

# HB 301: Renewable Portfolio Standard Testimony

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UNIVERSITY  
of HAWAII®  
MĀNOA

## Hawaii's Energy Transition Framework: Binding Commitments and Stakeholder Alliance

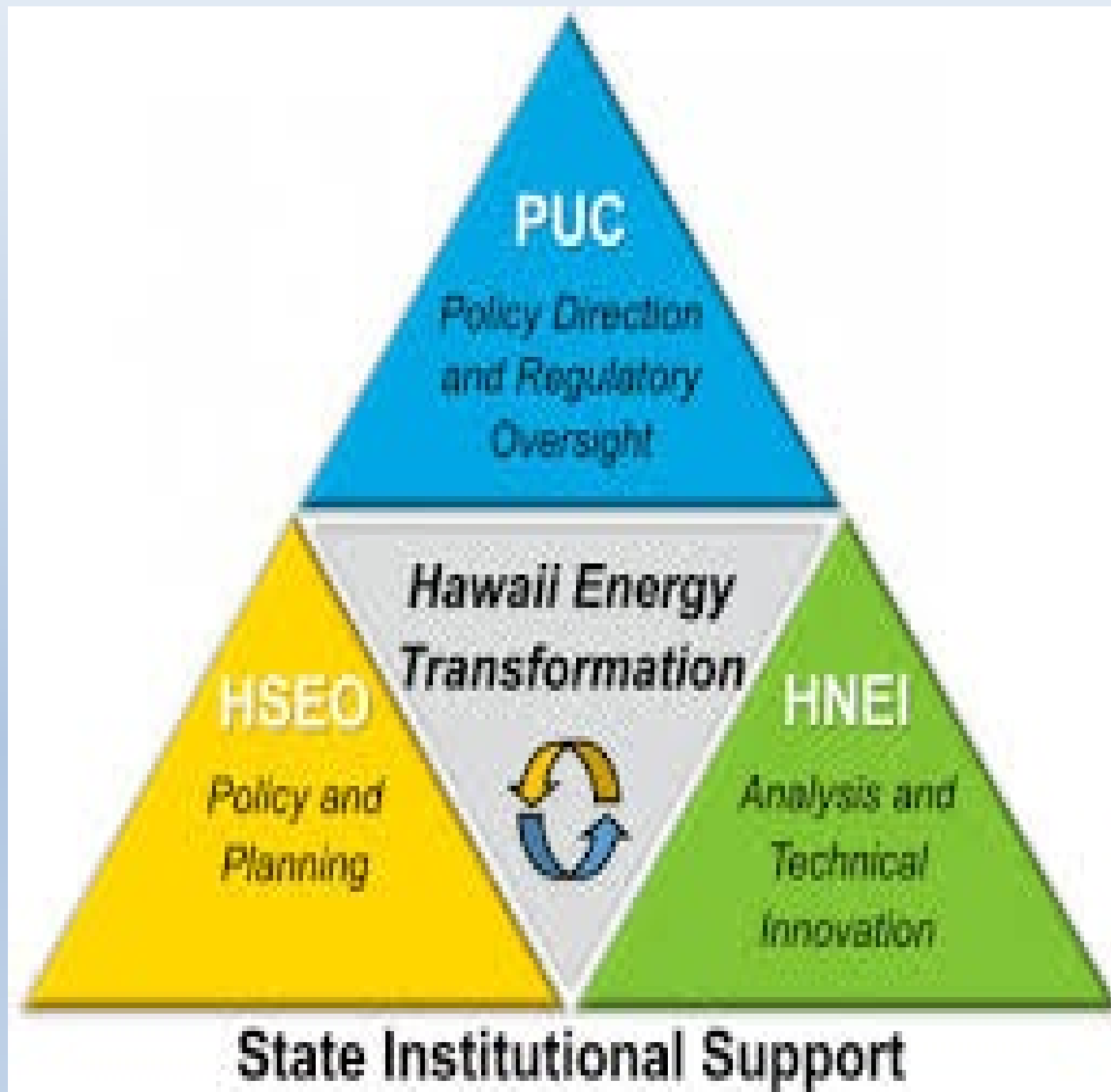
ALASKA LEGISLATURE

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# Hawaii Natural Energy Institute (HNEI)

*School of Ocean and Earth Science and Technology, University of Hawaii at Manoa*



- Founded as an organized research unit in 1974 - established in statute in 2007 to serve as the Hawaii's lead on energy resource and technology development.
- HNEI, along with the Hawaii State Energy Office and Public Utilities Commission, helps drive Hawaii's energy transition.
- Diverse staff including engineers, scientists, lawyers; students and postdoctoral fellows, combining research excellence & deep experience, with two of the three current Hawaii Public Utility Commissioners serving at HNEI at the time of their appointment by the Governor.



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# Energy Transition Drivers in Hawaii

- Oil Shock - Recession
  - Sense of Urgency / Public Will to Act
- Bipartisan Collaboration

