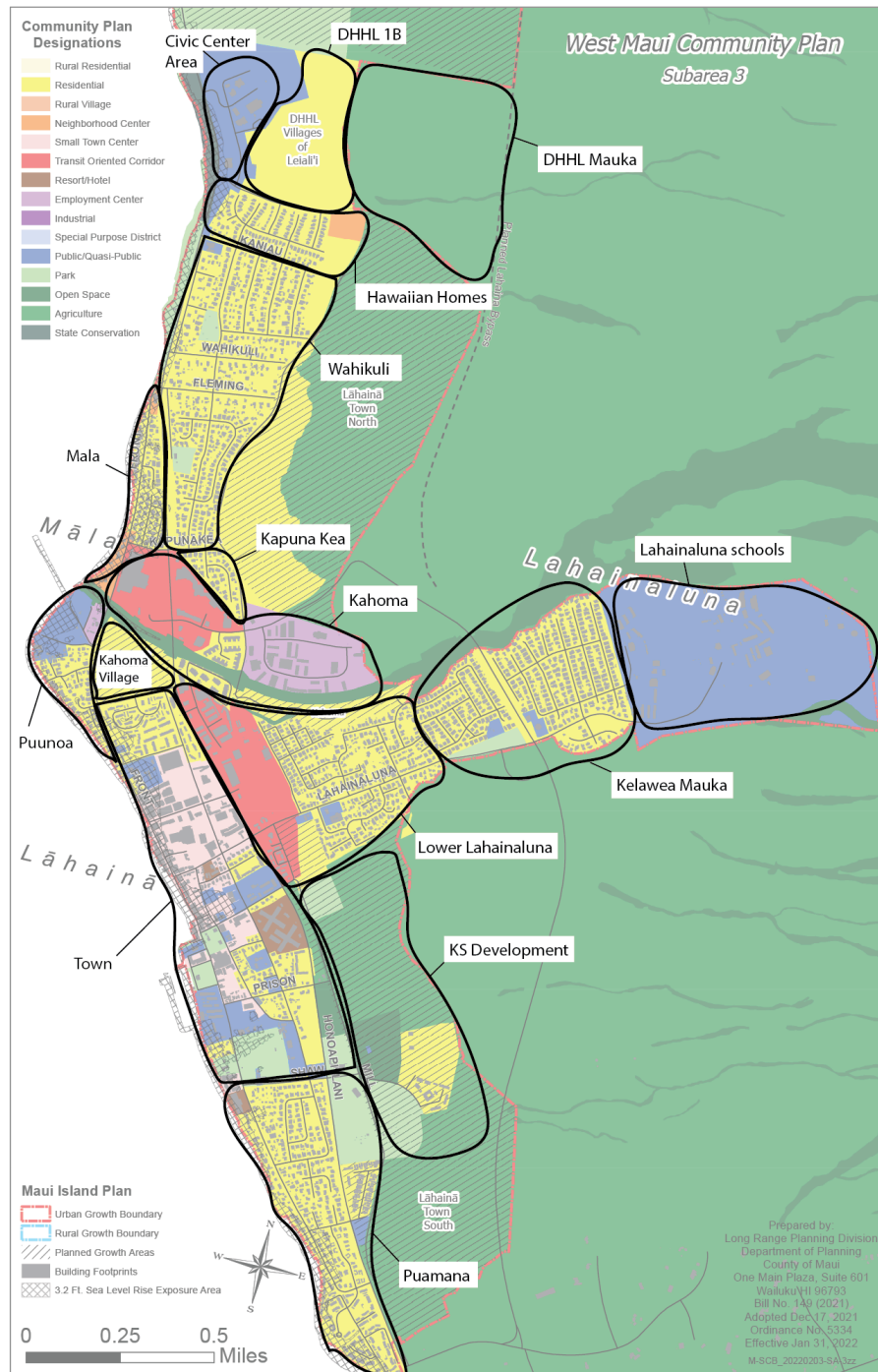


Figure A.2: Community-defined neighborhoods for small-scale microgrid and energy profile analyses

