Hawai'i Powered

Integrated Grid Planning Stakeholder Council

November 30, 2022

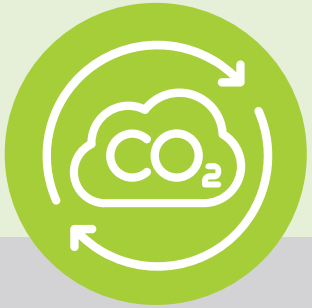
Hawaiian Electric

Agenda

- 9:00 – 9:30 am
  - Introductions
- 9:30 – 10:30 am
  - Goals, Objectives, Pathway to Net Zero
  - Q&A
- 11:00 am – 12:30 pm
  - Lunch Break / PPCTF Meeting (Gardenia)
- 12:30 – 2:30 pm
  - Community Engagement
- 2:30 – 3:30 pm
  - Breakouts – Recommended Actions and Next Steps
- 3:30 – 4:00 pm
  - TAP Update

IGP plans and action plans are needed to achieve 2030 carbon reduction target of Act 238 – just 8 years away

Reduce carbon emissions by **70%** by 2030

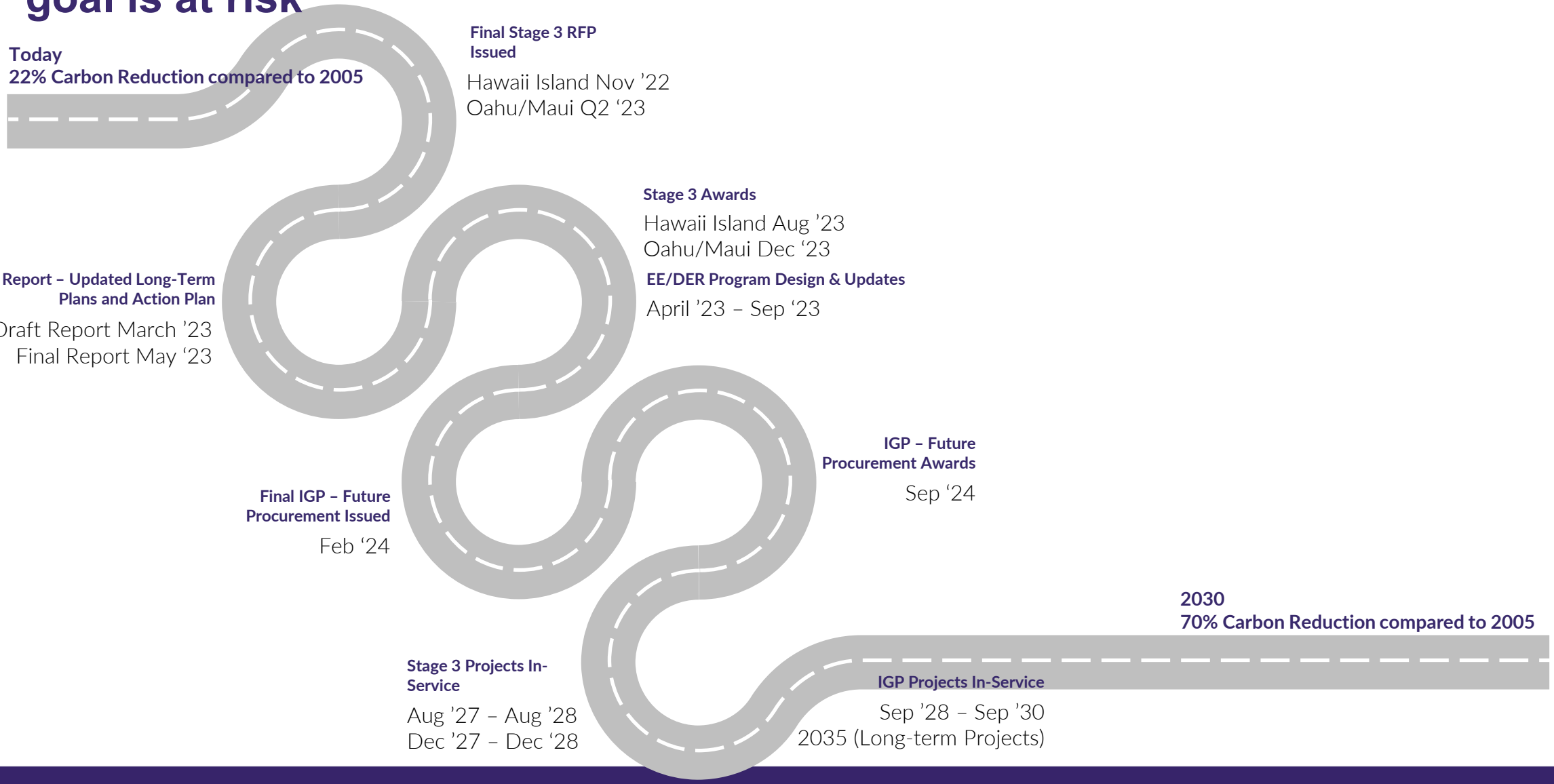


Reach **net zero emissions** by 2045

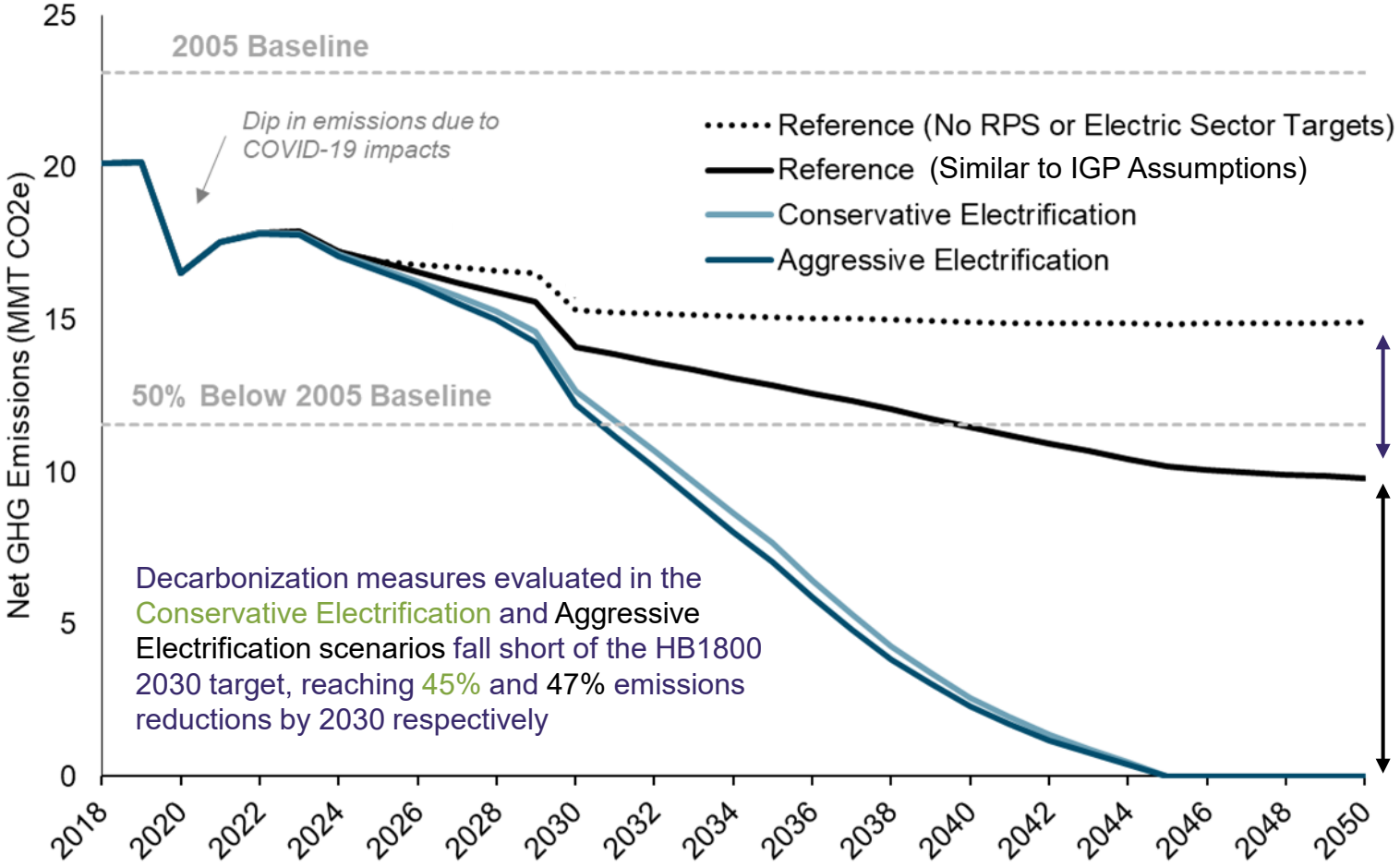
Be **100% Hawai‘i Powered**—using all local, renewable resources—by 2045

Compliance with Act 238 to Reduce Economywide Carbon Emissions by 50% by 2030 (and Net Zero by 2045) Substantially Depends on Hawaiian Electric's Commitment to Reduce Electric Sector Emissions by 70%.

Achieving Act 238 and Hawaiian Electric's 70% GHG reduction by 2030 goal is at risk



Achieving statewide 50% reduction will likely require electric sector reductions of at least 70% by 2030



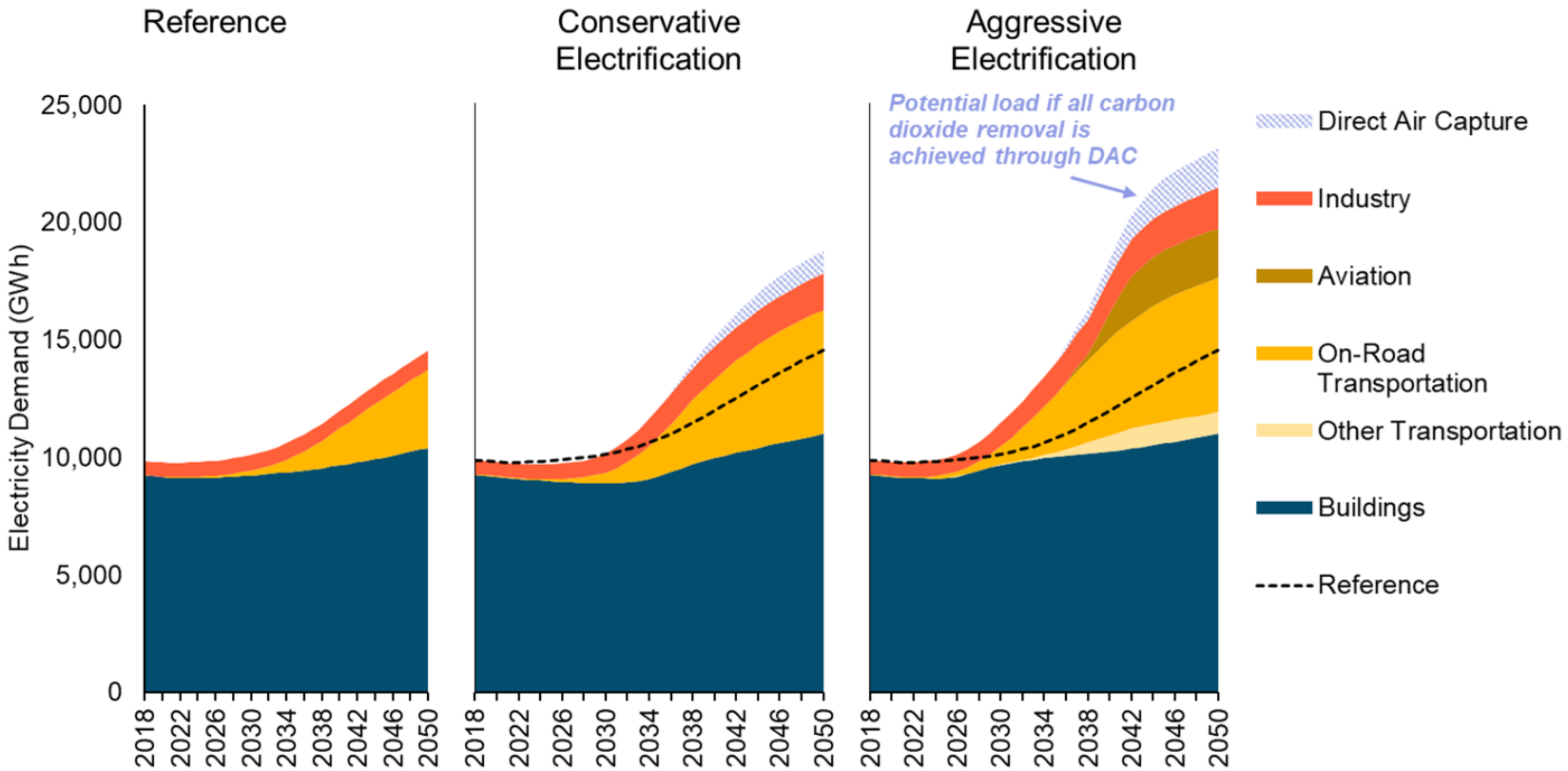
State RPS policy and Hawaiian Electric targets will lead to significant emissions reductions by 2045

However, major action is needed in other sectors of the economy to reach Hawai‘i’s Net Zero by 2045 target

Achieving deep emissions reductions by 2030 is challenging due to the long lifetimes of physical assets in the economy and the natural pace of asset replacement

For many other sectors of the economy, electrification will be seen as a key option for that sector to reduce GHG emissions

Illustrative



These scenarios assume some energy efficiency across scenarios

- More aggressive efficiency and/or demand reduction measures may help to reduce these load impacts

The net zero scenarios are not forecasts

- ***They include technologies that are not yet commercial and policies that are not in place***
- ***IGP forecast may be more predictive, especially for near-term resource needs***

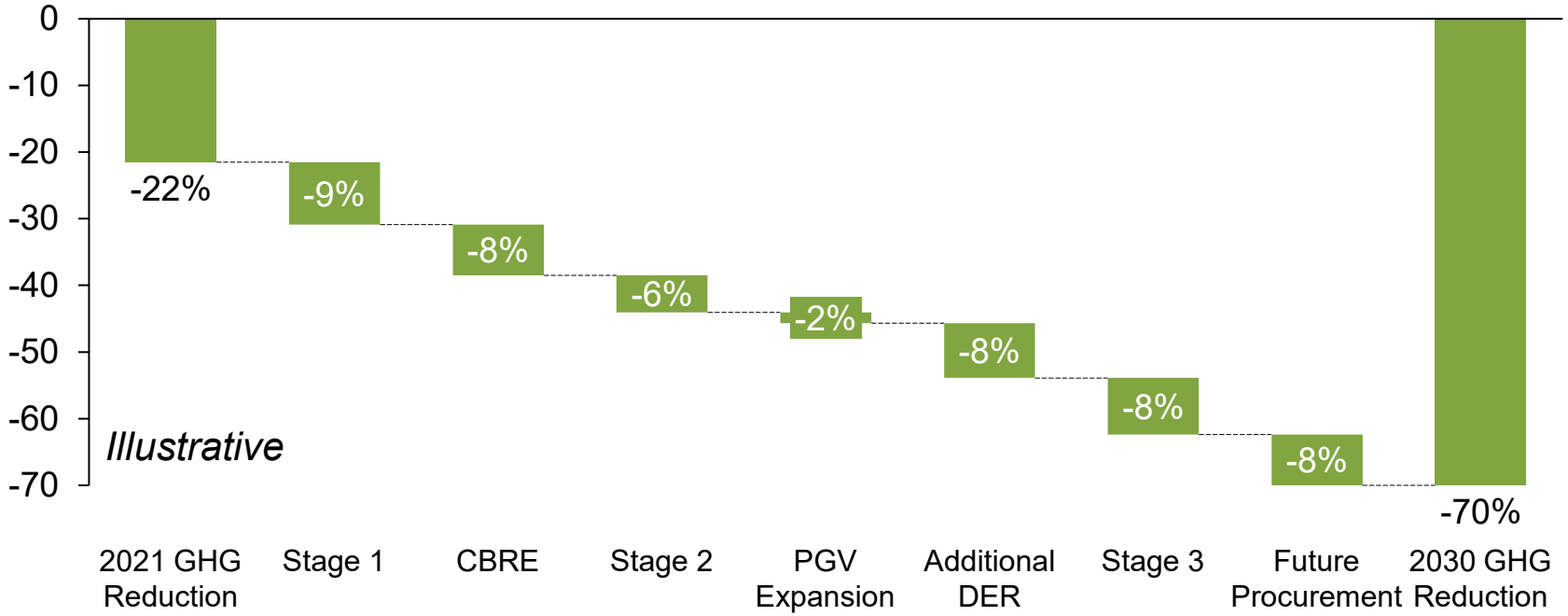
However, it is prudent to consider these high loads as a sensitivity in electric system planning