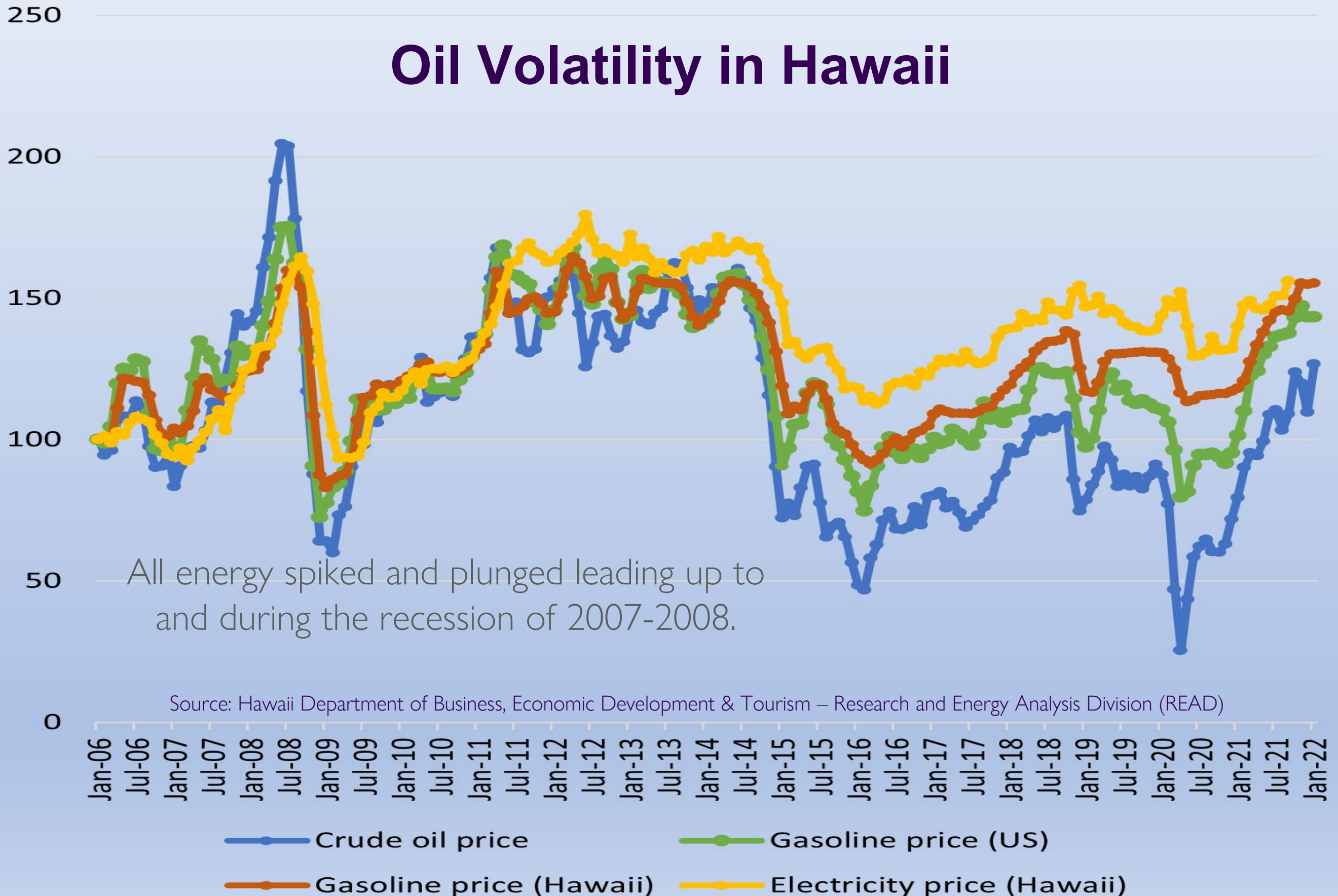


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# Energy price trend (Index, Jan. 2006=100)