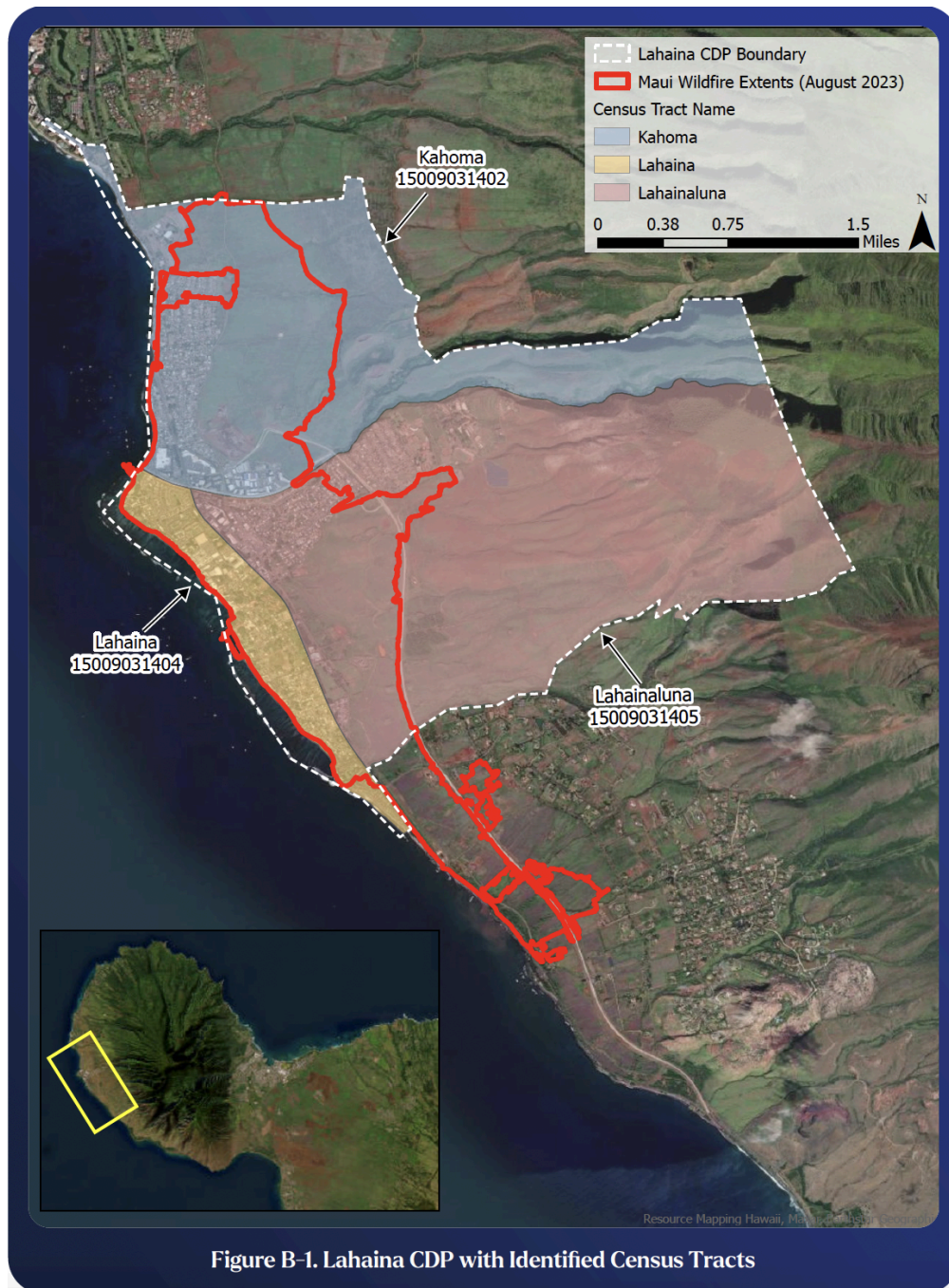


Figure A.3: Map identifying the Lahaina burn zone⁴¹

⁴¹ **County of Maui.** *Lahaina Long-Term Recovery Plan*. 2024, p. 135. <https://www.mauirecovers.org> (accessed 2025).

Appendix B: Engagement Activities

Engagement Activities

The following table provides a detailed breakdown of engagement activities conducted during Phase 1, categorized into co-design workshops, Hui Meetings, Stakeholder Engagement, and Targeted Outreach.

Date	Event Type	Location	Key Topics	Key Takeaways	Resource	LEP Participants
07/29/2024	Stakeholder Meeting—Hawai'i Community Foundation	Virtual	LEP introduction, funding	Introduction of the project and discussion of funding opportunities		Hā Sustainability
08/28/2024	Community Launch Event—Wednesday Disaster Recovery Community Update Meeting County of Maui	Lahaina Civic Center	Project introduction, community awareness	Introduction of the LEP to the community	August Community Engagement Report	Hā Sustainability, Shake, Lāhainā Strong, NREL
08/29/2024	Hui Convening	Office of Recovery	LEP introduction	Discussion of LEP, who is involved, timeline, and deliverables. Desire for local control, enthusiasm for cooperative models and microgrids. Identification of the potential use of R-1 wastewater as a resource for power generation	August Community Engagement Report and Event Summary	Hā Sustainability, Shake, Lāhainā Strong, NREL
09/13/2024	Stakeholder Meeting—County of Maui OED	Hybrid	Intro to the LEP. AWE energy system, energy-water integration	Caution around unproven tech; suggested private landowner piloting	September Community Engagement Report	Hā Sustainability, Shake, Lāhainā Strong, NREL