- Key for planners, regulators, and stakeholders to understand the electric load impacts of economywide net zero emissions

Although full economywide decarbonization scenarios were not developed for the first IGP cycle, this future context is important for today's discussions

We have a good plan to achieve our goals, but there's a lot of work to do and barriers to remove

Estimated Pathway to 70% carbon reduction by 2030 –
Actual achievement will depend on projects and programs that reach commercial operations



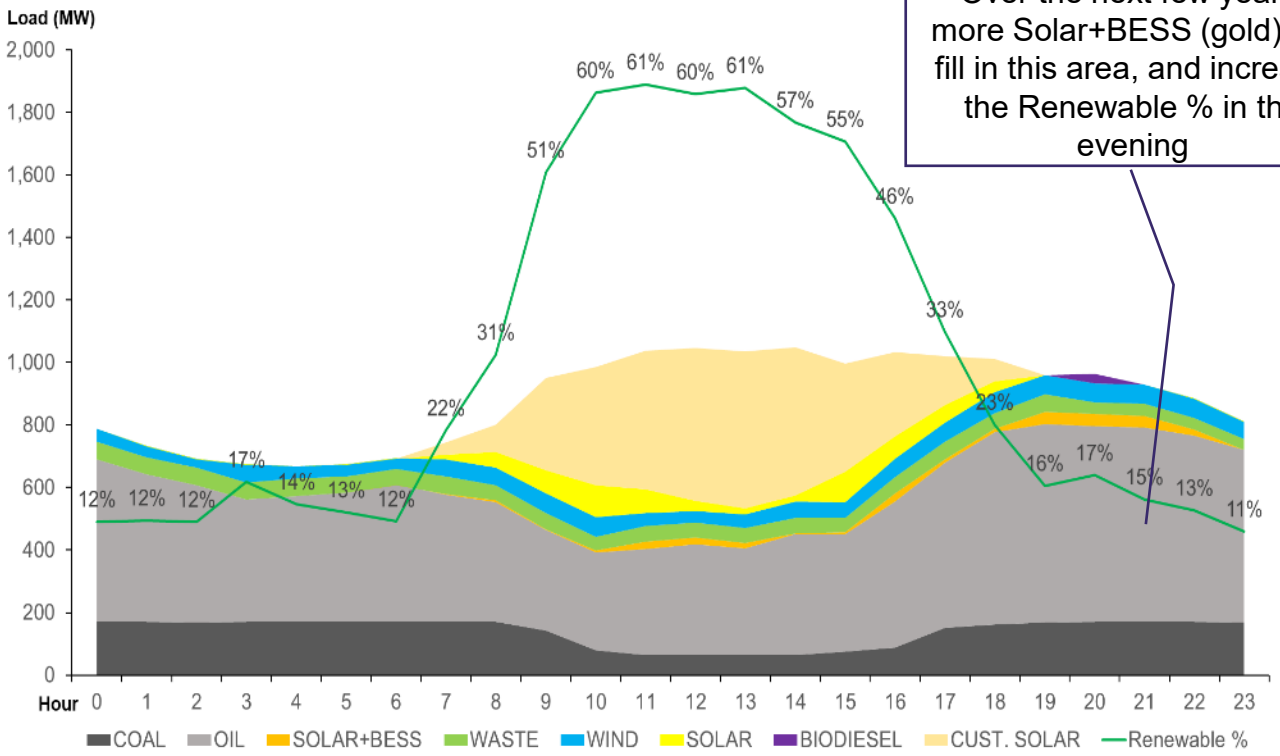
We are quickly running out of time to meet Act 238 in the next 8 years

- Need to execute two more large procurements, permit, and build
- Limited transmission capacity remaining and prime solar land next to transmission lines (Stage 1 and 2) already developed
- Additional infrastructure needs to be planned and built to enable interconnection of Stage 3 and future IGP procurement

Solving the problem is bigger than simply issuing another RFP and streamlining interconnection…

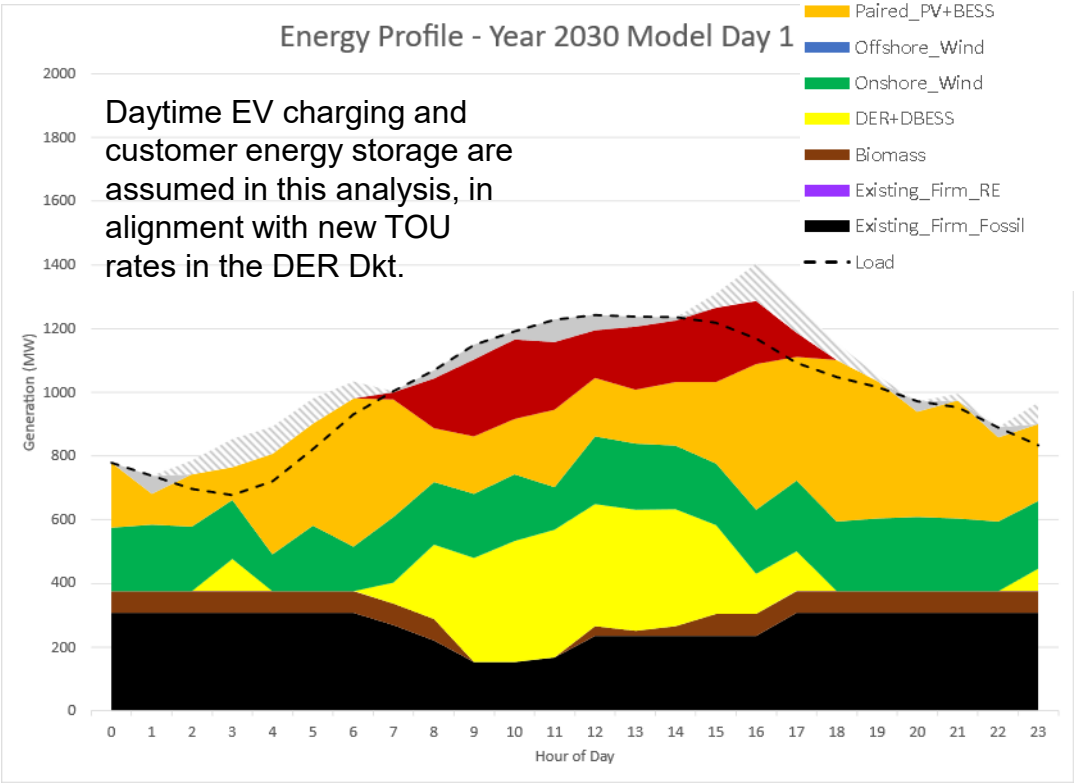
Continued acquisition of significant solar, energy storage, and wind resources in the mid-term is needed – grid-scale and DER

The Grid Today - July 31, 2022

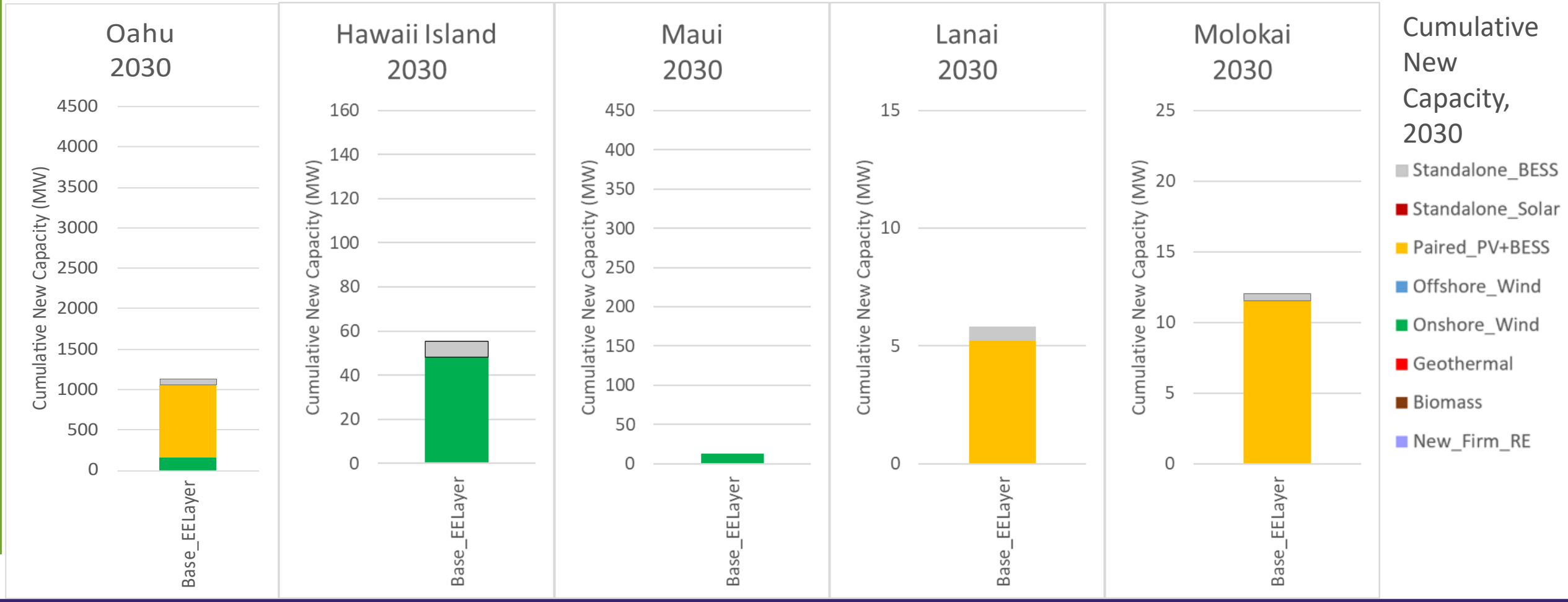


Over the next few years, more Solar+BESS (gold) will fill in this area, and increase the Renewable % in the evening

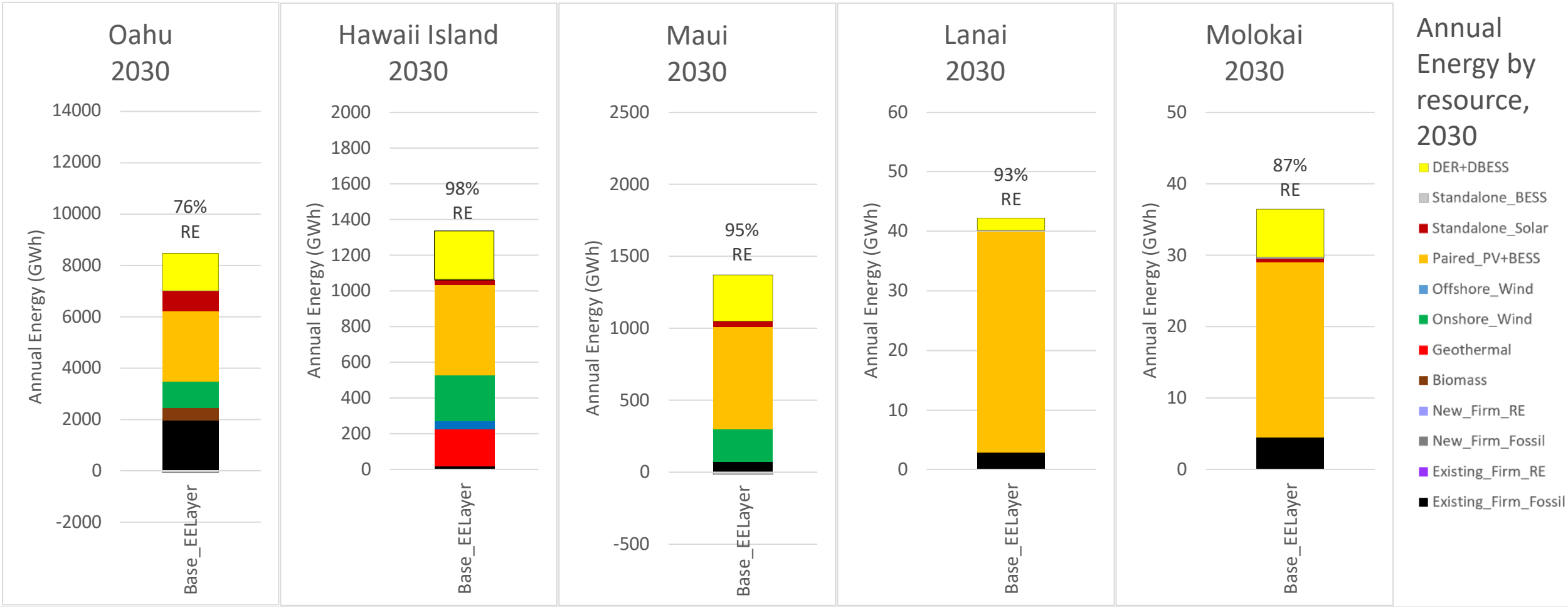
The Grid in 2030



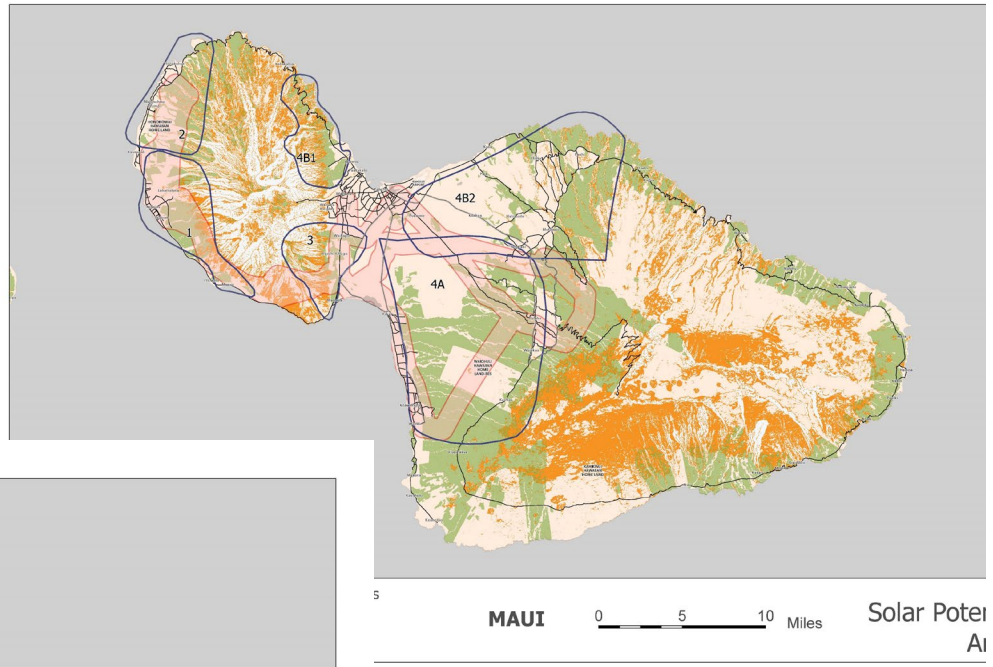
The modeling analysis continues to select wind and solar as the least cost pathway

