



**Hawaiian
Electric**

Battery Bonus Program

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Climate Change Action Plan



Our path to cut carbon emissions 70% by 2030*



Shutting down the state's last coal plant in September 2022



Retiring at least 6 fossil-fueled generating units and significantly reducing the use of others as new renewable resources come online



Using more grid-scale and customer-owned energy storage



Promoting energy efficiency



Adding nearly 50,000 rooftop solar systems to the 92,500 now online



Adding renewable energy projects capable of generating a total of at least 1 gigawatt, including shared solar (community-based)



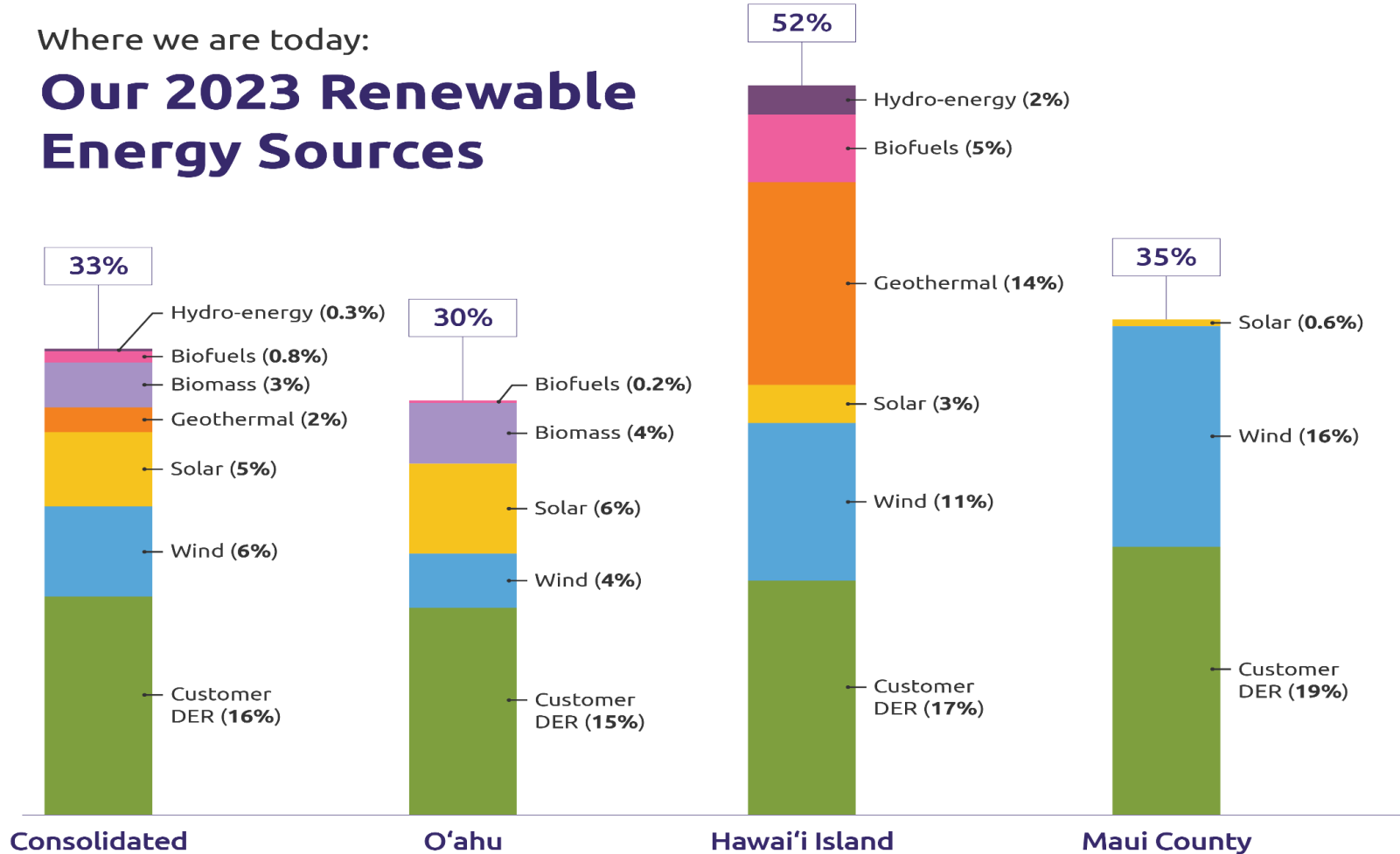
Expanding geothermal



Creating innovative programs that provide customers incentives for using clean, lower-cost energy at certain times of the day and using less fossil-fueled energy at night