09/23/2024	Stakeholder Meeting—Hawaiian Electric	Hybrid	Intro to the LEP. Grid restoration, wildfire mitigation, and microgrid potential	Hawaiian Electric commitment to collaboration; offered Grid 101 sessions and site visits	September Community Engagement Report	Hā Sustainability, Shake, Lāhainā Strong, NREL
10/08/2024	Hui Convening	Office of Recovery	Energy history, solar + storage, hydropower, grid hardening and undergrounding	Interest in hydropower, rooftop and parking lot solar, microgrids; request for regulatory clarity	October Community Engagement Report	Hā Sustainability, Shake, Lāhainā Strong
10/24/2024	Co-Design Workshop #1	Lahainaluna High School	Intro to the LEP. Grid resilience, energy storage, renewable energy, hydropower	Participants showed strong support for solar, microgrids, and selective undergrounding, while expressing a need for education on grid ownership and emerging technologies	October Community Engagement Report and Event Summary	Hā Sustainability, Shake, Lāhainā Strong, NREL
10/24/2024	Stakeholder Meeting—County of Maui OED	OED Office	Intro to the LEP. LEP engagement, county alignment	OED and the energy commissioner emphasized realistic goals, quick wins, and county integration	October Community Engagement Report	Hā Sustainability, Shake, Lāhainā Strong, NREL
11/07/2024	Stakeholder Meeting—Dept. of Water Supply	Virtual	Intro to the LEP. hydropower feasibility, desalination, energy-water nexus	DWS open to collaboration; discussed hydropower and desalination studies, emphasized dual-piping for reuse	November Community Engagement Report	Hā Sustainability, Shake, Lāhainā Strong, NREL
11/07/2024	Stakeholder Meeting—Dept. of Environmental Mgmt	Virtual	Intro to the LEP. Waste-to-energy, wheeling legislation, in-line hydropower	DEM interested in community-informed projects such as waste-to-energy and in-line hydropower; need for resilience, and NREL TA noted	November Community Engagement Report	Hā Sustainability, Shake, Lāhainā Strong, NREL
11/07/2024	Stakeholder Meeting—Dept. of Management (Office of Recovery)	Virtual	Intro to the LEP. Long-term recovery, undergrounding, funding	Discussed alignment with Long-Term Recovery Plan; undergrounding as priority; coordination with Grants Manager and DPW planned	November Community Engagement Report	Hā Sustainability, Shake, Lāhainā Strong, NREL
12/03/2024	Stakeholder	Virtual	Intro to the LEP. Energy	KS open to microgrid and solar integration; noted	December	Hā Sustainability,

	Meeting—Kamehameha Schools		planning collaboration	community skepticism of large-scale solar	Community Engagement Report	Shake, Lāhainā Strong, NREL
12/09/2024	Stakeholder Meeting—HSEO	Virtual	Intro to the LEP. Alignment on energy education and outreach	Interest in Haven tool; coordination with Sea Grant and Wayfinders	December Community Engagement Report	Hā Sustainability, Shake, Lāhainā Strong, NREL
12/12/2024	Hui Convening	Office of Recovery	Review of needs statements, hydropower, solar, ownership	Interest in in-line hydropower and solar education; concerns about battery disposal	December Community Engagement Report	Hā Sustainability, Shake, Lāhainā Strong
01/16/2025	Stakeholder Meeting—PUC	Virtual	Intro to the LEP. Regulatory processes	PUC offered presentations and guidance on dockets; LEP interested in wheeling and IGP	January Community Engagement Report	Hā Sustainability, Shake, Lāhainā Strong, NREL
01/22/2025	Stakeholder Meeting—MHLA	Virtual	Intro to the LEP. Energy planning and tourism	MHLA supports Town Hall with hotels; emphasized infrastructure reliability	January Community Engagement Report	Hā Sustainability, Lāhainā Strong, NREL
01/27/2025	Maalaea Power Plant tour and Lahaina site visit-Hawaiian Electric	In person	Site visit	Maalaea Power Plant tour and Lahaina site visit for Hawaiian Electric West Maui energy infrastructure	January Community Engagement Report	Hā Sustainability, Shake, Lāhainā Strong, NREL
01/28/2025	Co-Design Workshop #2	Lahainaluna High School	Solar PV, storage, hydropower, undergrounding	Call for feasibility studies; interest in localized solutions and grid hardening	January Community Engagement Report and Event Summary	Hā Sustainability, Shake, Lāhainā Strong, NREL
02/11/2025	Presentation—Lahaina Sunrise Rotary Club	Lahaina	Lahaina Sunrise Rotary Club intro to LEP	The group was most interested in rooftop and parking lot solar, microgrids, ownership models	February Community Engagement	Hā Sustainability, Lāhainā Strong