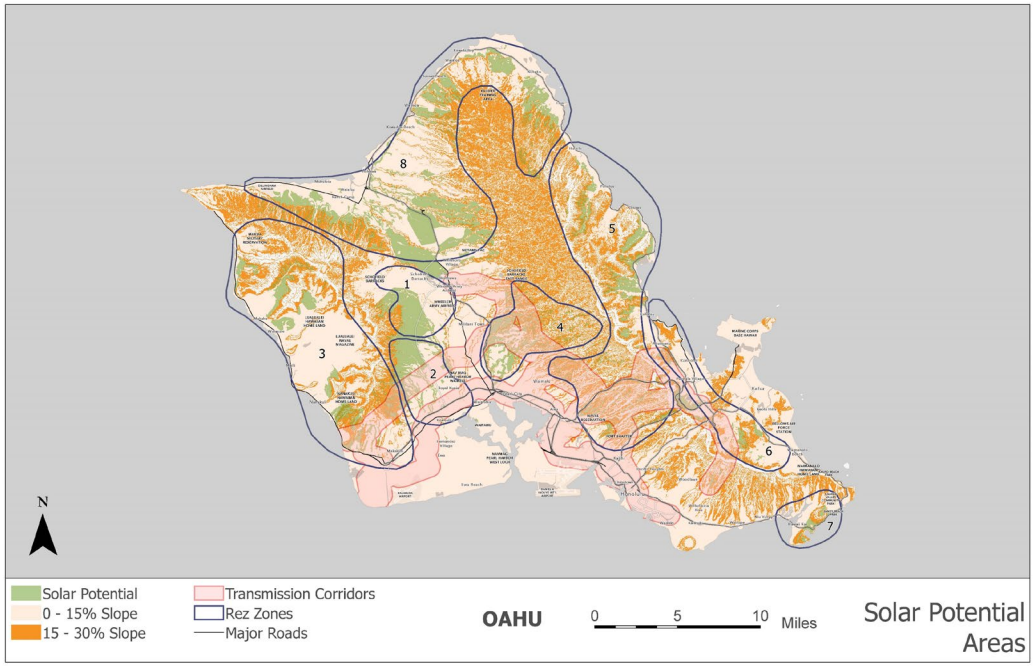


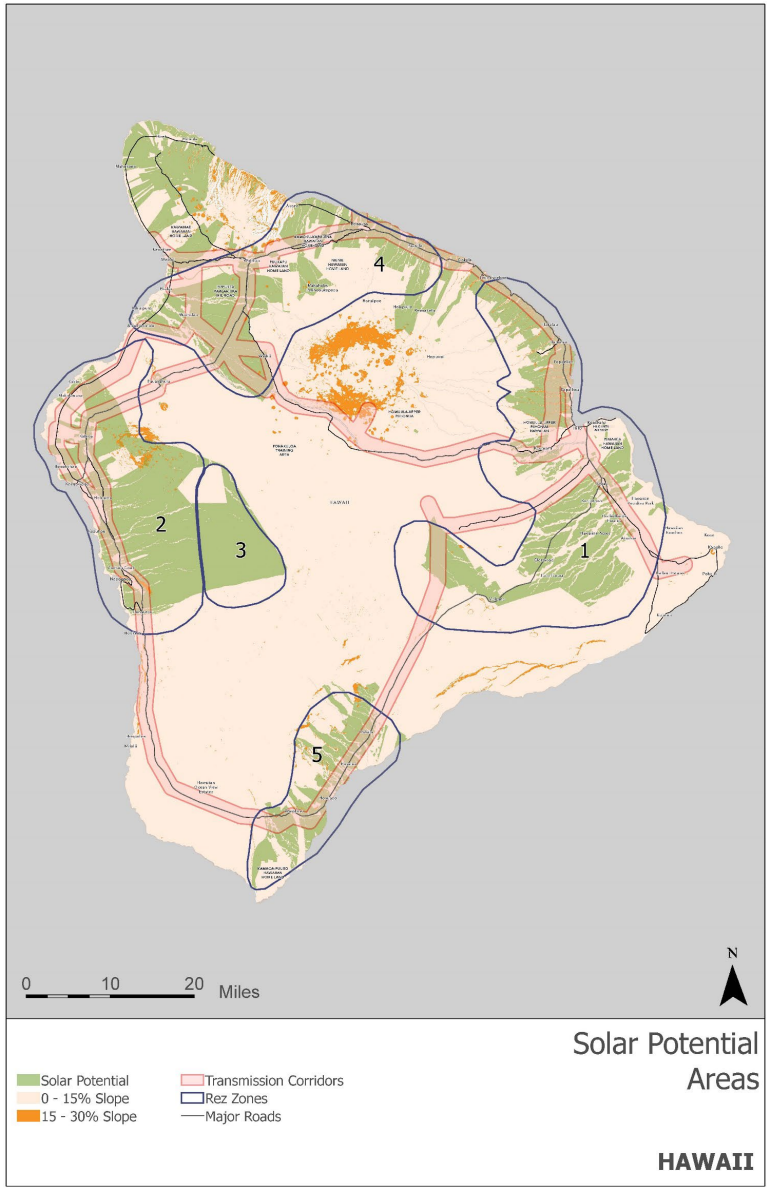
Significant wind and solar additions will lead to high RPS achievement by 2030



Transmission infrastructure is needed to enable interconnection of renewable resources

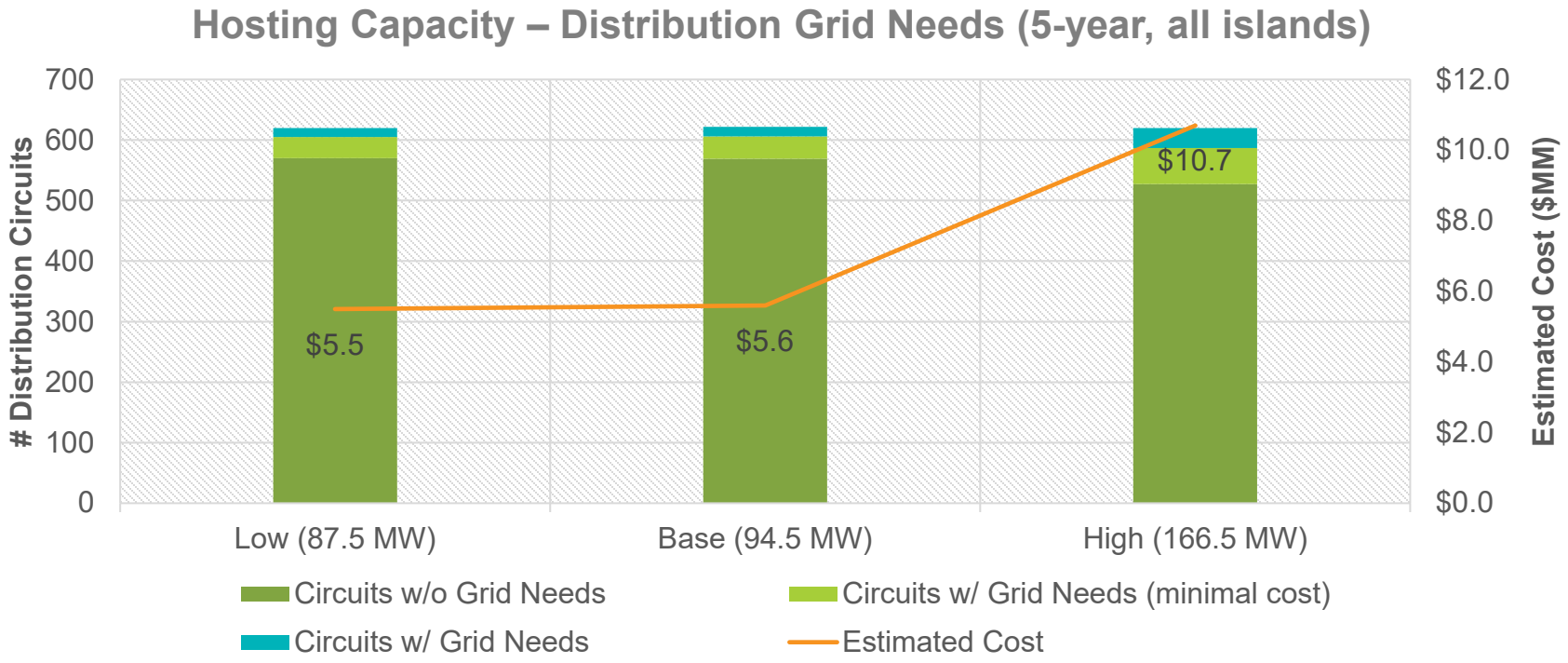






Distribution investments and advanced DER capabilities continue to be required at the distribution level to scale DER

- Hosting capacity analysis over the next 5 years show a relatively small number of circuits requiring upgrades to address hosting capacity. Longer-term DER growth may trigger the need to address higher portions of the remaining circuits.
- Hosting capacity is one of several enablers for DER growth. Impacts at the system level, such as curtailment and stability also need to also be addressed to continue DER growth.



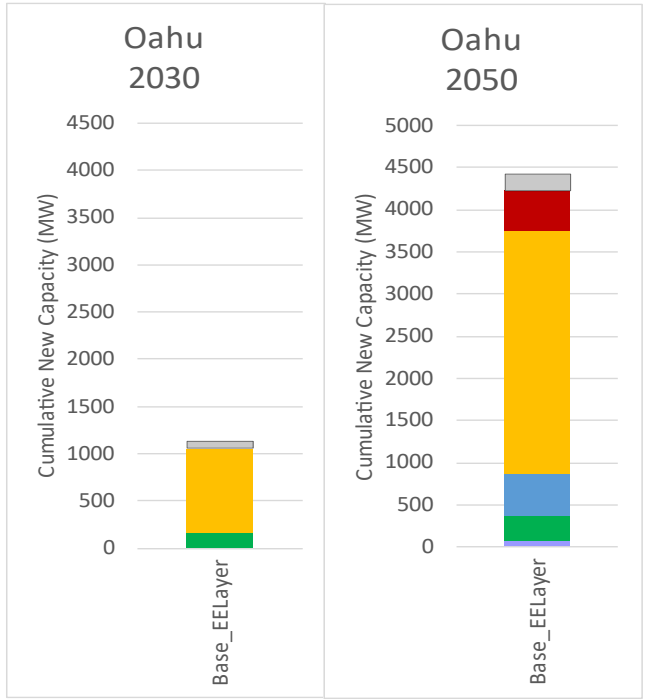
As DER scales, will need to address system stability risks caused by DER such as momentary cessation, ROCOF ride-through, impacts to Underfrequency Load Sched Scheme, and enable control / dispatch capabilities.

*ROCOF = Rate of Change of Frequency

Renewable Energy Zone development makes the most sense; however, success will take time and community support

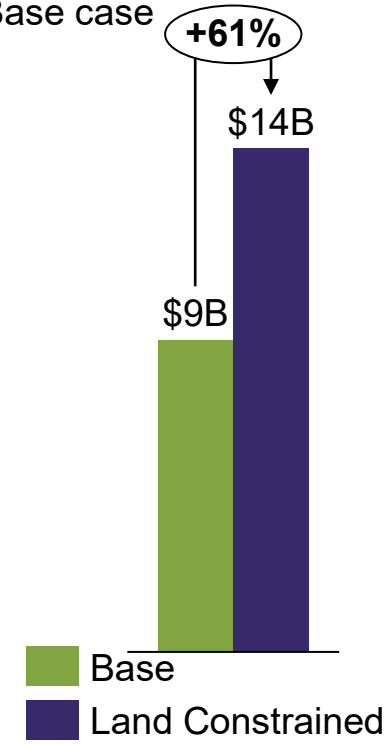
Optimal Pathway

To achieve 2050 goals significant solar (gold) and transmission is needed



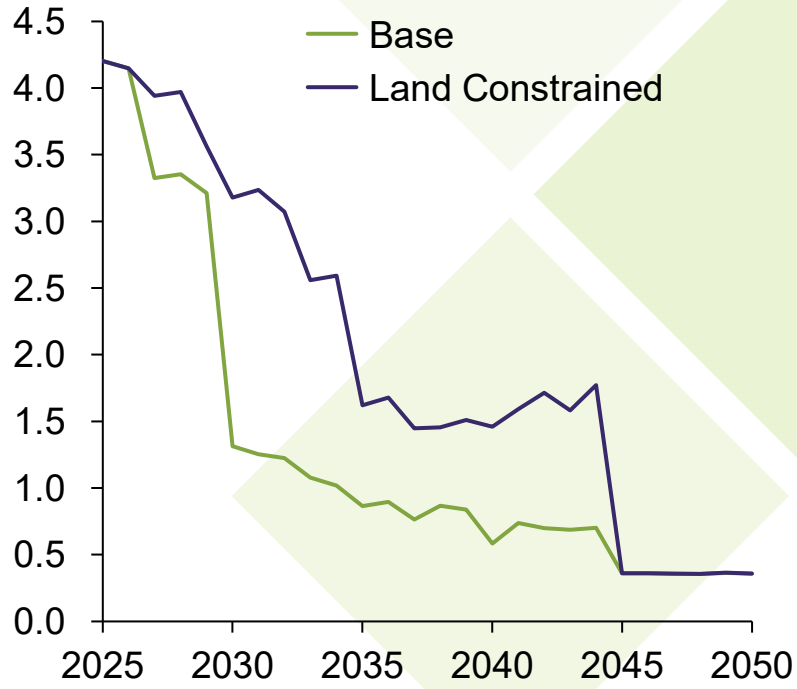
Least cost

Land (and transmission) Constrained scenario is 60% more expensive than the Base case



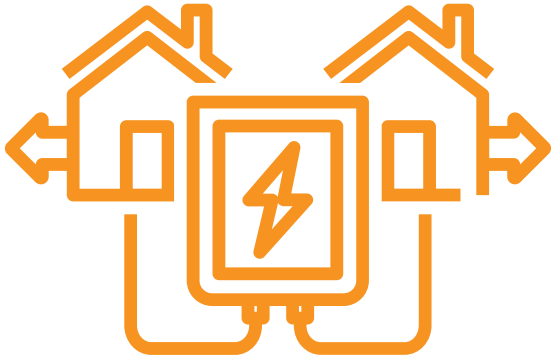
Lower Carbon Emissions

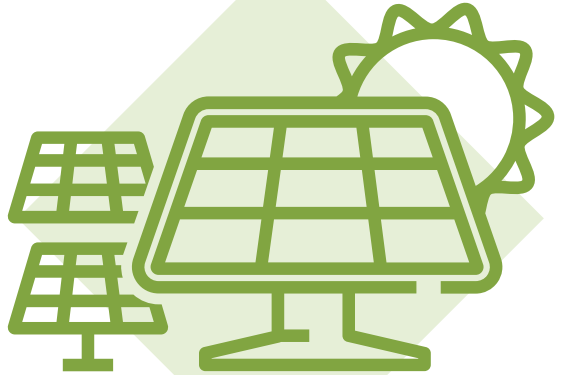
The Base Scenario also results in lower emissions due to higher solar build



We must promptly proceed with IGP and proper planning

We need everyone's Kōkua – Land use and policy support; state and county; customer participation in programs





Achieving a more sustainable future is a complex challenge that takes **collaboration, compromise** and **creativity** on customer, community and statewide levels. Coordination on other state policies like affordable housing, agriculture and food sustainability. We need government, other industries, lawmakers, landowners, etc. to collaborate and figure this out, together. Until that happens, we're going to continue to have unintended conflicts in plans and projects.

Menti

- What do you think are the critical aspects that need to be addressed now to achieve our 70% decarbonization by 2030 goal?
- What is needed from the IGP process & Hawaiian Electric to support these critical aspects?
- What is needed from state and local government, Commission, communities and other stakeholders?