## Oil Volatility in Hawaii



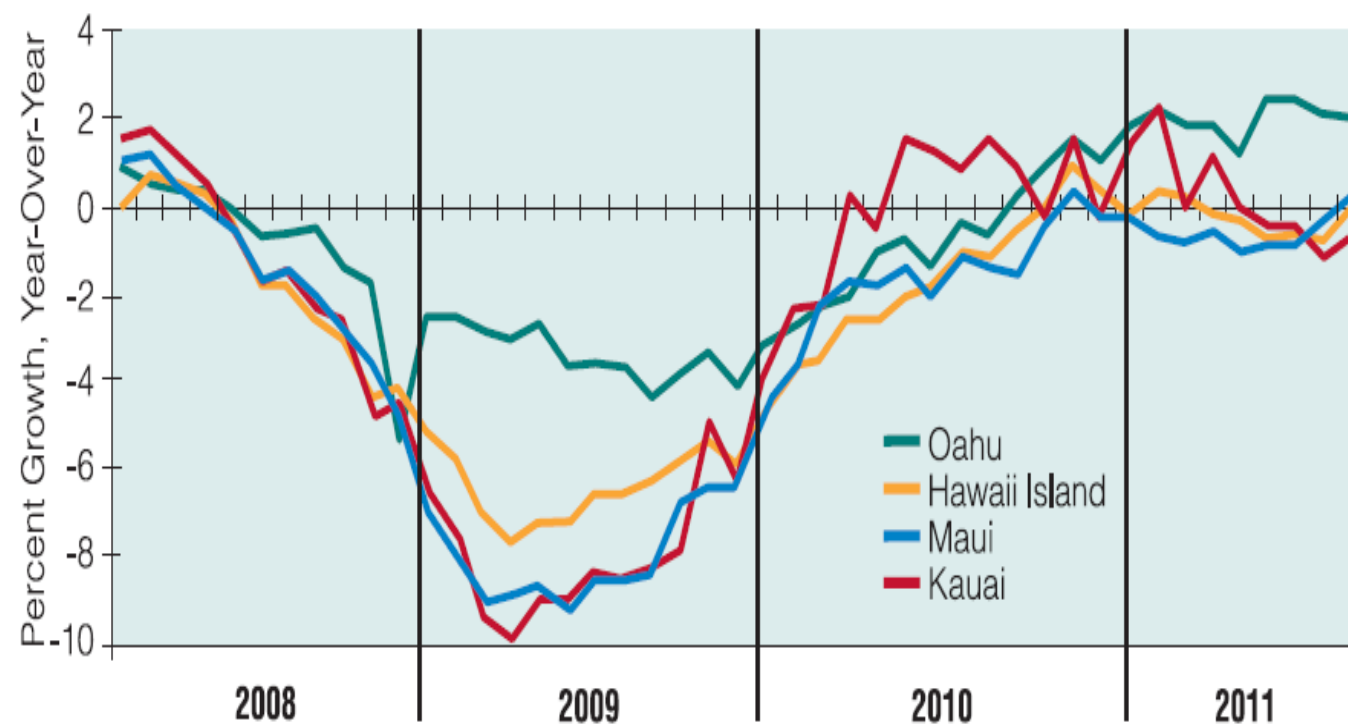


# Hawaii's Economic Recession (2008-09)

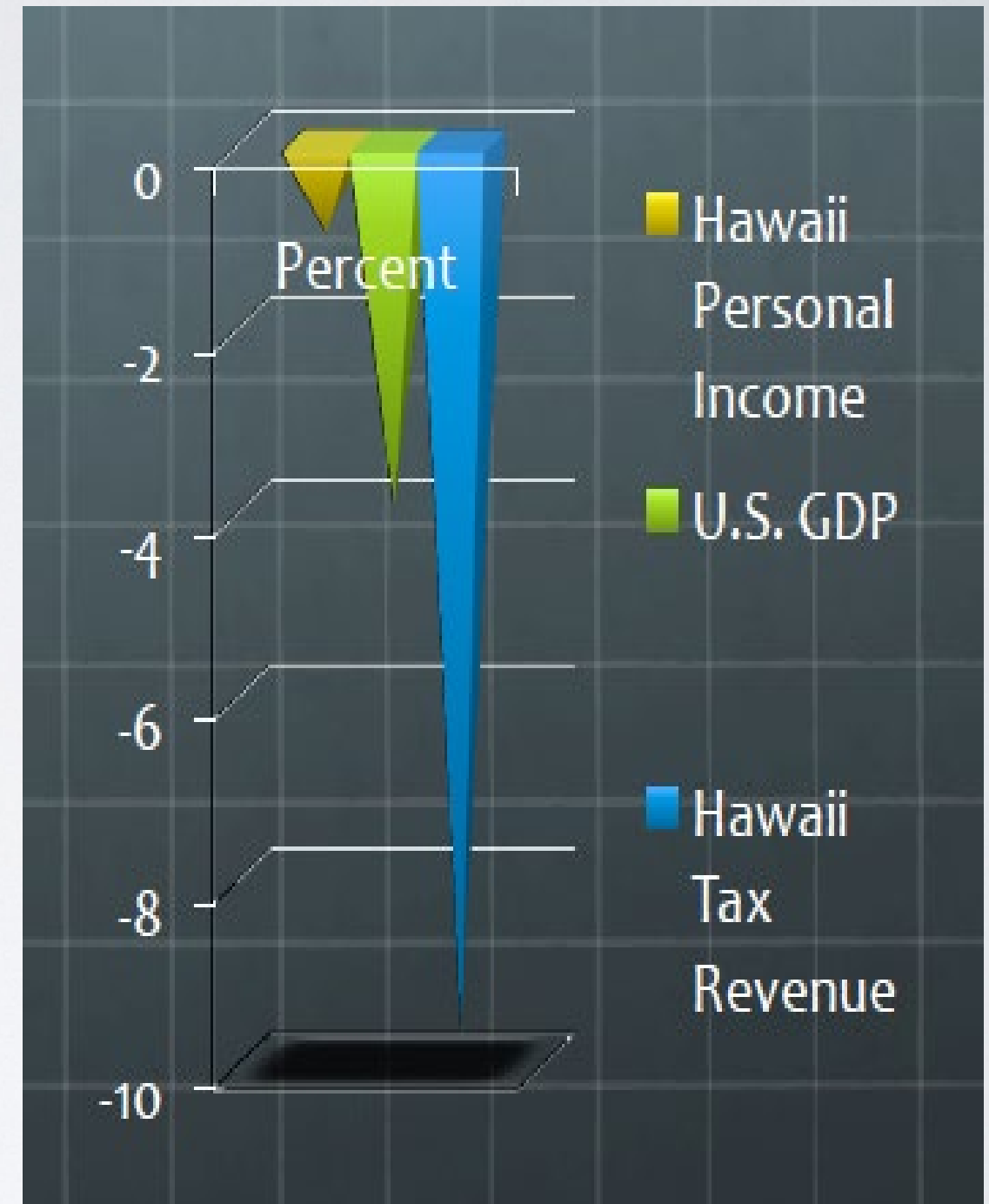
## Decline in Hawaii and U.S. Economy and Hawaii Tax Revenues FY 2009

- Freefall in tax revenue & job growth

CHART 1 • JOB GROWTH, BY COUNTY, 2008-11



Source: State Department of Labor & Industrial Resources



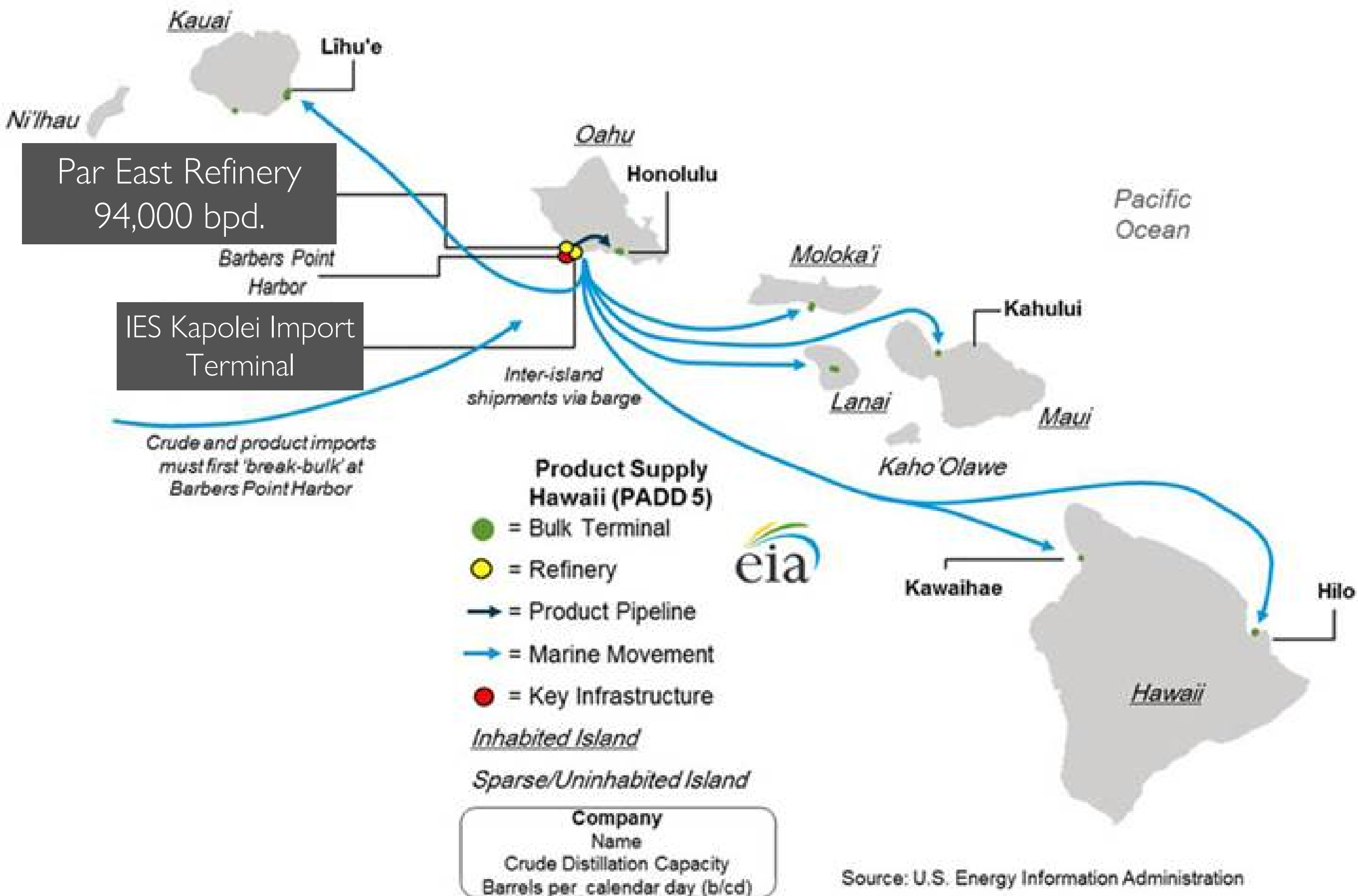
Source: Lawrence Boyd, Univ. of Hawaii 2011