					Report	
02/18/2025	Stakeholder Meeting—MEMA	Hybrid	Intro to the LEP. Emergency planning, evacuation, wildfire risk	Support for undergrounding along evacuation routes; funding mechanisms	February Community Engagement Report	Hā Sustainability, Shake, Lāhainā Strong, NREL
02/18/2025	Stakeholder Meeting—Hawaiian Electric	Virtual	Undergrounding, microgrids, wildfire safety	Hawaiian Electric to continue discussion on undergrounding strategy and work with the county; open to community feedback. Resilience hubs and FEMA funding. Microgrids.	February Community Engagement Report	Hā Sustainability, Shake, Lāhainā Strong, NREL
02/27/2025	Stakeholder Meeting—Hawaiian Electric	Virtual	Grid modernization, CBRE, microgrid feasibility	Community microgrid integration discussed; follow-up planned on implementation logistics	February Community Engagement Report	Hā Sustainability, Shake, Lāhainā Strong, NREL
03/05/2025	Presentation—Maui Hotel and Lodging Town Hall	Virtual	About LEP	Share with their employees and keep in mind for future work	March/April Community Engagement Report	Hā Sustainability
03/06/2025	Hui Convening	Office of Recovery	Workshopped priorities, vision statement, and energy ownership	Interested in energy independence and co-op. Want to learn more from communities that have done this. First pass at vision statement and priorities ranking	March/April Community Engagement Report	Hā Sustainability, Shake, Lāhainā Strong, NREL
03/11/2025	Co-Design Workshop #3	Lahainaluna High School	Finalize priorities, vision statement, and microgrids with a bit of energy ownership	Finalized vision statement, excited about ranking priorities, questions about ownership and if it is possible	March/April Community Engagement Report and Event Summary	Hā Sustainability, Shake, Lāhainā Strong, NREL
04/03/2025	Hui Convening	Lahaina Canoe Club Hale	Review draft priorities with Hui members and discuss areas of interest for technical assistance to be provided in Phase	Low-impact hydropower and in particular, the use of R-1 wastewater as a resource for power generation was reiterated. Undergrounding and grid hardening was discussed, and there was interest in better understanding all potential options in situations in	March/April Community Engagement Report	Hā Sustainability, Shake, Lāhainā Strong

			2.	which full undergrounding may not be feasible. This includes options such as partially burying lines to avoid having to trench too deep, encasing power lines in raised sidewalks, and laying power lines in protective conduit directly on the ground. Agrivoltaics were discussed, and there were concerns about this being used as a justification for utility-scale solar PV installations as well as concern about land access by community members. Maps of West Maui Sub Area 3 were reviewed, and neighborhoods were identified that would benefit from neighborhood-scale microgrids and that could also benefit from load estimates to better understand power generation needs for each neighborhood. Desalination was identified as something the community does not support because of potential for environmental impacts of brine waste and infrastructure footprint, the high power demand required to run desalination technologies, as well as concern of desalination allowing for more development on the West Side and leading to overconsumption of local water resources.		
04/11/2025	Priorities Survey	Virtual	Community priorities	Survey collected input on energy priorities across Lahaina; results supplement co-design process and are sorted by ZIP code to highlight Lahaina residents' input	March/April Community Engagement Report	N/A

Table B.1: Summary of Engagement Activities Conducted During Phase 1 of the Lahaina Energy Partnership



Appendix C: Community Input Synthesis Reports (CISRs)

Appendix C.1: CISR Regarding Undergrounding and Grid Hardening

Given the role of transmission infrastructure on increased risk during the August 2023 wildfire, community members indicated interest in investigating undergrounding and grid hardening as a pathway to mitigate future risk.

Methods for Community Engagement

Community engagement on this topic was conducted primarily through facilitated discussions. To constrain discussions, these discussions were limited to 15 minutes.

Discussion Guide

The following questions were used to guide community discussions:

- What information do you need to make a confident decision about undergrounding?
- How does pricing impact your opinion toward undergrounding?
- What are your hesitations around undergrounding?
- Some community members have voiced their concerns about how implementing underground lines might impact archaeological sites and iwi kūpuna.
 - What considerations do you think should be taken into account regarding this?
 - What concerns might you have on this topic?

Key Concerns and Considerations

Cost and Affordability

Although there is no exact estimate for the per-mile cost of undergrounding infrastructure on Maui, this price is assumed to be significantly high. With this assumption in mind, community members expressed concerns about how this pricing might be passed through the utility to consumers in the form of higher electricity rates. Some community members shared they would be willing to pay more for additional safety, whereas others emphasized the need for subsidies and grant support.