Go to www.menti.com and use the code 6757 6350

Public Engagement Update

- **10 mins // General engagement overview**
- **45 mins // Island engagement:** Maui, Hawai‘i and O‘ahu
- **15 mins // Engagement statics:** By the numbers
- **20 mins // Discussion:** Community insights

Engagement Tools

Online participation site

Online hub for up-to-date information and community feedback, with interactive maps, comment form and survey questions.

www.hawaiipowered.com

Briefings with community organizations

Offering presentations at existing community meetings, either virtually or in person.

Ongoing

Community talk stories

Smaller, informal in-person or virtual conversations with community members to share information and discuss Hawai‘i’s energy future.

Fall – Winter 2022

Community events

Connecting with community members at various community events hosting booths gathering survey insights and sharing information

Fall – Winter 2022

Safety is our top priority!

Our outreach strategies will align with all local, state and federal guidelines for public health and safety.

We continue to tailor our outreach tools and strategies to meet the unique needs of each island.

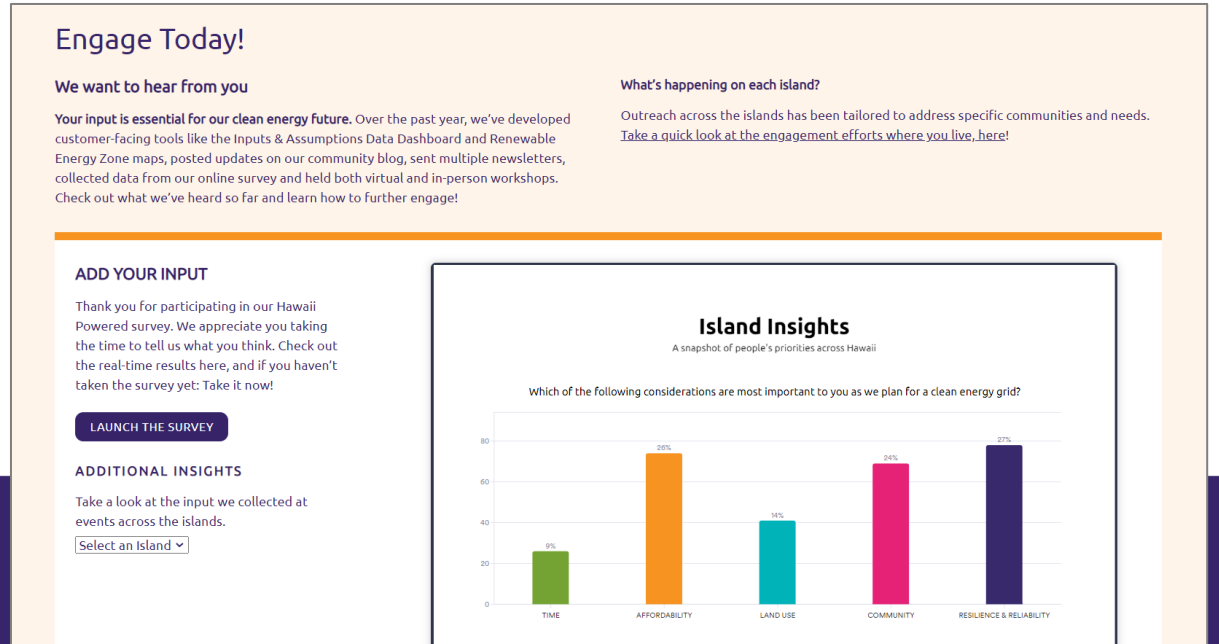
Engagement Update

Island-specific engagement and Renewable Energy Zones

HawaiiPowered.com Updates

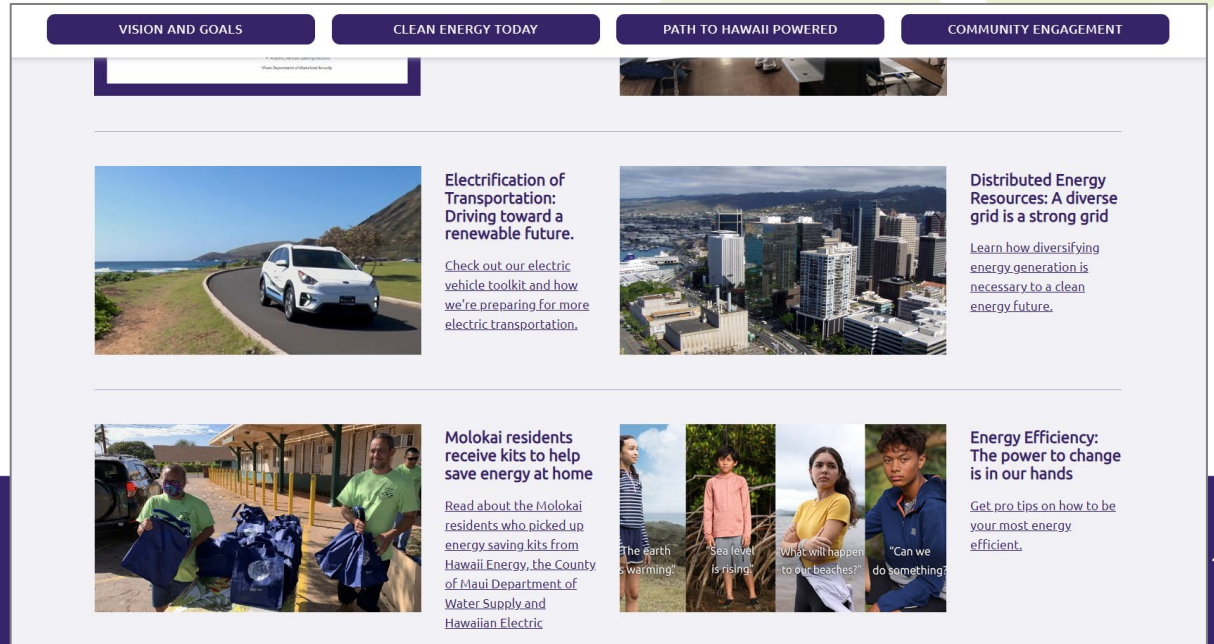
Online Engagement Opportunities

- A new “Engage Today!” section makes it easy for users to add input and participate in the process
- Refresh the page to see real-time updates



Collecting Communication Materials

- All blog posts and featured tools (I&A dashboard, REZ maps, and ETIPP) are now available in one location
- Updated archive of newsletters/presentations



Events and engagement opportunities since summer

Event Name (Date)	Location	# of Participants	Notes	IGP considerations activity completed?
County of Hawai‘i Community Informational Sessions (Mar to May)	Islandwide	67	Introduced Hawai‘i Powered and website	No
Hawai‘i Leeward Planning Conference (Jul. 29)	Virtual	30	Introduced Hawai‘i Powered and website	No
Waimea Community Association (Sep. 1)	Virtual	25	Introduced Hawai‘i Powered and website	No
He Ala Pono Electric Vehicle and Sustainability Fair (Sep. 24)	Hilo	68 *	Official launch of Hawai‘i Powered	Yes
Rotary Club of Kona Mauka (Sep. 27)	Kona	13 *		Yes
Kiwanis Club of East Hawai‘i (Sep. 30)	Hilo	8 *		Yes
AstroDay (Nov. 5)	Kona	160 *		Yes
Girl Scouts of Hawai‘i STEM Fest (Nov. 12)	Puako	48 *		Yes
Vibrant Hawai‘i’s Resilience Hub Makahiki & Community Resource Fair (Nov. 12)	Puna	55 *		Yes
Vibrant Hawai‘i’s North Hawai‘i Resilience Fair (Nov. 19)	Waimea	60 *		Yes
Focus Groups: County of Hawai‘i and Sustainable Energy Hawai‘i (Nov. 21)	Hilo	16 *		Yes

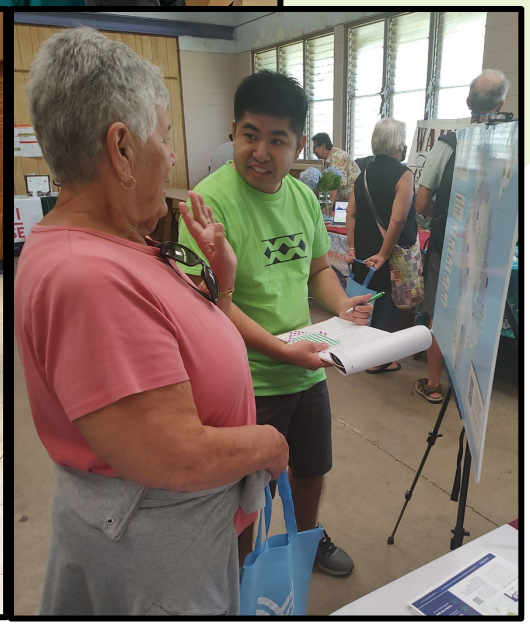
* = Number of participants in key considerations activity, not event participants

Hawai‘i

Tell us what you think!
We want to hear from you!

We want to hear from you!
Tell us what you think!

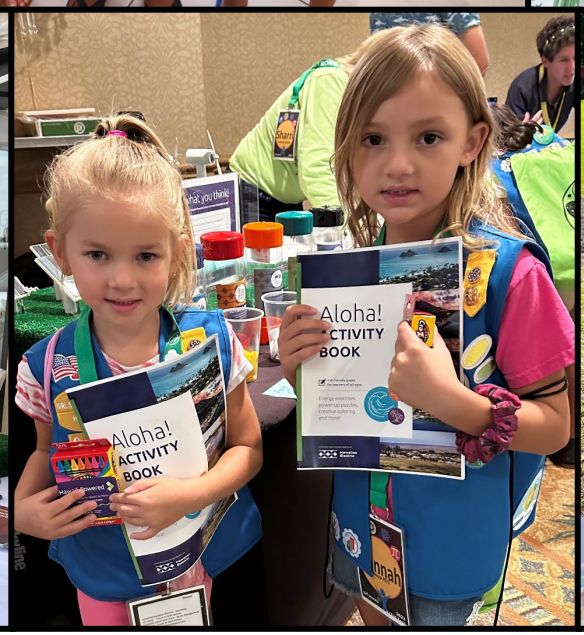
Hawaiian Electric
Hawai'i Powered



Hawai‘i

Aloha!
ACTIVITY
BOOK

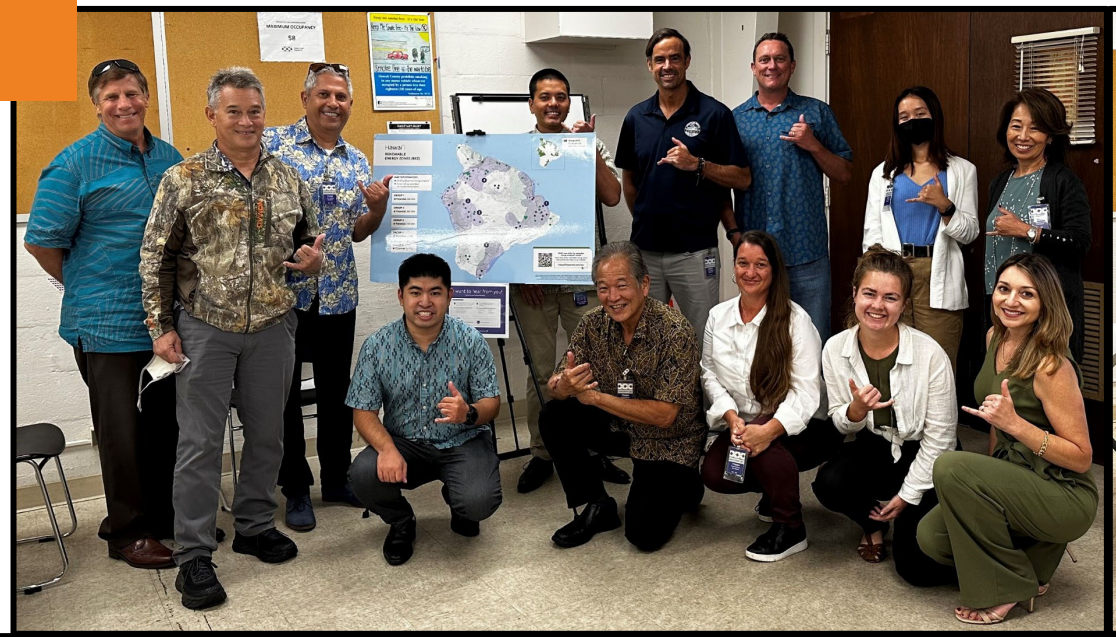
Keep Our Environment Clean

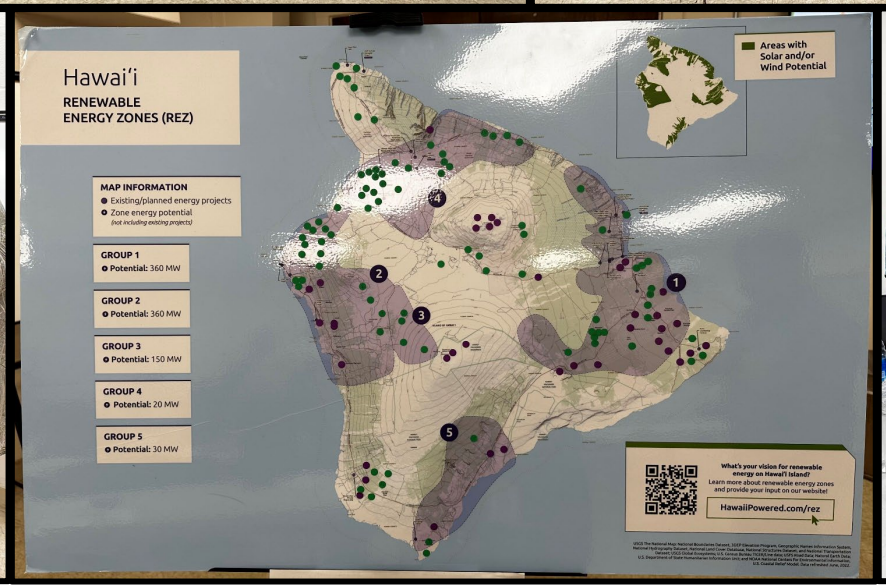

Aloha!
ACTIVITY
BOOK

ROTARY CLUB
KONA MAUKA HAWAII
ROTARIAN
THE FOUR-WAY TEST
of the things we think, say or do
first...
Is it the TRUTH?