Where we are today:

Our 2023 Renewable Energy Sources



	Metric	Battery Bonus Program ⁷²
Overview	Primary Drivers	Resource Adequacy Decarbonization
	Grid Services	Capacity (Reduction)
	Resource Type	New Battery Storage w/Solar
	Customer Market Segment	Oahu Residential & Commercial, Maui Residential & Commercial
	Participating OEMs	OEM Agnostic Battery
	MW Enrolled	Oahu: 46.8 MW Maui: 8 MW
	Customers Enrollments ⁷³	~4,000
VPP Roles and Responsibilities	Resource Offtaker	Hawaiian Electric
	Program Operator	
	Customer Enrollment	
	Customer Payment Channel	
Customer Experience	Device Owner	Customer or Third-Party
	Participation Incentives	Up-front: \$850/kW Monthly Flat Rate Credit: \$5/kW of committed peak capacity Monthly Export Credit (available for non-net energy metering customers)
	Participation Requirements	Non-optional dispatch, required 10-year enrollment contract
	DER Control	OEM autonomously device-controlled dispatch without customer override
	Dispatch Timing	Frequency: Annual, daily 6–8:30 p.m. Duration: 2 hours Scheduling: Fixed 2-hour schedule established by HECO

← 7,500

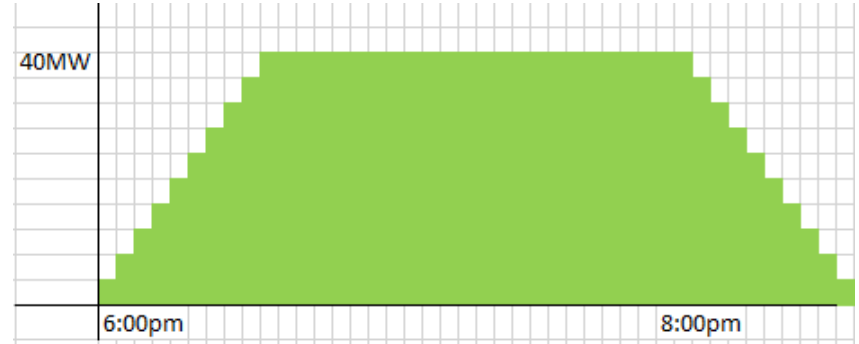


Utility Benefit of Battery Bonus

- ◆ Generation: Increased renewable energy (14MW) and battery (29MW) decrease reliance on fossil fuel.
 - Battery enablement of 47MW expected by end of the year/early next year
- ◆ Reliability: Rough estimate of 15MW of DER export shifted from day-time to evening time via program.
- ◆ Predictability: Every single day for 10 years battery scheduled to discharge for 2 hours (6:00 – 8:30pm window)