Cultural and Archaeological Impact



The abundant presence of archaeological sites presents a unique challenge to the implementation of underground infrastructure. Cultural practitioners in attendance expressed concerns that digging to the depth required for undergrounding would disturb known cultural sites. These practitioners also suggested undergrounding in more upland neighborhoods may have less of a risk for disrupting archaeological sites than in coastal areas. These cultural practitioners have suggested they would like to see the county archaeologist involved with future undergrounding efforts.

While many community members were familiar with traditional undergrounding, they expressed interest in other methods for grid hardening as well. One method of special interest was shallow undergrounding under raised sidewalks. Reducing the depth of digging required for the implementation of energy infrastructure may reduce the risk of disturbing archaeological sites significantly.

Impacts on Development Timelines

Intersecting with concerns around the archaeological challenges of undergrounding are concerns about how grid hardening might impact the pace of rebuilding neighborhoods. In Maui County, there is a precedent for encounters with archaeological sites significantly delaying the timeline for infrastructure updates. Community members voiced the need for any infrastructure updates to be planned to minimize potential impacts to redevelopment efforts.

Risk Reduction and Safety

Prioritizing undergrounding in egress routes for safety was a shared value across many community members. Some wildfire survivors shared the struggles they encountered while trying to evacuate because of downed infrastructure. For some people, the visible absence of poles would create a sense of peace of mind. In the case of non-undergrounded grid hardening, it may be helpful to share information with the community about the risk-reducing impact of less visible grid-hardening methods.

Appendix C.2: CISR Regarding Energy Storage and Microgrids

Energy Storage Scenario Critiques

The facilitation team leveraged a worksheet activity to facilitate community engagement about microgrids. Discussions focused on hypothetical pumped storage hydropower and battery energy storage systems for microgrid applications.

Scenario 1: 2 MWh pumped storage hydropower in Launiupoko using existing pipes and reservoirs

This scenario generated a mix of curiosity and skepticism, with many participants raising questions about feasibility, efficiency, and impact. The idea of using existing infrastructure and



R-1 recycled water was seen as a more feasible and low-impact approach given limited access to water in the region. Participants shared significant concerns about the scale and energy output, which many felt would be too low to justify the cost, and land use. People asked about system efficiency, maintenance, longevity, and end-of-life concerns, whereas others noted that water rights and existing community tensions around water access could make implementation difficult.

There were also questions about whether private landowners and irrigation companies would be viable partners and whether the area's zoning and conservation designations would even allow such a project. Some expressed interest in pursuing alternative gravity-based storage methods, which might offer fewer environmental and social challenges. Overall, although pumped hydropower is an appealing alternative to a battery energy storage system (BESS) because of lowered fire risk, most felt this specific proposal's intersection with existing limitations around water would require significant analysis to determine if it's worth pursuing.

Scenario 2: 50-MWh pumped storage hydropower using new reservoirs and channels in Wahikuli location

This larger-scale pumped storage hydropower proposal sparked interest but also serious concerns. Supporters appreciated the potential for greater energy output, especially if powered by excess renewable energy and paired with regreening or fire mitigation efforts. The use of R-1 recycled water, especially when treated through constructed wetlands, was frequently suggested to offset potable water use and reduce waste. Ideas like covering reservoirs with floating solar panels to minimize evaporation were also shared.

However, participants expressed deep cultural and environmental reservations, particularly regarding disturbance of sacred lands, 'iwi kūpuna, and archaeological sites. The creation of new reservoirs and delivery channels raised flags about flood risks, landscape disruption, ecological impact, and long-term maintenance. Some questioned the feasibility of using fresh water at this scale, suggesting alternatives such as stormwater, seawater, or a more closed-loop system. Although the concept was seen as more impactful than smaller pumped hydropower projects, it was also viewed as high risk and potentially controversial, requiring extensive environmental review, cultural consultation, and innovative water sourcing to be viable.

Scenario 3: 10-MWh BESS behind Lahaina Gateway that powers the mall during outages

This scenario received broad support, especially for its ability to provide localized backup power during outages and contribute to community resilience. Participants appreciated the idea of a closed-loop system that could store excess solar energy, particularly if paired with carport solar installations. The proposal was seen as feasible and relatively easy to implement, especially for commercial spaces. However, many felt its benefits should extend beyond the mall to serve



critical infrastructure, such as emergency shelters, communication hubs, and water systems, or at least be accessible to residents during crises as a resiliency hub.