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# Supply Chain Vulnerabilities





# “The Hawaii Clean Energy Initiative” *An Energy Transformation Partnership*





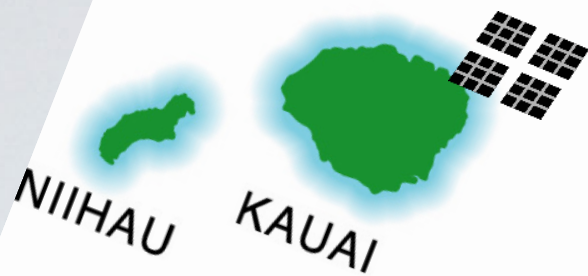
# Affecting Change on Six Isolated Grids

## RPS Targets

30% by 2020

70% by 2040

100% by 2045



80MW

1200MW



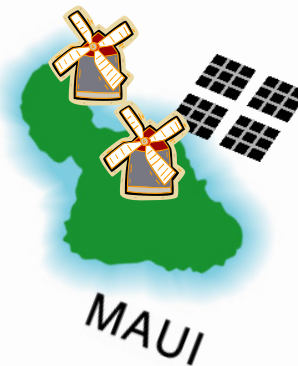
5MW

MOLOKAI

LANAI

5MW

KAHOOLAWE



200MW



190MW

## **FORMIDABLE CHALLENGES**

- >70% of energy use on Oahu
- No interconnections between islands
- Resource and population not co-located
- Land availability, community acceptance, and permitting remain significant hurdles

Meeting RPS goals requires innovation and community commitment



# 100% RPS by 2045



- **Under Act 97 Hawaii is the first state to set a 100% RPS.**
- **A binding commitment for renewable energy establishes confidence in the market that drives investment decisions.**



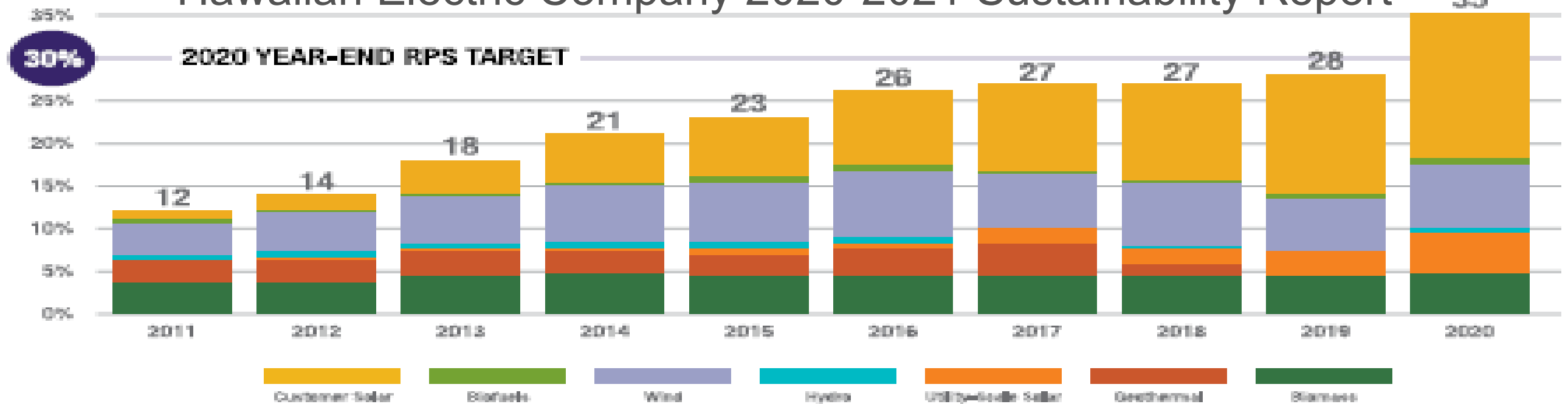
# Recent PV Plus Storage PPAs in Hawaii

Project name	Island	Developer	Size	Storage	Cost per KWh
Waikoloa Solar	Hawaii	AES	30 MW	120 MWh	\$0.08
Hale Kuawehi	Hawaii	Innergex	30 MW	120 MWh	\$0.09
Kuihelani Solar	Maui	AES	60 MW	240 MWh	\$0.08
Paeahu Solar	Maui	Innergex	15 MW	60 MWh	\$0.12
Hoohana	Oahu	174 Power Global	52 MW	208 MWh	\$0.10
Mililani I Solar	Oahu	Clearway	39 MW	156 MWh	\$0.09
Waiawa Solar	Oahu	Clearway	36 MW	144 MWh	\$0.10

