

Evolution of Net Metering in Hawaii

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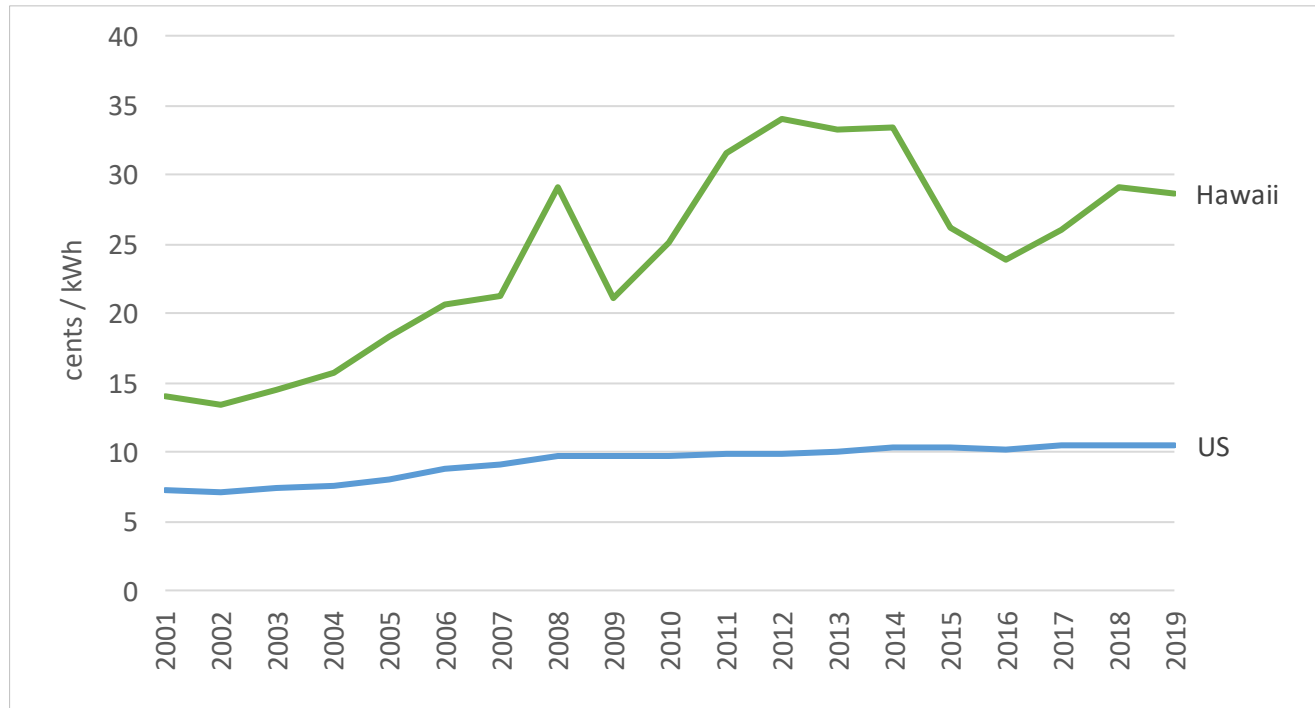
- Founded in 1996 by CEO Bruce Biewald
- Leader for public interest and government clients in providing rigorous analysis of the electric power sector
- Staff of 30+ experts in energy and environmental economics and environmental compliance

A satellite photograph of the Hawaiian Islands, showing the main islands and surrounding waters. The text "Net Metering Early Days" is overlaid in white.