There were notable concerns around battery safety, particularly related to fire hazards and aesthetic impacts, especially if the battery is placed in a visible, open area. Suggestions included using containerized systems with thoughtful architectural design. Participants also highlighted the environmental costs of lithium-ion batteries, especially regarding mineral extraction, disposal, and short lifespan, and some voiced a preference for waiting on more sustainable battery technologies.

Scenario 4: 100 residential battery packs (15 kWh each) mounted on garages

This scenario was seen as one of the most community-beneficial and empowering options, with strong support for its potential to provide direct relief to homeowners through energy bill savings, backup power during outages, and increased resilience at the household level. When paired with rooftop solar, participants saw it as a step toward energy independence and microgrid potential. Many noted this could be especially impactful if included in rebuild efforts, with integrated PV + BESS systems in both single and multifamily homes.

However, there were recurring concerns about fire risks. People questioned the safety, lifespan, and environmental impact of these systems, both during use and at end-of-life. Suggestions included ensuring fire suppression systems, choosing safer battery chemistries, and considering long-term waste and sourcing issues for lithium. Still, compared to other storage options, this was considered one of the most practical, and community-focused proposals, especially if structured with strong consumer protections and clear utility integration such as net energy metering.

Microgrid Resilience Worksheet

During a separate, similar facilitated activity, participants were asked to share their thoughts on microgrids in the context of building resiliency in their communities. The following bullet points capture the synthesized notes from these worksheets.

Question 1: By harnessing microgrids, what are some of the most important things you want to protect. and why?

- Communications: internet, wifi; air purifiers; lifesaving equipment, food
- Lifesaving equipment; seniors; water treatment facility; medical center; fire department
- Dialysis, oxygen, pharmacy, grocery, urgent care, cellular phone structure, senior housing
- Health, protective services, water treatment
- Medical facilities, grocery stores, schools, fire, police



- Schools and hospitals, critical infrastructure; resilience hubs, grocery stores, gas stations; holistic system infrastructure protecting communications (specially emergency); water infrastructure; fire/police stations
- Most congested areas like up Lahainaluna Road
- Medical, communication
- Lightning, sewage systems, roadways and traffic signals, stores, gas pumps
- Medical facilities, large indoor shelter building
- Critical health services—dialysis, and so on; kūpuna, cell towers
- Emergency care facilities, police/fire stations (first responders), cell towers
- Reliability to water, police, shelter, food and gas, communications
- Emergency/healthcare facilities; open communications/evacuation locations
- Medical services (including dialysis, urgent care, medications); grocery stores (including ice makers ([commercial])); gas station; wastewater facilities; senior housing; water pumps; traffic lights; communications; first responders, facilities
- Medical or emergency services; grocery stores; street lights/traffic lights; emergency shelters; water pumps/wastewater; gas station; Starbucks

Most Mentioned Terms: Communications, medical facilities, grocery stores, water infrastructure, emergency response services

Question 2: And what are you protecting those things from? Microgrids protect us from power outages, but what causes of outages are you most concerned with?

- Wind storms; fires; ANY WEATHER; monopolized utilities
- Hawaiian Electric power safety power shutoff events, earthquake, wind events, hurricane, wildfire
- Storms—large waves, wildfires, high winds that topple trees and poles
- Protecting people with vital services: fire, police, food, medical; concerned about wind + fire events
- Medical; communication
- Wildfire, power outages, death, downed power lines, future disasters, heat-related impacts
- Electromagnetic Pulse (EMP), back surge, phone lines
- Natural disaster and lack of MECO generation
- Being able to have power/communication available; protecting—all area/ energy grids from high wind; tropical storms/rain/flooding
- Grid-debilitating outages because of disasters; but if a storm/natural disaster roles through, a microgrid couldn't be spared from the elements that would also affect the larger grid; trees in power lines, vegetation overgrowth
- Natural disaster, poor infrastructure.

Community Plan Designations

- Rural Residential
- Residential
- Rural Village
- Neighborhood Center
- Small Town Center
- Transit Oriented Corridor
- Resort/Hotel
- Employment Center
- Industrial
- Special Purpose District
- Public/Quasi-Public
- Park
- Open Space
- Agriculture
- State Conservation

West Maui Community Plan Subarea 3

Maui Island Plan

- Urban Growth Boundary
- Rural Growth Boundary
- Planned Growth Areas
- Building Footprints
- 3.2 Ft. Sea Level Rise Exposure Area

Map Labels: Civic Center Area, DHHL 1B, DHHL Mauka, Hawaiian Homes, Wahikuli, Lahaina Town North, Kapuna Kea, Kahoma, Kahoma Village, Puunoa, Lower Lahainaluna, KS Development, Lahaina Town South, Puamana, Lahainaluna schools, Kelaweia Mauka, Mala, Māla, Lāhaina, Town, PRISON, HONOLULU, KAHANUI, WAHIKULI, ELEMING, PUNAKE, LAHAINALUNA.