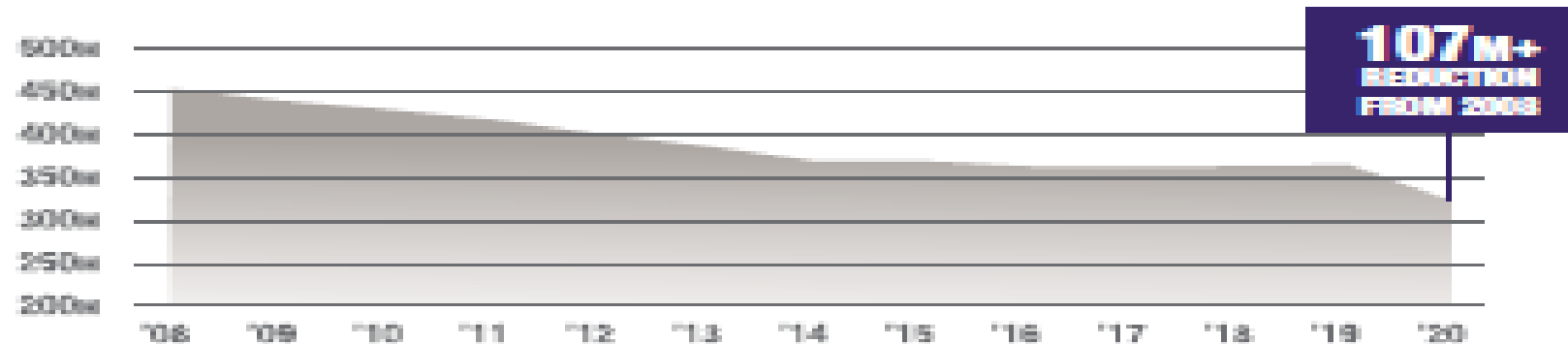
Fuel oil has ranged in past 5 years from **\$0.14** to **\$0.25 per KWh**



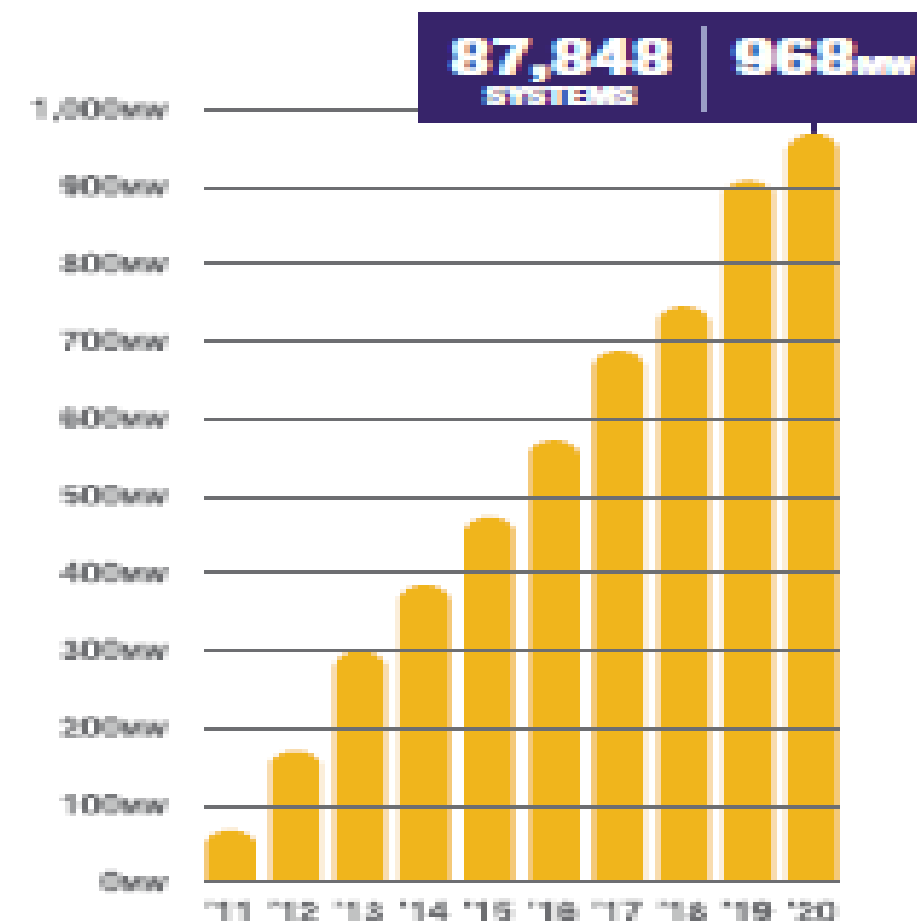
# Hawaiian Electric Company 2020-2021 Sustainability Report