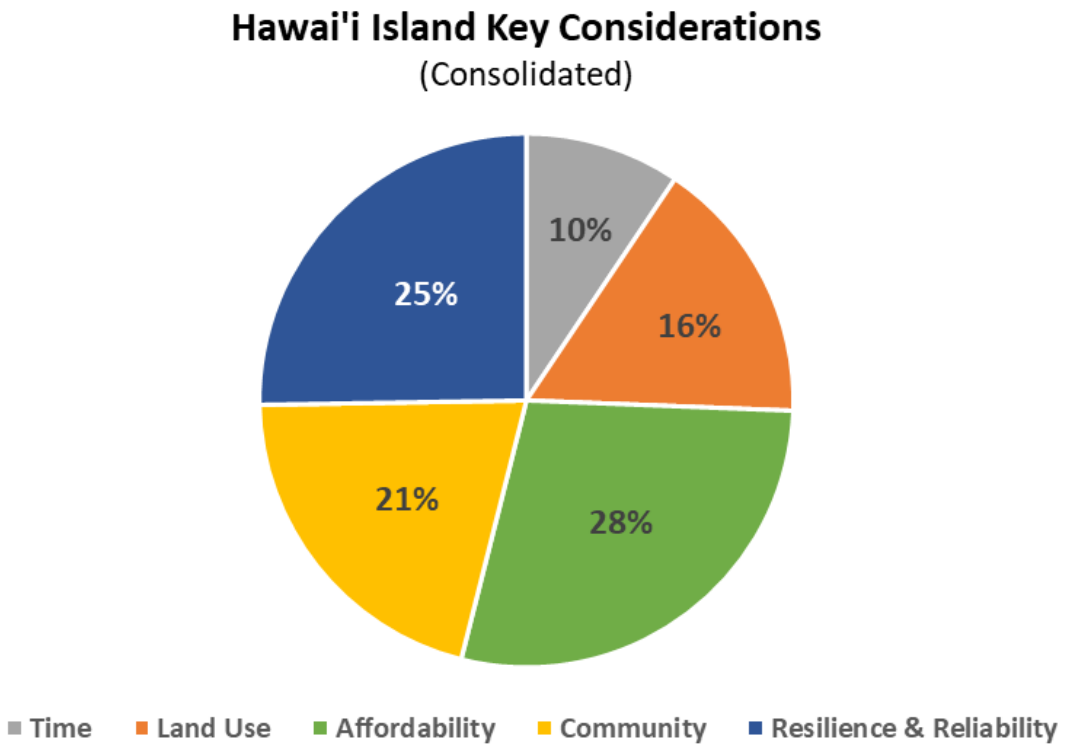
ROTA
CLU

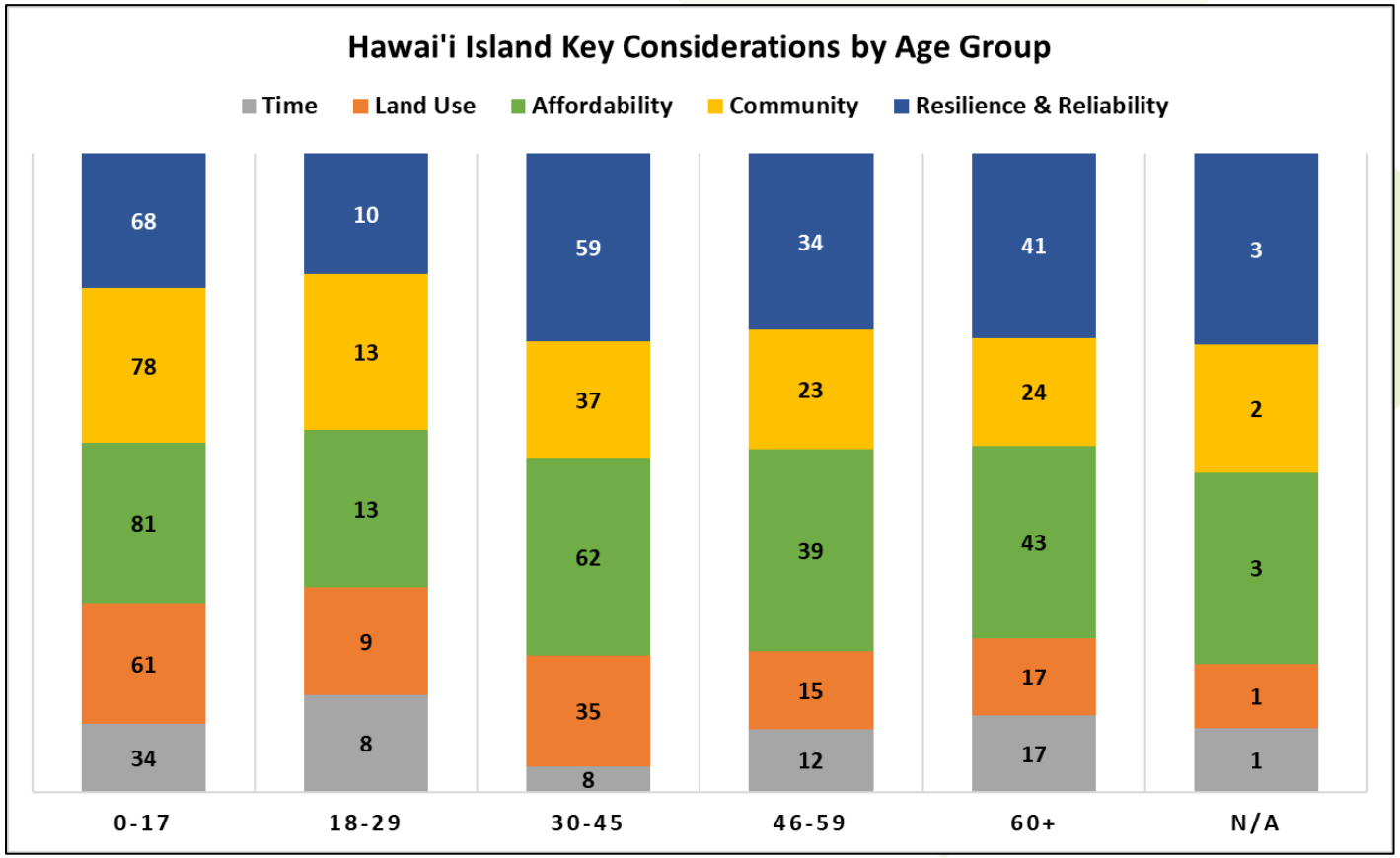
Hawai‘i




Hawai‘i
RENEWABLE
ENERGY ZONES (REZ)
Areas with Solar and/or Wind Potential
MAP INFORMATION
Existing/planned energy projects
Zone energy potential
(not including existing projects)
GROUP 1
Potential: 360 MW
GROUP 2
Potential: 360 MW
GROUP 3
Potential: 150 MW
GROUP 4
Potential: 20 MW
GROUP 5
Potential: 30 MW
What's your vision for renewable energy on Hawai'i Island?
Learn more about renewable energy zones and provide your input on our website!
HawaiiPowered.com/rez

Top 2: Affordability, Resilience & Reliability





Themes, takeaways, and next steps

Event Name	Top Consideration	Overall Takeaways	Next/Future Steps
County of Hawai‘i Community Informational Sessions	Affordability	Support adding more renewable energy quickly to make bills affordable	Continue presentations and activities to departments
Business and community organizations	Resilience, reliability	Affordability helps people make ends meet.	Continue presentations and activities to diverse organizations.
Youth (consolidated)	Affordability	Youth are informed about renewable energy and concerned about climate change	Focus groups, career fairs, museum exhibit
EV and Sustainability Fair (Hilo)	Community	Many frustrated with bills. EV owners concerned about charging infrastructure	Planning for 2023 fair
Vibrant Hawai‘i Fair (Puna)	Affordability	Community input is important to Puna. Many expressed concerns about vegetation management and outages	Participating in Vibrant Hawai‘i fairs in Ka‘u and Hilo. Continue to collaborate on opportunities to partner on future community events.
Vibrant Hawai‘i Fair (Waimea)	Affordability	Concerned about siting projects on land used for farming in Waimea	
County of Hawai‘i directors	Affordability	Concerned about siting in lava zones, funding, and additional requirements	Continue to inform and encourage departments to be part of process
Sustainable Energy Hawai‘i	Time	Supports using geothermal to produce hydrogen for export	Continue to inform and encourage departments to be part of process

Events and engagement opportunities

Tell us about the events and engagement opportunities that have occurred on O‘ahu between summer 2022 and today.

Event Name (Date)	Location	# of Participants	Notes	IGP considerations activity completed?
Ko‘olauloa Moku Workshop (Oct. 24)	Kahuku Elementary School	13	Interest in resilience and energy equity	No
Wai‘anae Moku (Oct. 26)	Agnes Kalaniho‘okahā Community Learning Center	19	Interest in resilience and energy equity	No
Kona Moku (Nov. 1)	Kapi‘olani Community College	36	Interest in resilience (critical facilities)	No
Waialua Moku (Nov. 3)	Waialua Elementary School	10	Interest in resilience and energy equity	No
Ko‘olaupoko Moku (Nov. 15)	Windward Community College	27	Interest in resilience	No
‘Ewa Moku (Nov. 17)	Leeward Community College	11	Interest in energy equity	No
Ko‘olauloa Moku Workshop – Follow Up (Dec 1)	Hauula Community Center	TBD	"	No

Community Meetings in each Moku on O‘ahu

A broadcast of the community meetings can be found at https://www.hawaiianelectric.com/clean-energy-hawaii/community-meetings

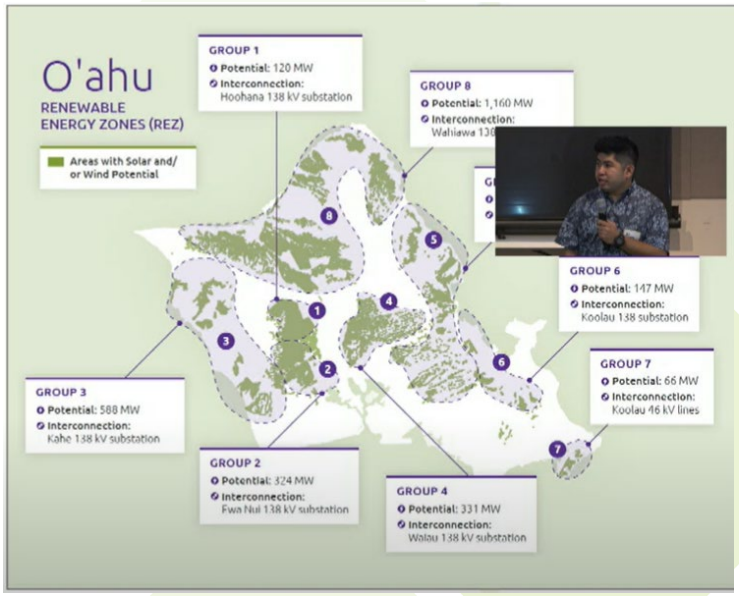
Center for Resilient Neighborhoods
CERENE
"Resilience from the Inside Out"

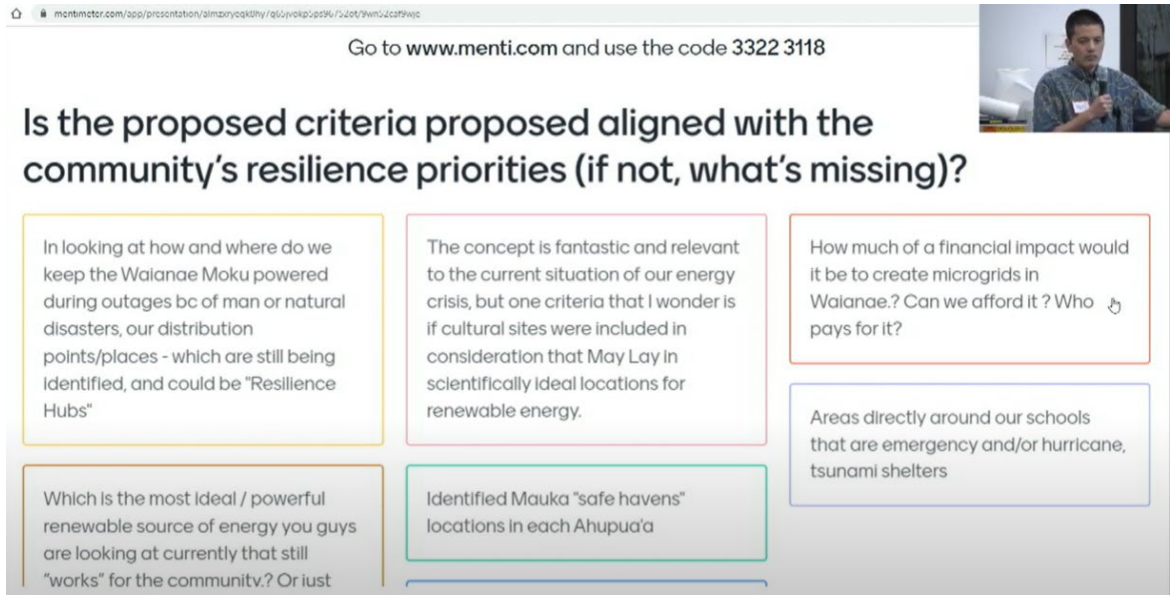
HNEI
Hawai'i Natural Energy Institute
University of Hawai'i at Mānoa

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

'ōlelo
COMMUNITY MEDIA

Community Meetings in each Moku on O‘ahu





Themes, takeaways, and next steps

Event Name	What We Heard
Ko‘olauloa Moku Workshop	Interest in resilience and energy equity
Wai‘anae Moku	Interest in resilience and energy equity
Kona Moku	Interest in resilience (critical facilities)
Waialua Moku	Interest in resilience and energy equity
Ko‘olaupoko Moku	Interest in resilience
‘Ewa Moku	Interest in energy equity
Ko‘olauloa Moku Workshop – Follow Up	TBD

Overall Takeaways
The development of microgrids and renewable energy projects must factor in energy equity
Siting renewable generation only where resource and land are available will not support energy resilience
Utility-scale renewable generation shouldn’t only be hosted in rural communities
Factoring in costs to develop microgrids and renewable energy must be considered
The concept of hybrid microgrids requires careful explanation

Next/Future Steps
Share Hawaii Powered resource links
Offer more community presentations and opportunities to share information
Full report summarizing community meetings will be forthcoming
Continue to collect community insight and input

Utility Expertise + Community Expertise

Seven roundtable discussion Sessions with representatives of special interest groups

- Agriculture
- Business leaders
- Community organizations
- Cultural practitioners
- Non-elected government officials
- Conservation and Environmental

Maui

- Farmers
- Food truck owner operator
- Non-profit executive directors
- Land conservation organization staff
- AARP leader
- Emergency Management Agency staff
- Community association board members
- Land conservation organizations
- Aha Moku po`o
- Airports manager
- County of Maui department directors
- Native Hawaiian cultural practitioners
- Maui Burial Council member
- Small business owners

Maui

What goes into transitioning Maui to more clean energy

NREL's development of Renewable Energy Zone Map

Community input can help shape future Requests for Proposals

Advice and cautions from their perspective welcomed to keep Maui's transition moving forward

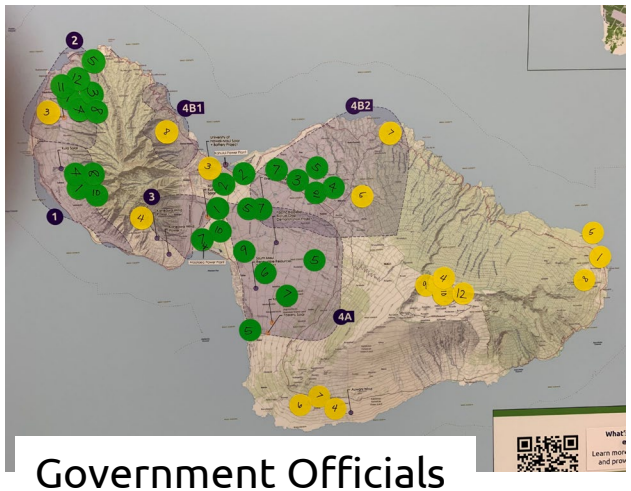
45 minutes for Q & A segment

Maui

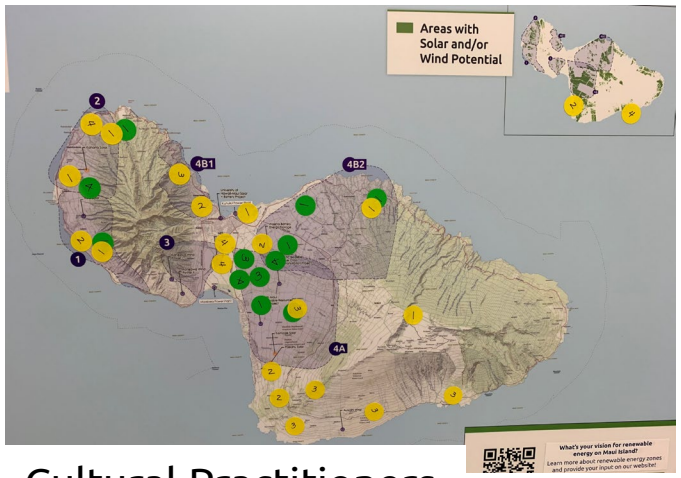
Some highlights:

- Protection of cultural sites necessary
- Efficient use of land
- Energy conservation
- Focus on existing urban corridors
- Diversify resource types
- Avoid shorelines and watersheds