Scale: 0, 0.25, 0.5 Miles

Prepared by: Long Range Planning Division, Department of Planning, County of Maui
One Main Plaza, Suite 601
Wailuku HI 96793
Bill No. 149 (2021)
Adopted Dec 17, 2021
Ordinance No. 5334
Effective Jan 31, 2022
M-SCB_202203-SA-322

Figure C.2: Community-defined neighborhoods for small-scale microgrid and energy profile analyses



Appendix C.3: CISR Regarding Solar Energy

Solar Scenario Critiques

To gather community sentiments on solar energy generation, participants were presented with five hypothetical energy scenarios and asked to share reactions. The following sections are synthesized notes related to each of the hypothetical scenarios.

Scenario 1: Connecting rooftop solar on 100 homes in Lahaina to act as a virtual power plant that can power homes and the grid

The idea of connecting rooftop solar on 100 homes in Lahaina into a virtual power plant was met with support, especially for its potential to boost sustainability, energy independence, and community resilience. Residents appreciated the vision of a locally managed, co-op-style microgrid that could reduce reliance on the main grid and help homes stay powered during outages. Although appealing, this was seen as the most expensive option. Participants noted this strategy would require significant government subsidies, bulk purchasing strategies, and financial models that ensure fair access and benefits. There was also a desire to make sure savings on electricity are shared fairly across the community.

Technical feasibility raised questions about whether MECO's current infrastructure can support such a system. Safety concerns were noted, particularly around lithium battery fire risks. Sourcing materials sustainably and maintaining neighborhood aesthetics were also flagged.

Scenario 2: Ground-mounted community solar farm on a 2-acre industrial parcel in town

The concept of a ground-mounted community solar farm on an industrial parcel received mixed reactions. Although some saw the practicality in using nonagricultural, already-developed land for solar, others expressed concerns about visual impact, environmental degradation, and limited scale. The 2-acre size was seen as too small to make a significant energy contribution to Lahaina on its own, though it could play a role as part of a mixed energy strategy.

Land use and devegetation were major concerns. Many were uneasy about clearing land, especially given the potential for erosion, dust, and runoff. However, some acknowledged the lack of vegetation could also reduce fire risk and industrial parcels may be more appropriate than agricultural or scenic areas. Still, careful site selection was emphasized. Some participants shared skepticism rooted in past failed projects, with one commenter mentioning a now inoperative solar installation abandoned by the company responsible. Long-term maintenance and planning for eventual decommissioning were flagged as important issues.

Scenario 3: Agrivoltaics (solar over crops) on 4 acres of agricultural land with medium-quality soil (Land Study Bureau Rating B)



This scenario received some support. Participants noted this as a more efficient use of land when tied to regenerative practices like agroforestry. Supporters highlighted the potential for agrivoltaics to subsidize farming costs, provide shade for crops, and make better use of agricultural areas without displacing food systems.

However, a few concerns were raised about potential health risks, visual impact, and the need for adequate water infrastructure. Suggestions included using treated water (R-1) and implementing constructed wetlands for irrigation. Some questioned feasibility, especially with large landowners or farmers resistant to sharing land or profits.

Scenario 4: Utility-scale solar farm on 30 acres of low-quality agricultural land (Land Study Bureau Rating E)

This scenario received mostly negative or cautious responses. Although a few saw the energy production potential as beneficial, most were concerned about the large land footprint, environmental impacts, and agricultural land. Many questioned whether 30 acres could be spared given housing needs and overall land scarcity on the island. Aesthetic concerns were common, with utility-scale farms described as eyesores, especially when compared to more discreet options such as solar on carports or rooftops. Some also pointed out fire risks and the challenge of maintaining vegetation-free zones safely.

Scenario 5: Carport solar over the parking lot at Lahaina Gateway and on the roofs of the buildings

This scenario received overwhelmingly positive support. Participants praised the dual-use benefits of generating clean energy while providing much-needed shade in hot parking lots. Many saw it as a “no-brainer” solution, especially because it uses existing infrastructure and avoids disturbing natural or agricultural land. Supporters emphasized this type of solar installation is visually appealing, low maintenance, and ideal for commercial centers, schools, and community spaces. It was also seen as a strong candidate for microgrid development, adding resilience while reducing the urban heat island effect.

Additional Notes

Although solar energy is widely supported, several broader concerns emerged around resource impact/use, infrastructure, and equity. A key point raised was the need to reduce overall energy consumption as the first and most effective step toward responsible resource use. Participants emphasized that current systems on Maui are not equipped to handle the end-of-life waste from solar panels and batteries, underscoring the importance of creating a system that includes recycling, disassembly, and responsible material management. There was also concern about the environmental impact of mineral mining required for solar technology, with calls for greater transparency in discussing these trade-offs.