Scheduled Dispatch Program



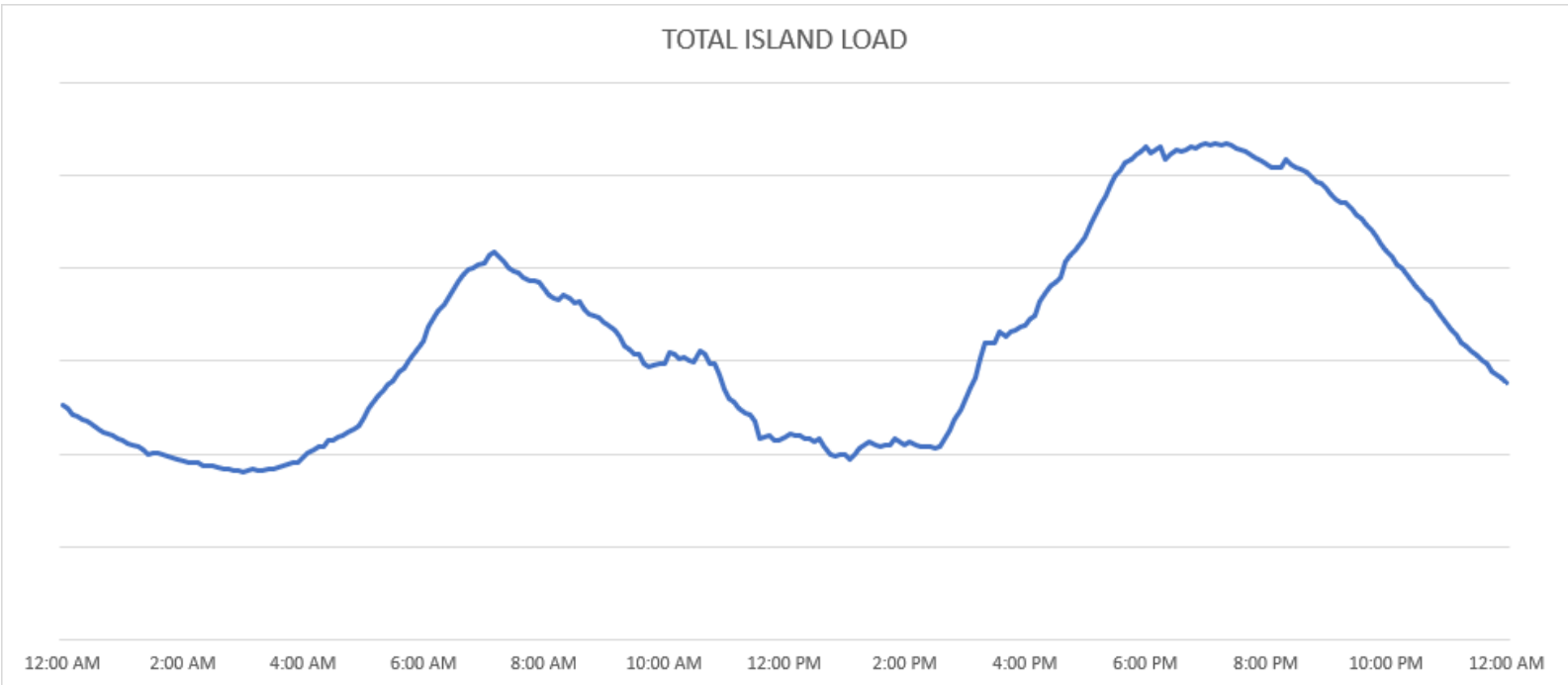
Scheduled Programs must be designed carefully to not jeopardized the grid stability.

Rather than all resource dispatching exactly at 6pm, the Battery Bonus program is designed for incremental scheduled dispatch (2MW/min).