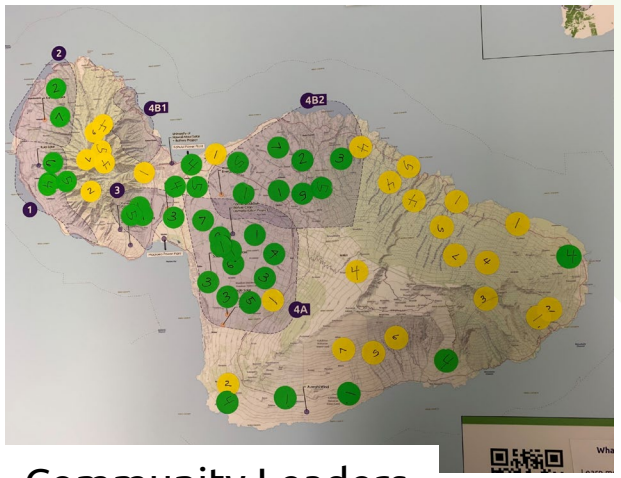
Green: Possibility | Yellow: Not recommended



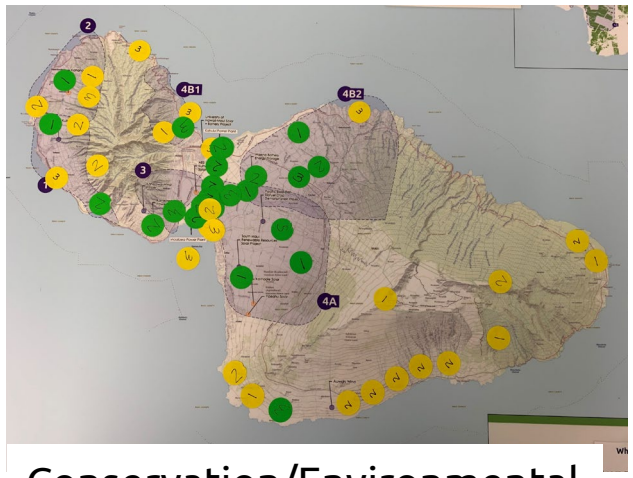
Government Officials



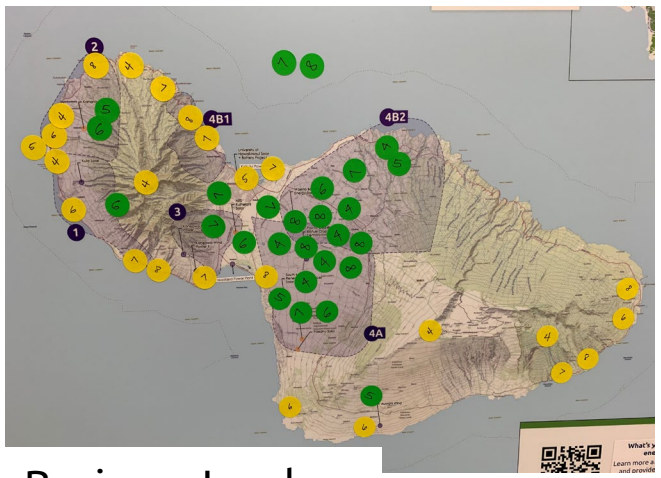
Cultural Practitioners



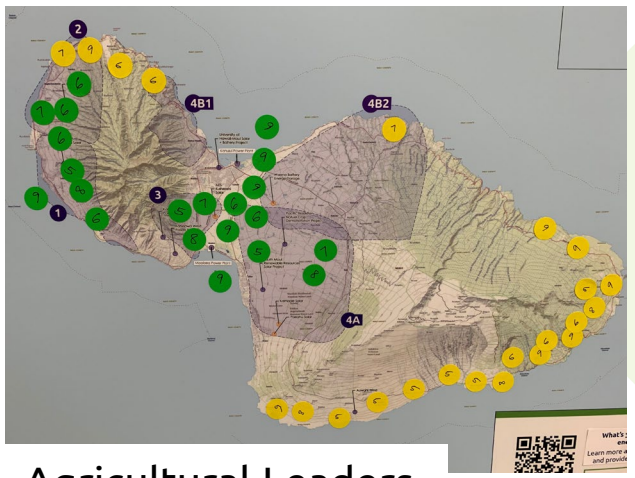
Community Leaders



Conservation/Environmental



Business Leaders



Agricultural Leaders

DECEMBER 6

SUMMARY SESSION WITH ALL GROUP PARTICIPANTS INVITED

WHAT'S ON HORIZON

Maui

"Horizontal panels would take up less land mass"

-Community association board member

"Prefer no more wind projects on forest land. We need the ecological benefits of forests. At Kaheawa too much of the forest has been cut to make space for the windmill project."

- Conservationist

"South Maui is one of the most densest cultural resources area"

- Burial Council Chair and cultural practitioner

Maui

“Cost prohibitive to farm in Lahaina. A lot of land in Lahaina won’t be farmed again because of lack of water so some Class A ag lands are worth revisiting to see if they can be included in future renewable energy plans”

- Lahaina-born farmer

“Look at new buildings. They’re required to put in trees for shade, they should be required to put in rooftop solar”

- Business owner

“Avoid the Pali due to fires”

-County official

Arbor Day - Maui

Arbor Day Event - Maui

	Age					**284** participants
	18 & under	18-29	30-45	46-59	60-plus	**TOTAL**
Time	14	1	4	0	4	**23**
Resilience	15	7	13	7	10	**52**
Affordability	28	10	16	16	24	**94**
Land Use	15	10	12	14	10	**61**
Community	20	5	9	6	14	**54**

Themes

Review of the nearly one hundred comments from roundtable discussion sessions is underway to identify themes.

Takeaway

The combined knowledge and perspectives of community and utility make for dynamic and productive dialogue.

Next Steps

December 6
Summary session

- Share results of roundtable discussions

Overall Engagement Calendar

Hawai‘i | O‘ahu | Maui

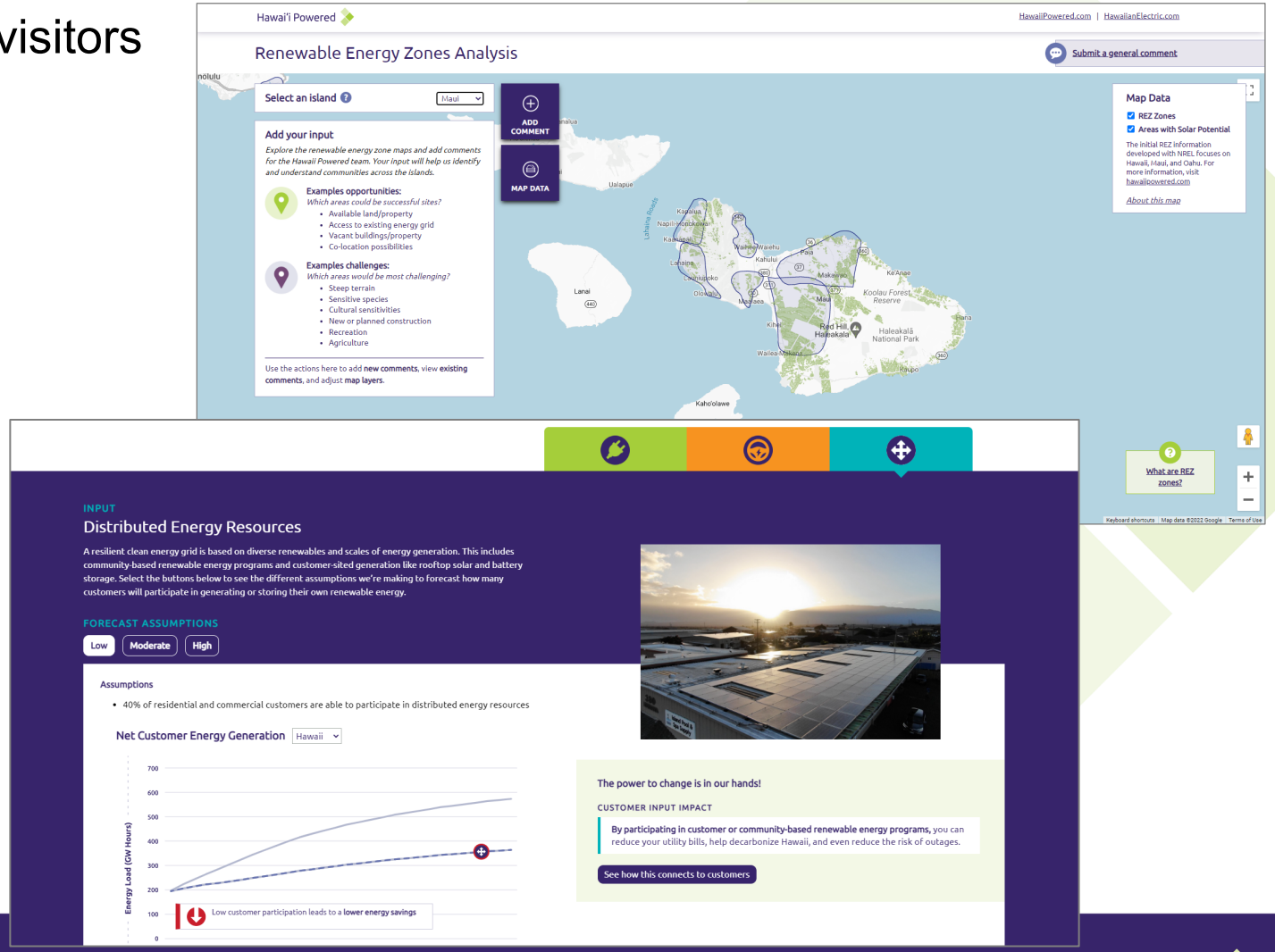
Month	Engagement Events	Total
July		1
September		4
October		8
November		10
December		3

26
Total Events

Hawaii Powered – By the Numbers

- HawaiiPowered.com: 859 different visitors
- HawaiiPowered.com: 1,551 visits (people visiting multiple times)
- Average visit length is 1:03 (more than a minute is positive!)
- Top city: Honolulu (426 visitors)
- Data Dashboard: 500 visits
- REZ Maps: 150 visits
- 80% desktop, 18% mobile

Increased mobile visits



Video Views

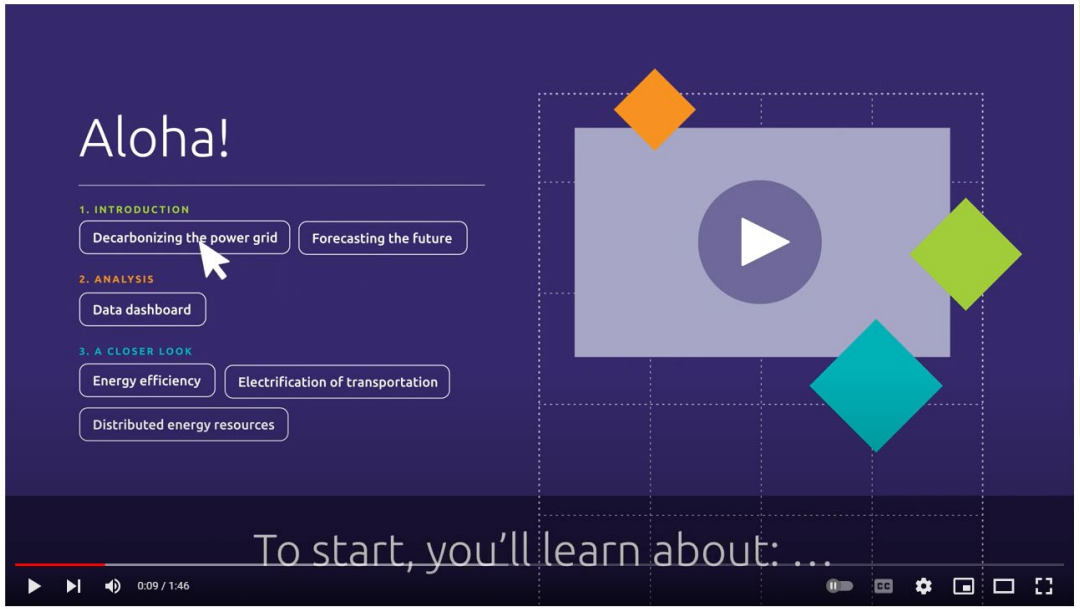
4× watch count

Hawaii Powered

- 191 views (YouTube + website embed)

Inputs & Assumptions

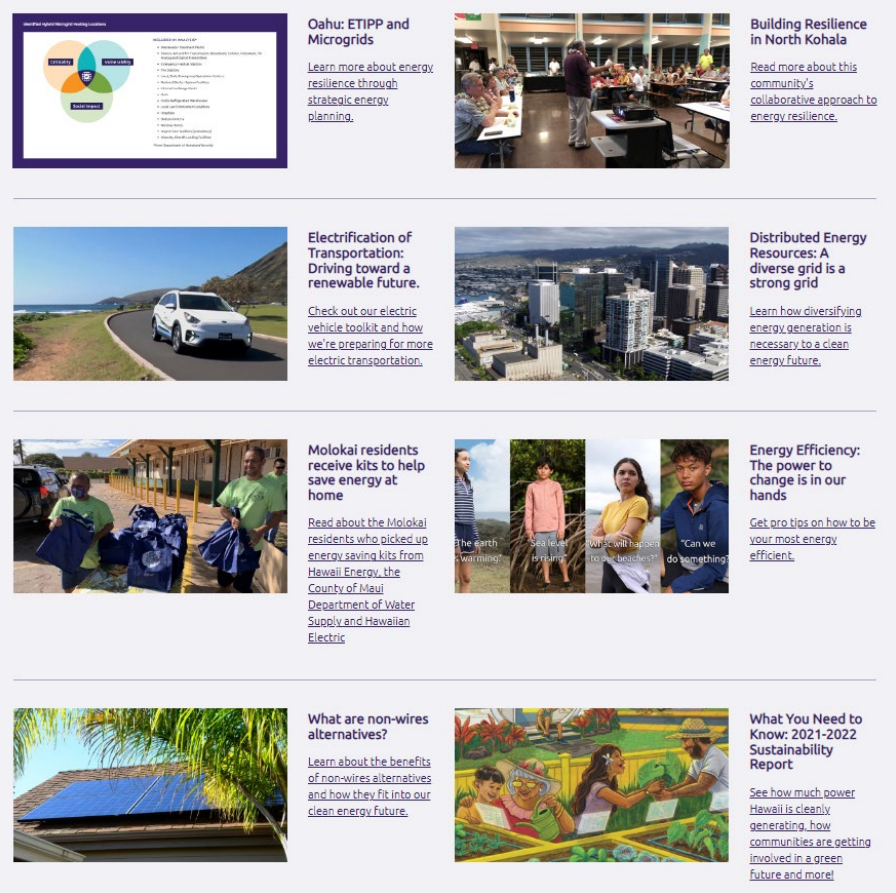
- 191 views (YouTube + website embed)



Plugged In Blog Readership

- What are non-wires alternatives?
  24 views, 7 reads, 29% read ratio
- Energy efficiency: The power to change is in our hands
  50 views, 11 reads, 22% read ratio
- Molokai residents receive kits to help save energy at home
  31 views, 11 reads, 35% read ratio
- Distributed Energy Resources: A diverse grid is a strong grid
  61 views, 17 reads, 28% read ratio
- Building Resilience in North Kohala
  35 views, 12 reads, 34% read ratio
- Electrification of Transportation: Driving toward a renewable future
  75 views, 24 reads, 32% read ratio
- Inputs and Assumptions: What does the data really mean?
  53 views, 18 reads, 34% read ratio

Consistent readership



Newsletter Readership

- Most recent newsletter sent on Sept. 12, 2022
- Sent to 243 addresses
- 39 bounces, 16% bounce rate
- 98 opens, 48% open rate
- 22 clicks, 22.4% click through rate
- 0 opt out, 0% opt out rate