Financially, questions were raised about who will bear the cost of necessary infrastructure upgrades, particularly for MECO, and whether taxpayers or ratepayers will be expected to shoulder that burden. Some advocated for coop-style energy ownership models that could offer more community control and financial benefit.

Appendix C.4: CISR Regarding Hydropower

Uncovering community perspectives on hydropower was one of the January co-design workshop's main objectives, and it revealed significant community interest in hydropower as a potential energy solution, though participants expressed a complex mix of concerns, questions, and innovative ideas that must be considered in future planning efforts.

Community Questions and Knowledge Gaps

Community members raised numerous questions about the technical feasibility of hydropower in West Maui. Many inquired about alternative water sources beyond traditional streams, asking whether rainwater, gray water, or treated wastewater (R-1) could power hydropower systems. Specific technical questions focused on pumped storage locations, reservoir refilling requirements, and the overall energy potential for West Maui systems. Several participants questioned the year-round reliability of local streams shown on planning maps.

The ownership structure of potential hydropower facilities emerged as a central concern. Workshop participants wondered who would own and benefit from hydropower infrastructure, whether pumped storage reservoirs required unified ownership, and if existing water infrastructure could be repurposed. Some suggested innovative approaches such as installing in-pipe turbines in resort water systems, though questions remained about how such arrangements would affect infrastructure ownership and energy rights.

Water Access and Rights Concerns

Water access represents perhaps the most significant concern raised during the workshop. Multiple participants noted that local streams like Kauaula and Kahoma are already "struggling" with reduced flow, questioning how hydropower implementation might affect these stressed systems. Several comments highlighted the community reportedly has access to only 23% of water resources, with the remainder privately controlled, a situation that highlights the contentious nature of water rights and systems issues on Maui.

The workshop revealed tension around water rights and planning processes. Some participants insisted securing community water rights should precede hydropower development, whereas others mentioned specific concerns about plans to divert mauka water on Konokawai for resort

use. Questions were raised about whether active kuleana claims to water (specifically mentioned: Kahona) would be considered in planning.

Community Preferences and Parameters

Despite these concerns, the workshop revealed community interest in creative approaches to hydropower, particularly using R-1 reclaimed wastewater. Multiple participants referenced historical precedent, noting that Maui pineapple operations once used R-1 water pumped uphill for energy generation. Several suggested pumped storage using R-1 water as a preferred approach, with comments emphasizing community desire to manage such systems rather than leaving control solely to county authorities.

The community expressed interest in integrated, multi-benefit systems. Suggestions included combining solar-powered pumping of R-1 water to constructed wetlands that could outflow to agrivoltaic systems, using hydropower infrastructure for fire mitigation, and exploring wetland ecosystems for both wastewater purification and energy production. Some questioned whether battery storage might be preferable to water-based energy systems, indicating openness to multiple renewable energy pathways.

Stakeholder Consultation Needs

Workshop comments clearly indicated that broader stakeholder consultation is essential before moving forward with hydropower planning. Cultural practitioners and lineal descendants with water connections were specifically mentioned as requiring engagement, particularly those holding kuleana water rights. Environmental advocates concerned with stream protection and native species (particularly regarding migration of 'opae, or *native shrimp*) need involvement, as do agricultural interests considering use of R-1 water.

The technical complexity of potential systems suggests consultation with specialists in pumped storage, wastewater reclamation, in-pipe turbine technology, and integrated energy systems combining hydropower with other renewables. Current landowners and infrastructure operators must also be included, as their systems and rights would likely intersect with any new hydropower development.

The workshop demonstrated that, although community members see potential in hydropower, particularly innovative approaches using reclaimed water, concerns about water rights, environmental impacts, infrastructure ownership, and community control must be addressed through comprehensive stakeholder engagement and detailed technical analysis before implementation can proceed.

Appendix D: Energy Education Materials

To support community energy education and engagement, the LEP developed a series of educational materials based on community-identified priorities. These resources were designed to provide accessible information on key energy topics discussed during Phase 1 activities, including microgrids, hydropower, water-energy nexus, regulatory process, and so on. Materials were shared during community co-design workshops, Hui meetings, and emailed to participants to build capacity and support informed decision-making throughout the planning process.

Educational materials include:

- Energy education one-pagers
- Short informational videos.

A full collection of these resources is available at the following link:

https://drive.google.com/drive/folders/1xYM_-lA1kvmZi5-bjVjQNSgZMKT50CUD?usp=sharing

These materials were developed with input from community members and technical partners and will continue to serve as foundational resources during Phase 2 of the project.



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Website

<https://www.nrel.gov/state-local-tribal/lahaina-energy-partnership.html>

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