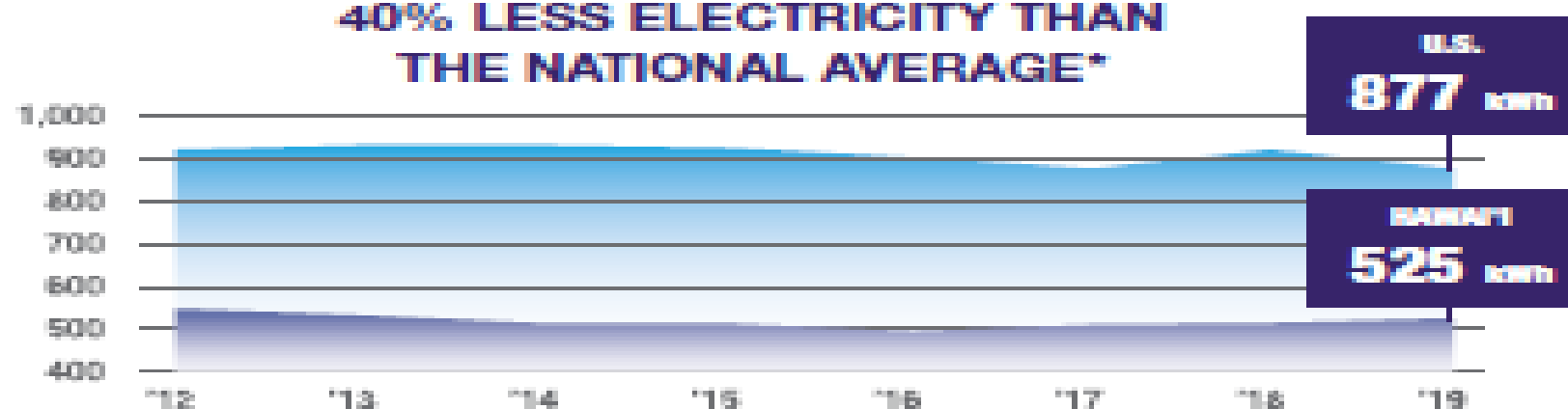
### LESS OIL USED FOR POWER GENERATION



## CUMULATIVE SOLAR INSTALLATIONS



**AVERAGE HAWAII HOME USES  
40% LESS ELECTRICITY THAN  
THE NATIONAL AVERAGE\***

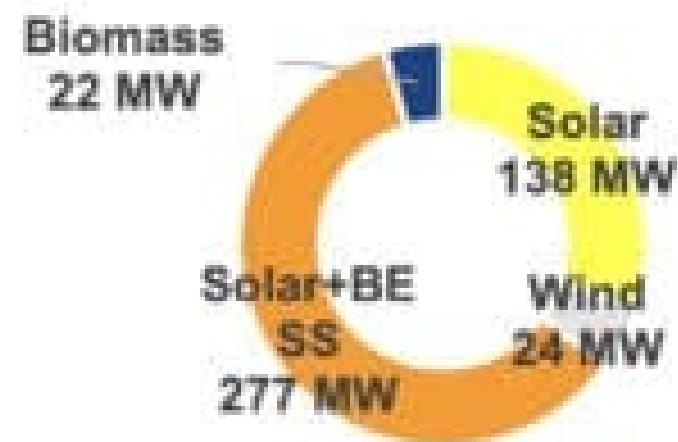




# Renewable energy projects—status update

Near-term renewable projects represent diverse resource mix, contribute significantly to RPS

Near term (2019 – 2022) projects by technology (MW)<sup>1,2</sup>

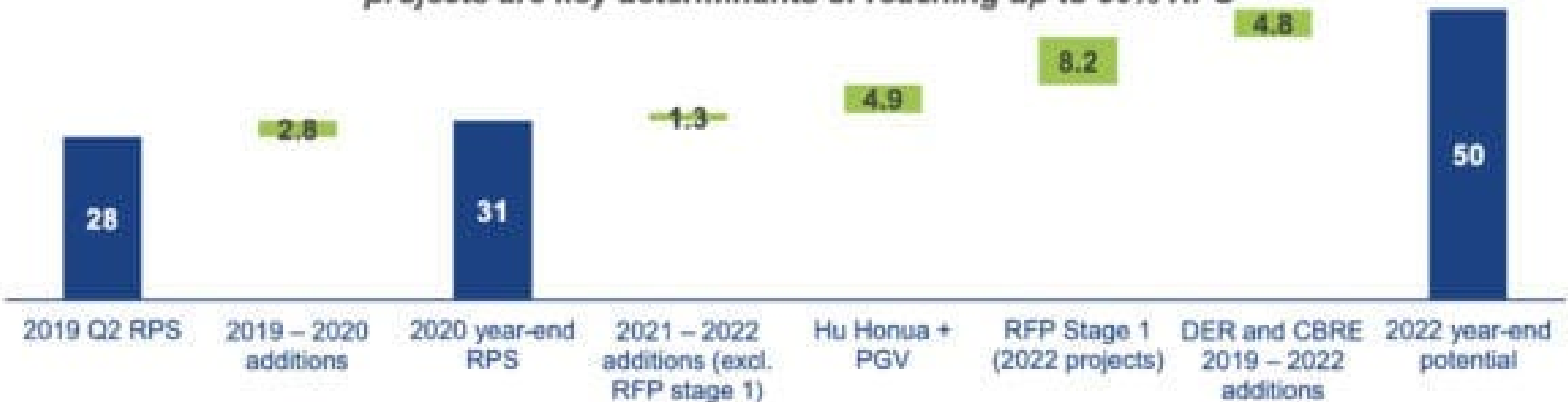


Near term (2019 – 2022) projects by status (MW)<sup>1,2</sup>



Near term projects, % RPS contribution by year<sup>3</sup>

*Community acceptance of projects, land availability and market's ability to deliver cost-effective projects are key determinants of reaching up to 50% RPS*



Note: Megawatts shown in charts at top of slide do not translate directly to RPS percentage points, as capacity factors of each technology must be factored in to get to RPS contribution.