Increased open rate compared to April newsletter

Link	Unique Click-Thrus	Click-thru Distribution
Hawaii Powered Inputs and Assumptions	16	40%
I&A: What does the data really mean blog post	5	12.5%
Distributed Energy Resources blog post	5	12.5%
EoT Driving Toward a Renewable Future blog post	4	10%
Energy Efficiency blog post	3	7.5%
Hawaii Powered I&A YouTube video	3	7.5%
Hawaii Powered Home Page	2	5%
View this email in your browser	2	5%

Website Connections

Community connections (web forms)

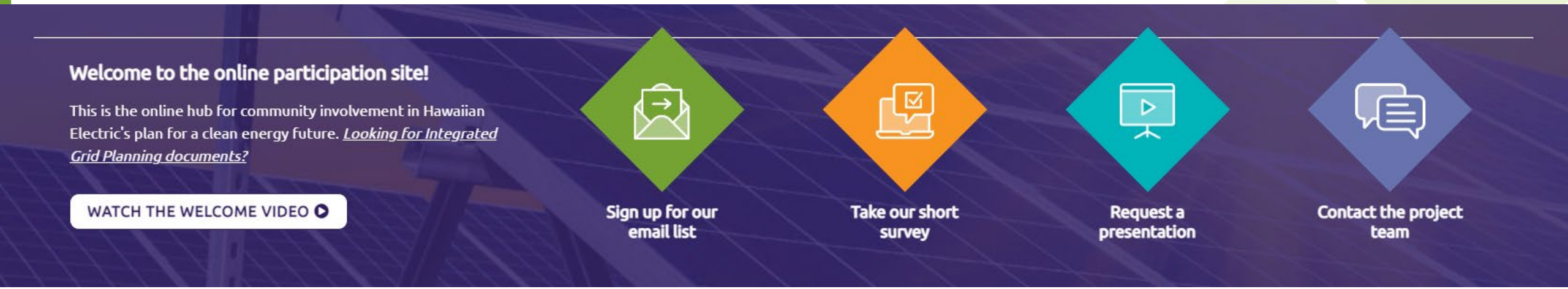
- 33 visitor survey submissions,
  7 contact submissions, 3 presentation requests

43 total online submissions
Analyzed along with (250+ in-person comments)

Join the mailing list requests (web form)

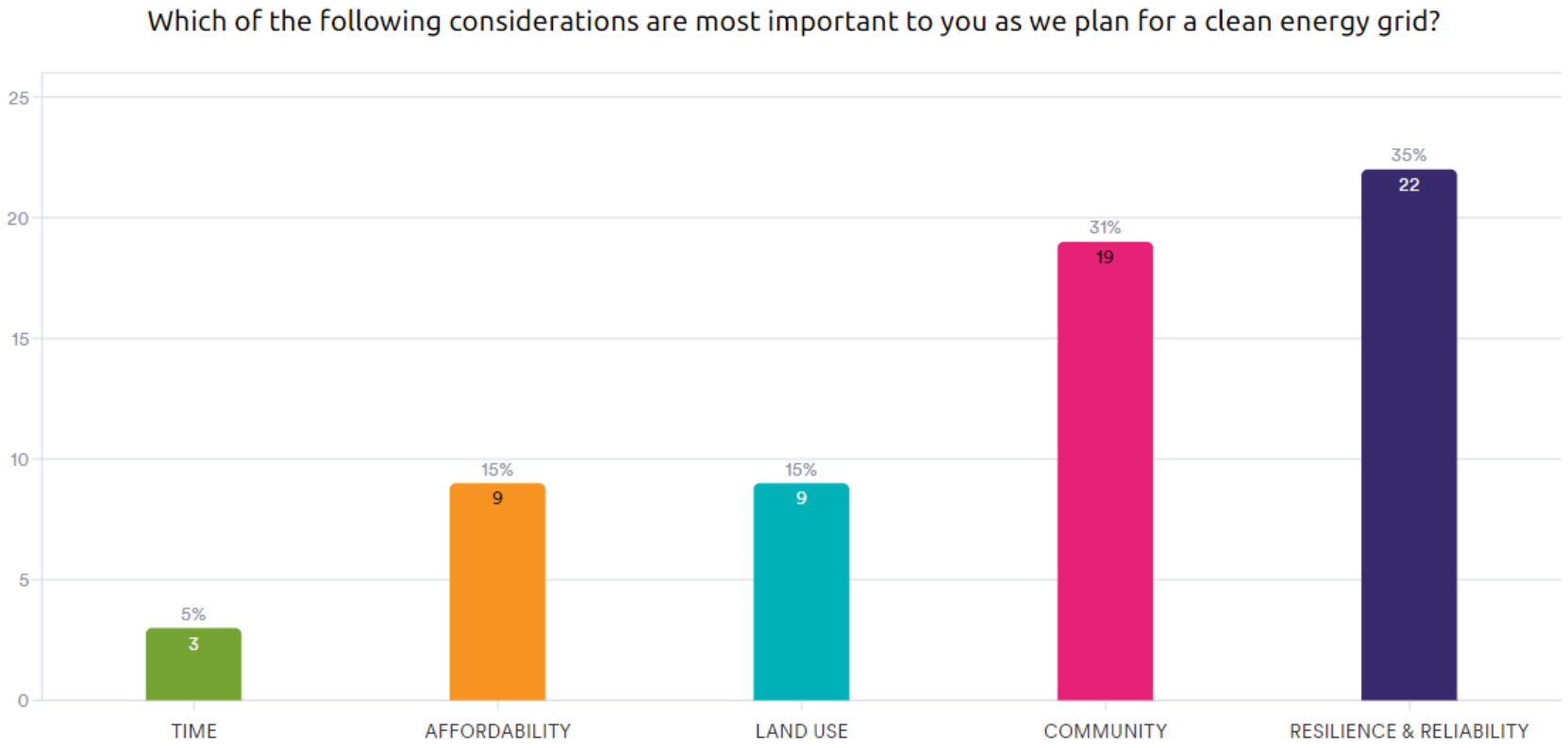
- 75 email sign-up submissions

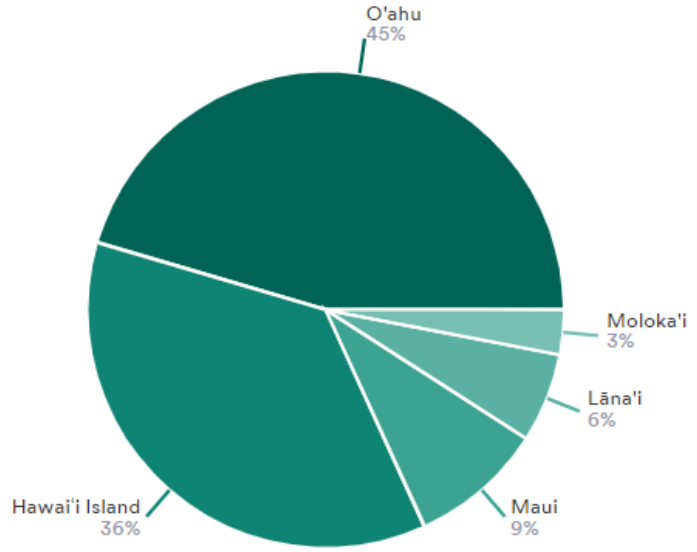
300% increase



Survey Responses for Engagement

Online Only

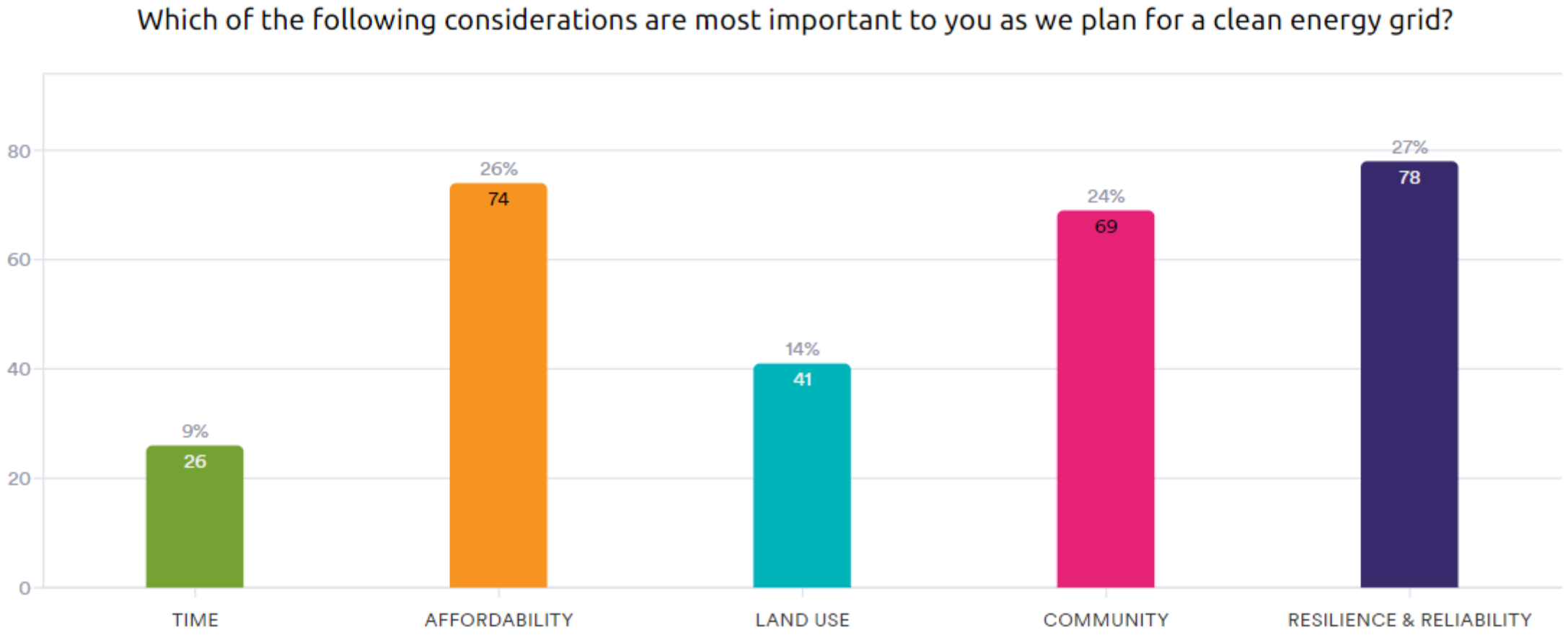




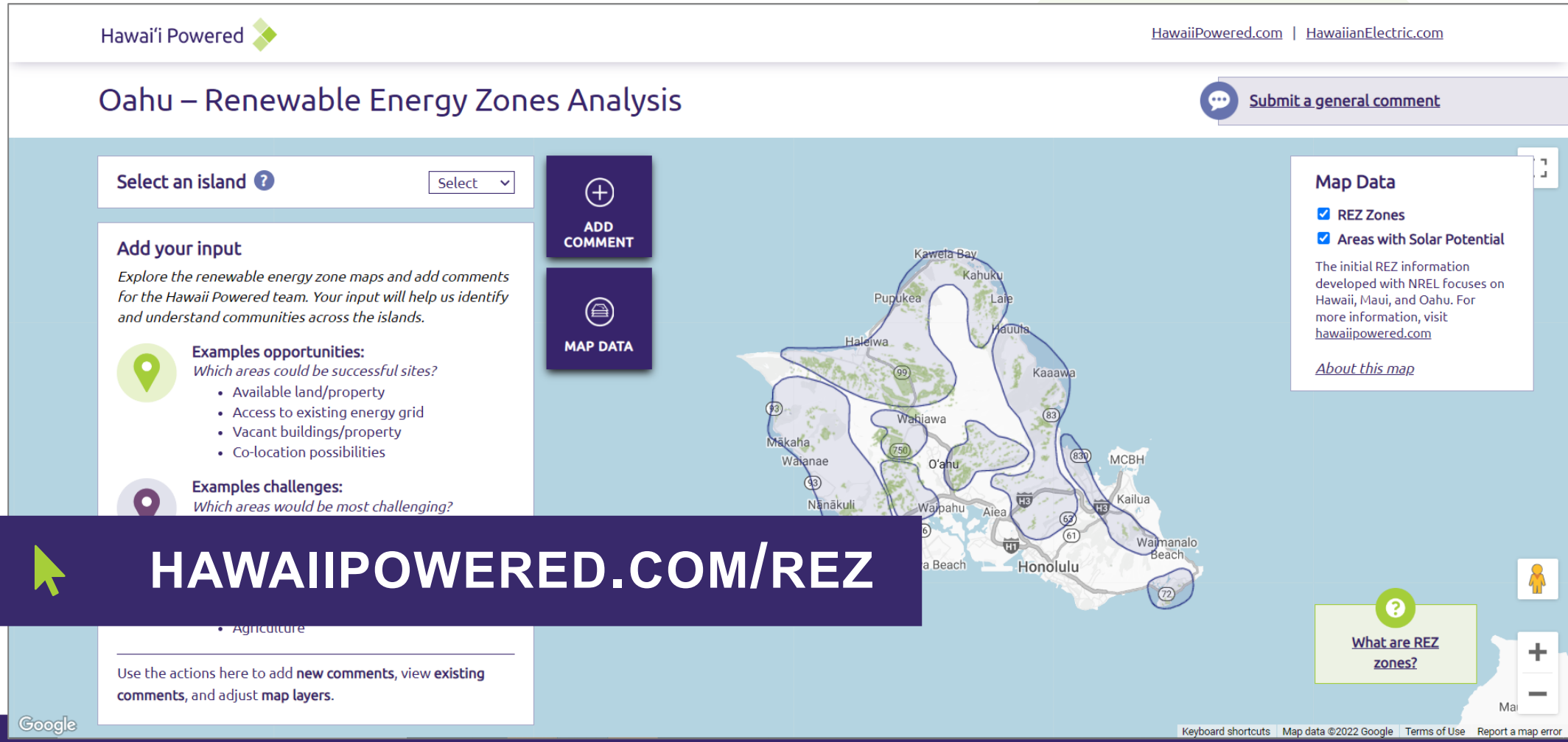
Data	Response	%
55 to 64 years	11	35%
65 to 74 years	7	23%
25 to 34 years	5	16%
35 to 44 years	2	6%
45 to 54 years	2	6%
75 and older	2	6%
Under 18	1	3%
18 to 24	1	3%

Survey Responses for Engagement

Online + In-person



Ongoing Engagement



HAWAIIPOWERED.COM/REZ

Menti Questions

1. What IGP consideration do you think is most important to your communities?

2. What type of feedback have you heard in your community or organization from those who have participated in recent IGP engagement?

3. What can Hawaiian Electric provide to make outreach in your community easier for you and your organization?

4. Are there any particular topics related to IGP that you'd like Hawaiian Electric to share more information about through various engagement channels (public participate site, Plugged In blog, newsletters, engagement events)?

Go to www.menti.com and use the code 6757 6350

Breakouts

Key Questions To Consider During Breakouts

- What specific recommendations do you have for Hawaiian Electric to keep (the collective) us on track to meet State policy goals, next steps, actions? (please consider the community feedback thus far)
- What specific recommendations do you have for state and local governments, Commission, communities and other stakeholders to help achieve State decarbonization policy goals? (please consider the community feedback thus far)
- What suggestions do you have for the role of the stakeholder council in support of Hawaiian Electric, state/local government, Commission and communities' decision making related to achieving decarbonization?