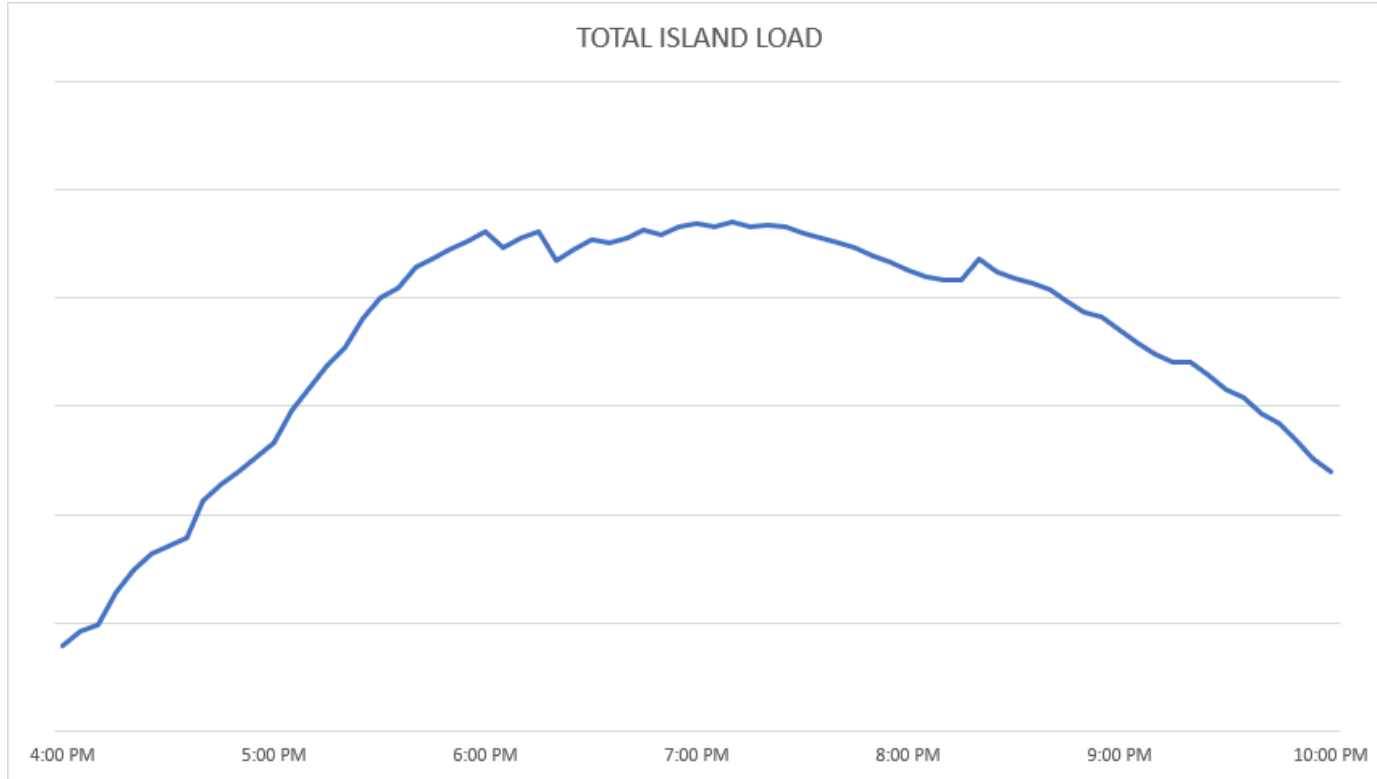
Lessons learned: Minute level dispatch very difficult to do.



System Load Curve - Example



Peak Load Curve - Example



Customer Benefit of Battery Bonus

- ◆ Financials #1: High upfront incentive to help pay for battery.
- ◆ Financials #2: Reduce monthly electric bills. (47% of customer have a carry over of a growing negative bill)
 - Utility recommended capping the battery size but the industry did not support the “right sizing” of battery.
- ◆ Programmatic: NEM is closed, however this program allowed for such customers to add solar panels without losing its NEM status.
- ◆ Resilience: If there is a grid outage, customer now has battery to keep essential appliances going.



Challenges for Program Development

- ◆ Export rate: Not an issue for NEM customers but for others, export rate that is not at retail rate has negative impact to their electric bill. (e.g. self-consumption is better than to send energy back to grid)
- ◆ Incentive rate: Battery Bonus setting a precedence such that any lower amount, the incentives is no longer attractive.
- ◆ Program complication: Dispatch, DR, DER, charge, discharge, grid services, are utility language and educating customer is very difficult on its benefit (societal vs individual). Relying on nationally recognized protocol vs proprietary system is also an on-going discussion.
- ◆ Financials: Who should receive the money if the PV system is of a lease model? What is tax-able and what is not?
- ◆ Communications: AMI, Cellular, customer wi-fi, private LTE, having a reliable comms to the device to control is still expensive and difficult to scale.



Future of CER

- ◆ Via programs like Bring Your Own Device (BYOD), utility will diversify its portfolio not limited to batteries, and look into other traditional direct load control.
- ◆ Stacking of grid services is becoming more difficult to deliver as well as setting a value, but will continue to investigate in pursuit of a cost effective CER program.
- ◆ Hawaii's PUC has open dockets on Microgrid, Equity, and Wheeling. These dockets will play an important role to CER programs' roadmap and immediate next steps.





Mahalo