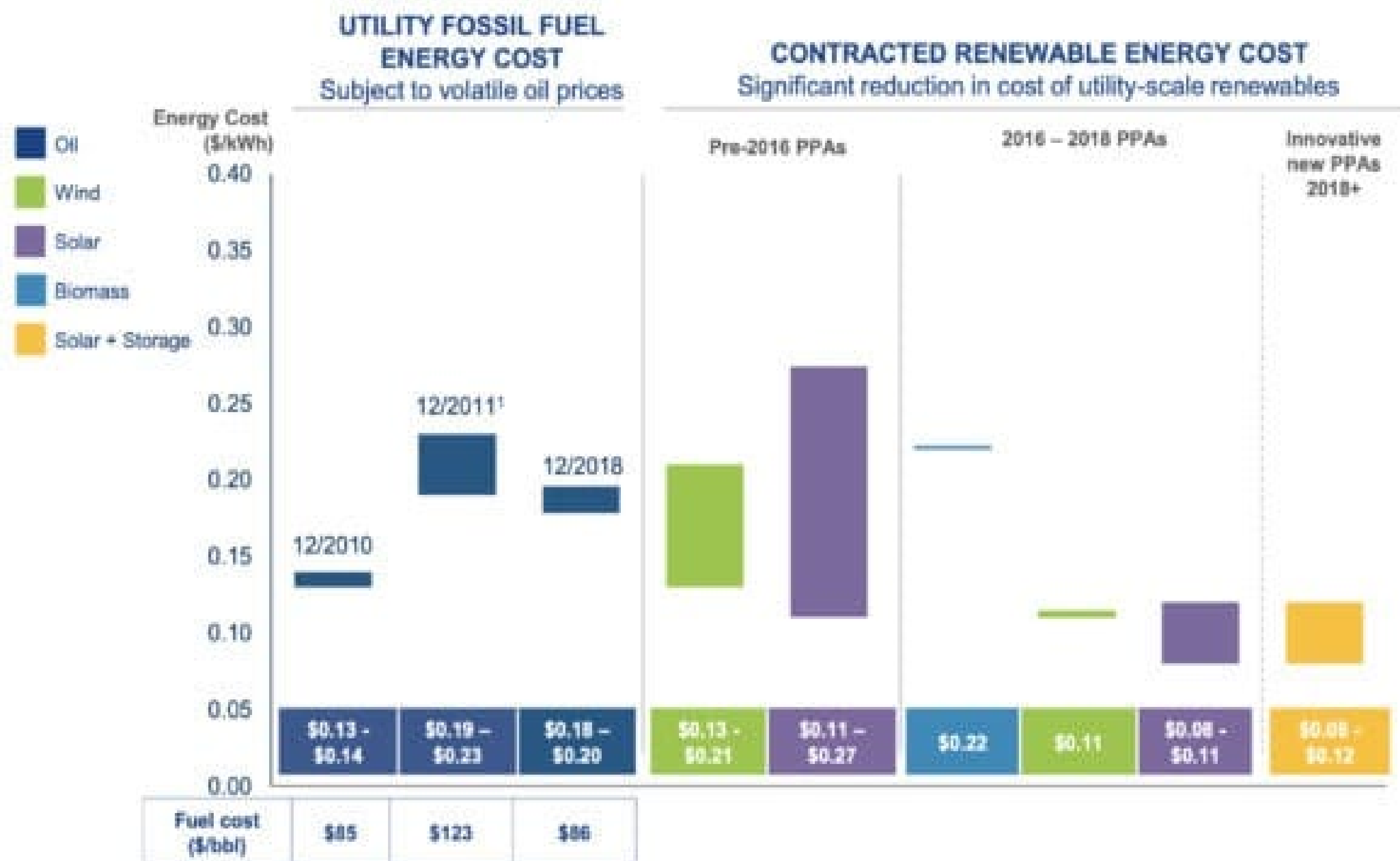
1 Megawatts exclude BESS portion of Solar+BESS projects, which are tracked in megawatt-hours rather than megawatts.

2 Excludes RFP Stage 2.

3 Puna Geothermal Venture ("PGV") was damaged by lava flows in 2018; timing for its return to service is currently uncertain. 50% RPS by 2022 assumes both PGV and Hu Honua are placed in service.



# Renewable energy is key to customer affordability in Hawaii



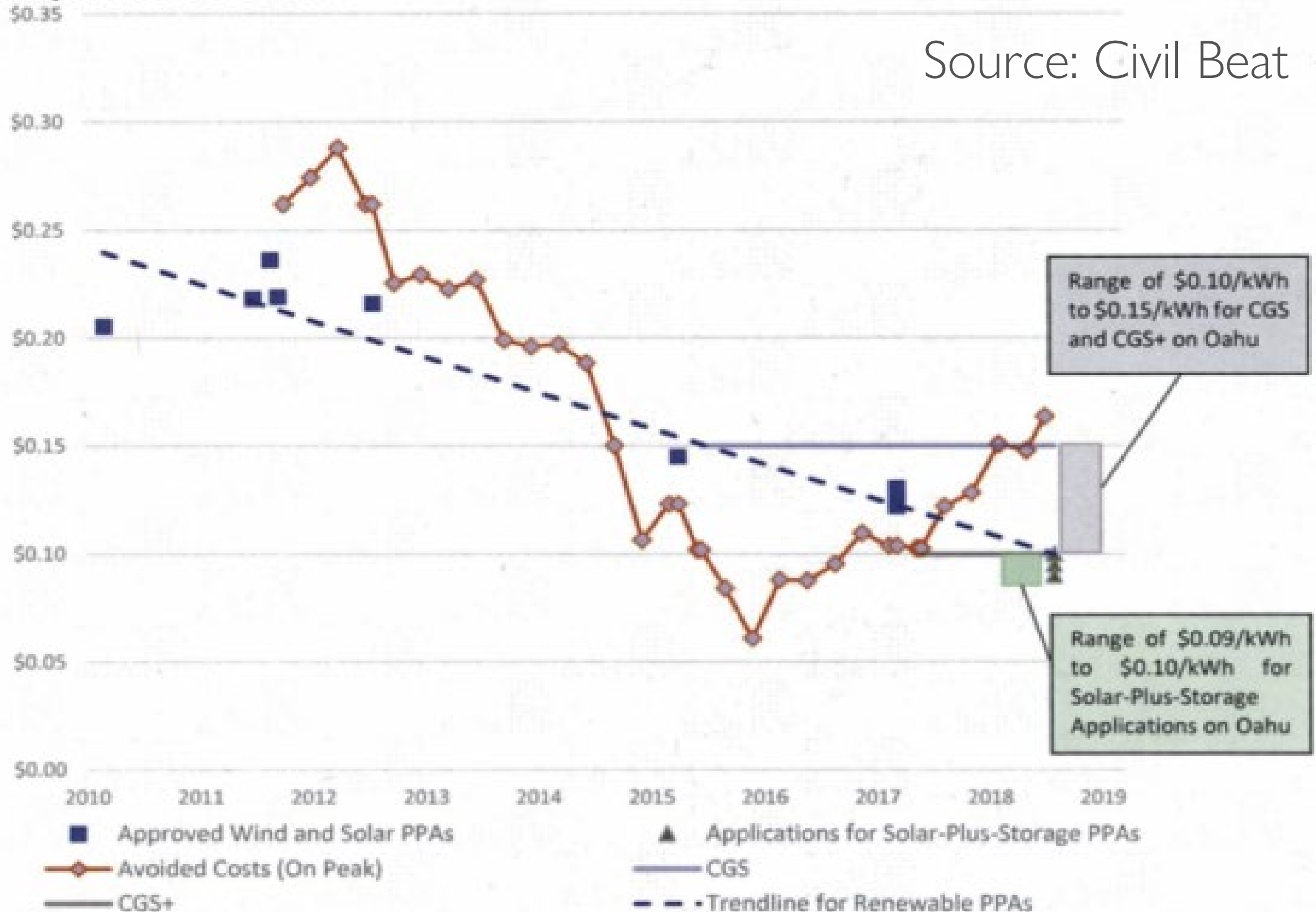
<sup>1</sup> The 2011 fuel oil increase was largely driven by the nuclear disaster of the Fukushima power plant in March 2011, which increased the price of oil in Hawaii as our fuel oil purchases are largely driven by the Asia Pacific market.