Groups

Breakouts				
A		B		C
Mike Wallerstein		Dave Parsons		Clarice Schafer
Keith Yamanaka		Kirsten Turner		Yvette Maskrey
Barry Usagawa		Melissa Miyashiro		Rocky Mould
Noelani Kalipi		Henry Curtis		Vishal Patel (TAP)
Aidan Tuohy (TAP)		Andy Hoke (TAP)		Stephen Mariani
Chair Leo Asuncion		Commissioner Naomi Kuwaye		Debbie Lew (TAP)
Murray Clay				
D		E		F
Grace Relf		Gina Yi		Virtual
Steven Rymsha		Pete Polonsky		
Wren Wescoatt		Caroline Carl		
Rick Rocheleau (TAP)		Kylie Wager Cruz		
Elaine Hale (TAP)		Terry Surles (TAP)		
Scott Glenn		Gerald Sumida		
Dean Nishina		Kevin Schneider (TAP)		

TAP Update

Hawaiian Electric Integrated Grid Planning Technical Advisory Panel: Update to Stakeholder Council

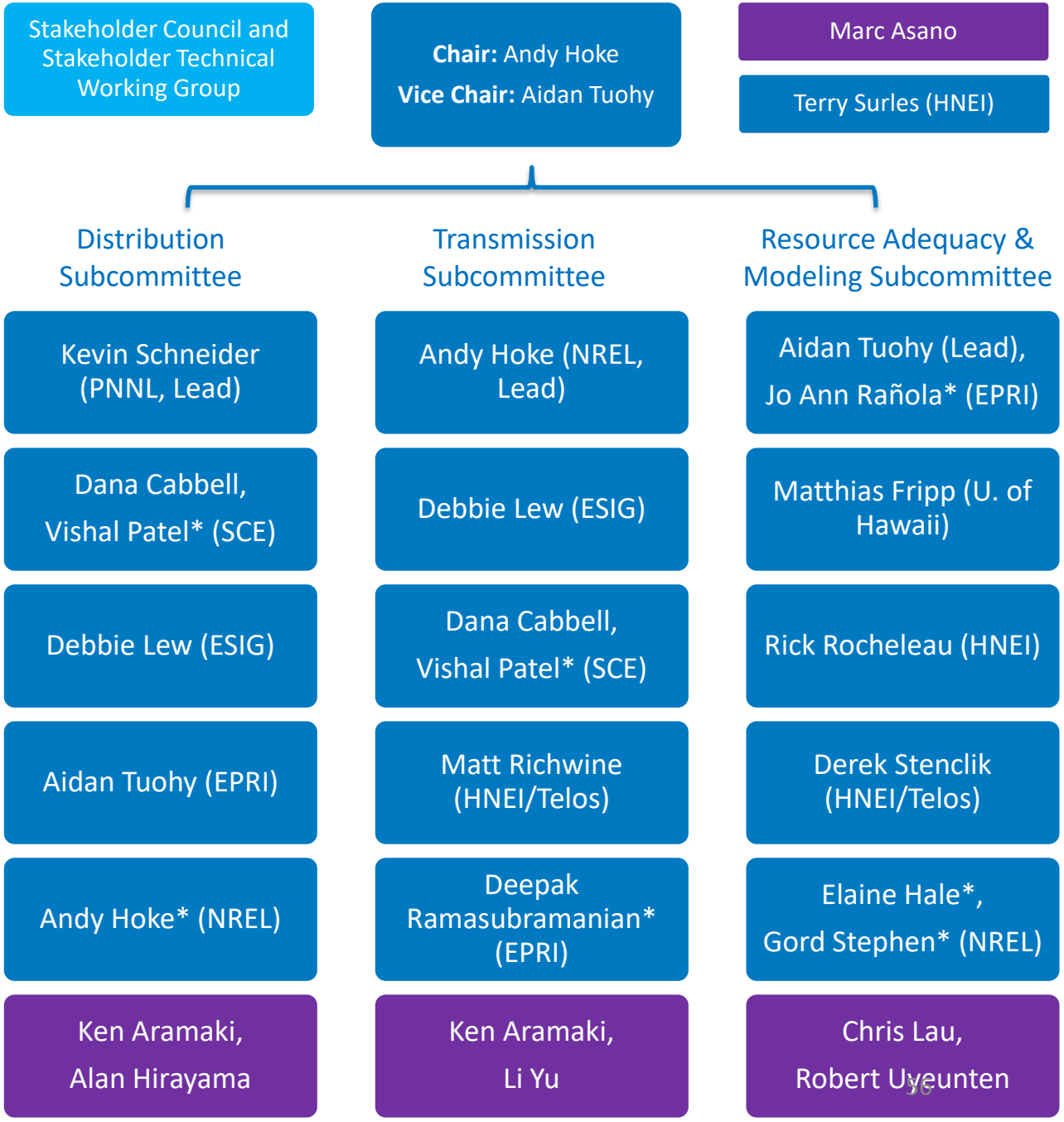
November 30, 2022

Andy Hoke, NREL; Aidan Tuohy, EPRI; Kevin Schneider, PNNL

IGP TAP Structure

- Technical Advisory Panel (TAP) purpose:
  - Provide technical review of HECO's Integrated Grid Planning (IGP) plans, methods, and results
- TAP divided into three subcommittees
  - Distribution
  - Transmission
  - Resource Adequacy and Modeling
- Allows each TAP member to focus on area(s) of expertise
- Each subcommittee has HECO POCs

*Some ad hoc TAP members brought in by existing members; more SMEs may be consulted as topics arise



IGP TAP Feedback Process

- Process for TAP feedback summarized above
  - TAP open to input to improve process
- HECO presentations to TAP and TAP feedback documents (as written by TAP) available to public:
  - https://www.hawaiianelectric.com/clean-energy-hawaii/integrated-grid-planning/stakeholder-and-community-engagement/technical-advisory-panel
- New aspects as of mid-2022, based on PUC feedback:
  - Regular TAP leadership meetings with STWG to provide update on TAP activities and opportunity for questions
  - HECO increasing communication of how TAP comments are addressed
- TAP continuing to balance need for detailed technical review with need to move IGP process forward in a timely manner by grouping feedback into three categories:
  1. Informational – no action necessarily needed
  2. Suggest revising before PUC review point
  3. Consider revising in future steps or iterations of the IGP process
- As always, TAP's role is to provide recommendations and feedback, not to direct

Summary of TAP Activity – Summer-Fall 2022

- Distribution subcommittee met twice
- Transmission subcommittee met twice
- Resource adequacy subcommittee meeting every 6 weeks
- Transmission subcommittee and resource adequacy subcommittee crossover topics:

Distribution subcommittee

- Reviewed HECO **process for evaluation of opportunities for non-wires alternatives (NWAs)** to distribution upgrades
  - NWA opportunity evaluation process appears reasonable in general: appears to fairly evaluation NWA opportunities
  - TAP offered feedback on several details

- Reviewed HECO **roadmap for protection needs** in evolving grid
  - HECO produced roadmap based on previous TAP feedback
  - Overall, roadmap appears reasonable, and identifies some key challenges HECO will face as the grid evolves to depend on inverter-based resources; other utilities facing similar challenges
  - Full TAP will discuss further tomorrow

Kevin Schneider (PNNL, Lead)

Dana Cabbell, Vishal Patel* (SCE)

Debbie Lew (ESIG)

Aidan Tuohy (EPRI)

Andy Hoke* (NREL)

Ken Aramaki, Alan Hirayama

Transmission Subcommittee Update

- Reviewed HECO plans for 2022 **system security study**
  - Study goal is to examine steady-state and dynamic stability of resource mix from grid needs assessment (GNA)
  - The TAP approved of the study plan and offered minor feedback points focused on future iterations given the urgent need to complete the study
  - TAP advised continuing to refer to national standards for DER and IBR interconnection where possible, while acknowledging that those standards are written for large interconnections and will not fully meet Hawaii's needs
  - HECO asked about the potential for a transmission non-wire alternative to defer/avoid transmission upgrades if renewables are installed in northern Oahu. TAP agreed this is worth examining.

Andy Hoke (NREL, Lead)

Debbie Lew (ESIG)

Dana Cabell, Vishal Patel (SCE)

Matt Richwine (HNEI/Telos)

Deepak Ramasubramanian (EPRI)

Ken Aramaki,

Li Yu

Resource Adequacy & Modeling Subcommittee

Aidan Tuohy (Lead),
Jo Ann Rañola (EPRI)

Matthias Fripp (U. of Hawaii)

Rick Rocheleau, Terry Surles (HNEI)

Derek Stenclik (HNEI/Telos)

Elaine Hale, Gord Stephen (NREL)

Chris Lau,
Robert Uyeunten

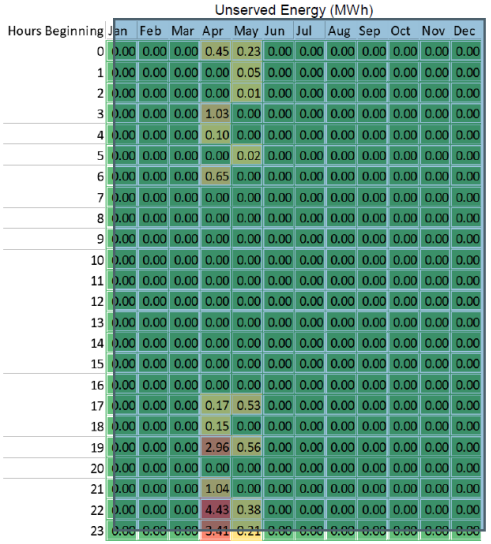
- 3 meetings since late 2021, plus interactions over email and full TAP meeting
- July 2022
  - Follow up to previous discussion with the full TAP, focused on results obtained to date for different scenarios
  - Feedback on how to present results given the wide range of sensitivities, including more details on aspects like what is being retired in each case.
  - Identified that it would be helpful to focus comparisons on buildouts of the system that meet reliability requirements to understand different ways to do so – for example comparing how much firm vs variable and storage capacity is needed to meet reliability needs.
  - Discussion on aspects like long duration storage modeling (longer time steps), how to project load.
  - Discussion about what a satisfactory reliability criteria would be and ensuring that is laid out at the start of the study and then system built to meet those (EUE, LOLE, etc.). This would allow for comparison across different renewable levels, from low to high, and identifying how much firm resource is needed for each.
  - If the concern is not getting sufficient renewables, then responses to RFPs can help identify available RES
  - Some discussion on whether taking approach of least regrets for new generation, where solar plus storage may build out more than higher than expected and can then retire additional generation, is lower regrets than right sizing firm capacity.
  - HECO/TAP want to focus on right sizing firm capacity, and can do this by looking at different levels of wind/solar and seeing firm needs under different load/retirement futures.

Resource Adequacy and Modeling SC

- August 2022
- HECO updated the TAP subgroup regarding the O‘ahu and Maui GNAs filed on July 29, 2022.
  - Near-term GNA objectives, Stage 3 RFP targets, and stakeholder feedback on the draft GNAs.

- The discussion was followed by an overview of Oahu and Maui GNAs covering, near-term action plan, bookend modeling scenarios, customer technology forecast, RESOLVE resource plan, ERM reliability analysis, probabilistic resource adequacy analysis, unserved energy heat map
- TAP provided feedback that probabilistic RA is a good approach to follow and bring forward
- Feedback on whether RESOLVE should be integrated into RFP process
  - Discussion on firm capacity needs and whether need to be procured now (show need in future results)

Year 2029	Existing Firm (MW)	New Firm (MW)	New Paired PV (MW)	New Onshore Wind (MW)	New Offshore Wind (MW)	LOLE (Days/Yr)	LOLEv (Events/Yr)	LOLH (Hours/Yr)	EUE (GWh/Yr)
Base_300_270PVB_0Wd_170HE_Mar22Out	1,135	300	270	0	0	0.09	0.16	0.22	0.02
Base_400_270PVB_0Wnd_Mar22Out	970	400	270	0	0	0.04	0.05	0.09	0.01
Base_300_958PVB_Mar22Out	970	300	958	163	0	0.08	0.20	0.37	0.06
Base_200_1600PVB_Mar22Out	970	200	1,600	163	0	0.08	0.18	0.34	0.09
Base_300_1600PVB_Mar22Out	970	300	1,600	163	0	0.01	0.04	0.07	0.02
Base_250_958PVB_Mar22Out	970	250	958	163	0	0.18	0.42	0.87	0.16
Base_300_270PVB_400OSW_Mar22Out	970	300	270	0	400	0.18	0.34	0.74	0.08



Resource Adequacy and Modeling SC

- September 2022
  - Discussed HECO motion for clarification, including how effective load carrying capability (ELCC) might be used instead of ERM/HDC approach
  - HECO developed work plan based in part on TAP feedback
    - ELCC – incl. iterations between RESOLVE resource planning and PLEXOS resource adequacy (or E3 RECAP tool – E3 are expected to run studies)
    - HECO plan to discuss criteria and assumptions based on initial set of results
    - May want to look at (automated) iterations to get quick solution – also need to identify differences between RECAP and PLEXOS (TAP feedback)
    - HEC is planned for thermal and renewable, and done using Plexos
      - TAP feedback - look at one day with normal production, thermal reduce by forced outage. One with normal for wind/solar but additional load for ERM
      - HECO - look at what is being produced during shortfall event (similar but not same as ELCC)
  - 4 methods proposed
    - Hourly Dependable Capacity using worst case (percentile or similar method) plus Energy Reserve Margin
    - Traditional style ELCC (using E3's surface method), plus planning reserve margin
    - Estimate of contribution during shortfalls (estimated ELCC?)
    - 'Hourly Expected Capacity' – use expected values instead of worst case used in HDC

TAP Resource Adequacy and Modeling SC

- Sept 22 meeting (ctd)
  - What should be used?
    - HDC/ERM and Traditional ELCC/PRM will be used based on PUC
    - Estimated ELCC and HEC could also be useful
    - ELCC might be helpful in an RFP so useful to calculate?
  - For Hourly Expected Capacity method, will want to add stressful days to RESOLVE, based on RA studies
    - Will allow for calibration of ERM based on troublesome days
  - **How to determine which method is best?**
    - **Solve time and data prep time, total resource costs of resulting plans**
    - **Will need to work with stakeholders to develop reliability criteria still**
  - HECO to finalize 3 criteria/methods to investigate
    - Expect to review in TAP meeting this week and provide feedback

Transmission and RA Subcommittee Crossover Topics

- (How) can we approximately **capture system security constraints in the grid needs assessment**?
  - For example the future grid needs:
    - A portion of resources to be voltage-forming (either synchronous machines or grid forming inverters)
    - Sufficient fast active power response to survive major events
    - Protection against damage and injury when faults occur
    - (The present-day grid also needs these things, but solutions will need to evolve as we move towards extremely high levels of wind and solar)
  - To what degree can the GNA account for these needs?
  - TAP and HECO have held initial discussions. This is a topic meriting additional discussion and research

- When a system security issue with a resource mix or dispatch is mitigated, **what mitigations require iteration of the grid needs assessment**?
  - Tradeoff: Re-doing GNA on every minor change is not feasible; but making major changes without considering economics holistically could lead to a more costly solution
  - HECO produced table of possible mitigations, and TAP provided feedback (next slide)

When is GNA iteration needed?

Excerpt of HECO's table with TAP's suggested redlines:

Examples of Mitigation Solutions Required by System Security Analysis	Need a new model iteration
Install traditional wire solutions (e.g. reconductor, cable replacement, add transformers to increase steady state capacity, add cap banks)	Maybe. Depends on capacity of wire solution; likely iterate production cost only.
Add synchronous condensers and/or, STATCOM to address dynamic voltage support and increase short circuit current	Yes

TAP feedback:

- Overall approach proposed by HECO is reasonable
- For Yes and Maybe entries, TAP provided brief guidance on threshold for iteration
- TAP generally not able to pre-define quantitative thresholds – need to consider each case individually
- Thresholds should be shared with stakeholders as decisions whether to iterate are made
- Many mitigations fix issues not directly captured in GNA models
  - In those cases, purpose of iteration is to represent mitigation in cost of new resources (to extent possible). Assigning costs may be very challenging!

Questions? Comments?

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Next Meetings

Next Stakeholder Council Meeting – December 5, 2022

- Discuss any follow up from Today's and this week's meetings
- Geothermal Presentation (Ulupono/Nicole Lautze)
- Resilience Planning Update

Seeking feedback on technical analysis conducted thus far (presented to the STWG and TAP); If stakeholder members would like a deep dive, then please contact us.

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