# Avoided Cost of Fuel-Oil v. Renewable Electricity

Figure 1. Energy Prices (\$/kWh) for Renewable Energy on Oahu (2010 - 2018)  
Compared to Avoided Costs<sup>8</sup>

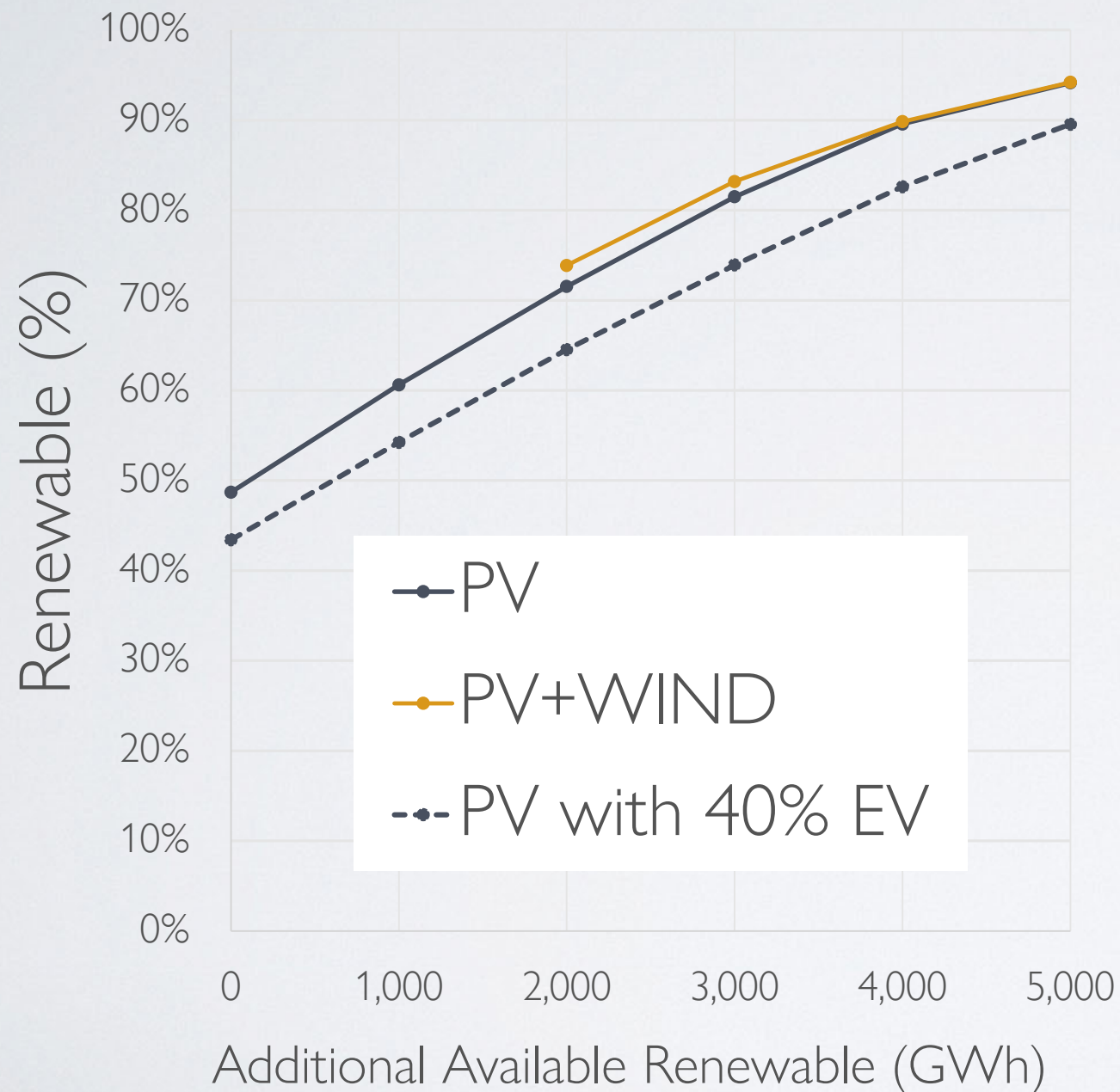
Source: Civil Beat





# Hawaii's Viable Path to 100% Renewable

## Total Renewable Utilization



- Additional solar or solar plus wind can get us to 70% without significant curtailment.
- Reaching 70% renewables will require an additional 2000GWh (800MW) of solar plus storage (beyond Stage 2) using ~ 6000 acres of land.
- Converting 40% of our light duty vehicles to EV will require an additional 900 GWh per year.
- At 70%, system still needs a minimum of 650MW of “firm” capacity to cover seasonality and multi-day low wind and solar events.
- As variable renewable increases, “firm” capacity needs decrease modestly but use of those systems decreases significantly with big effect on the “firm” generation needs.

Thank you for the opportunity to testify in support of HB 301.



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**Shortly After Passage of Act 97 (Hawaii's 100% RPS Legislation)**

Energy Administrator Mark Glick; House Energy & Environment Chair Chris Lee; Senate Chair  
Energy Chair Mike Gabbard at the Hawaii Legislature