Net Metering Early Days

Context

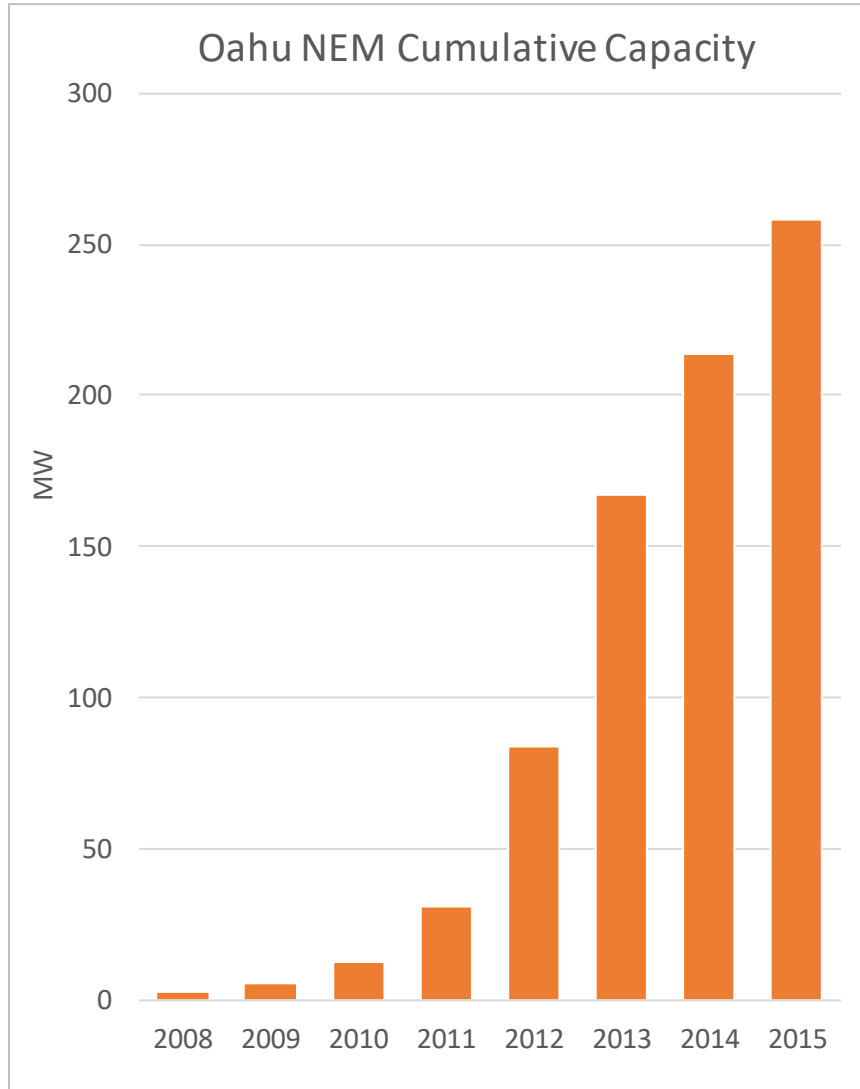
- Hawaii's electricity prices are more than double the US average



Source: EIA

- Tied closely to price of oil

NEM Growth through 2015



Source: HECO Quarterly Installed Solar Data
<https://www.hawaiianelectric.com/clean-energy-hawaii/our-clean-energy-portfolio/quarterly-installed-solar-data>

- ~10% of Hawaii households had installed PV
- Backlogs in interconnections
- Safety and reliability concerns
- Curtailment of grid-scale renewables concern

2014: The Tipping Point

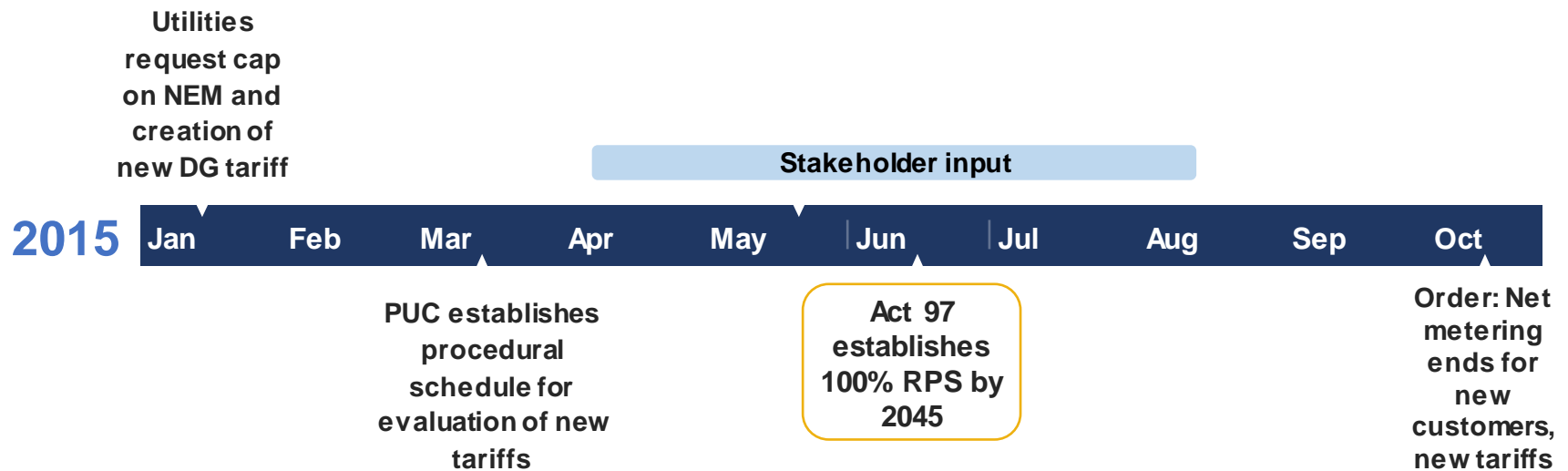
Hawaii Public Utilities Commission:

- Rejected utilities' integrated resource plan (IRP)
- Found that utilities were not proactive in anticipating or mitigating PV adoption
- Required the utilities to:
 - Establish plans to mitigate adverse grid impacts from DG
 - Upgrade circuits to accept more DG
- Instituted a proceeding to investigate DER Policies (Docket 2014-0192)

The solar industry in Hawaii will have to move to a new model that “benefits **both** individual customers and the overall electric system”

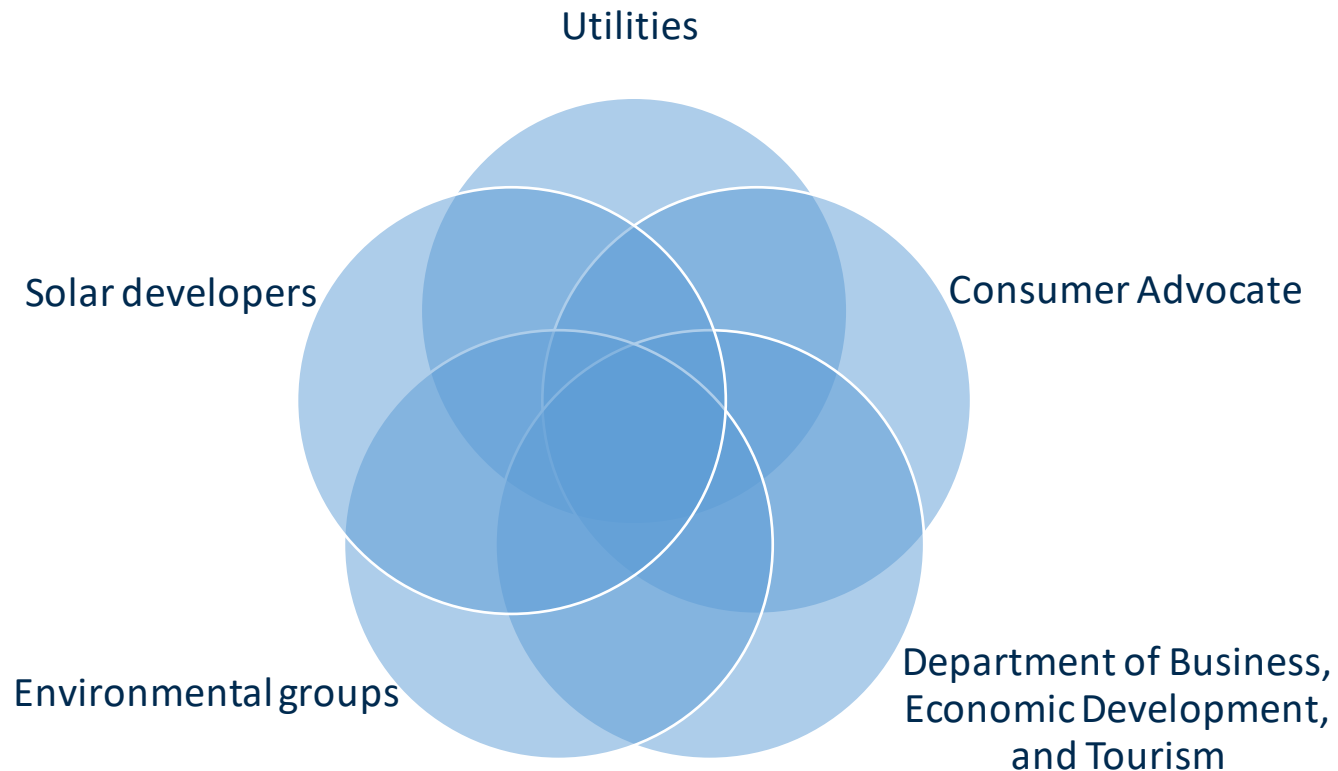
- PUC, Order No. 32503

2015: Back to the Drawing Board



Development of Replacement Tariffs

- Commission directed parties to work together to the extent possible to establish a transition roadmap and interim tariffs
- 15 parties filed positions



2015 Adopted Tariffs

- All parties support more accurate and efficient time-of-use (TOU) rates
 - But lack of advanced metering
- General agreement that export credit should be less than full retail rate

Two approved tariffs with capacity caps:

Customer Self Supply (CSS)

Designed to not export to grid

No compensation for exports

\$25 minimum bill

Customer Grid Supply (CGS)

Lower export credit approximates
on-peak avoided cost

No carry-over of credits from
month to month

\$25 minimum bill

2017 Successor Tariffs

Customer Self Supply (CSS)

Designed to not export to grid

No compensation for exports

\$25 minimum bill

Customer Grid Supply *Plus* (CGS+)

Requires activation of advanced inverter controls

Lower export credit

\$25 minimum bill

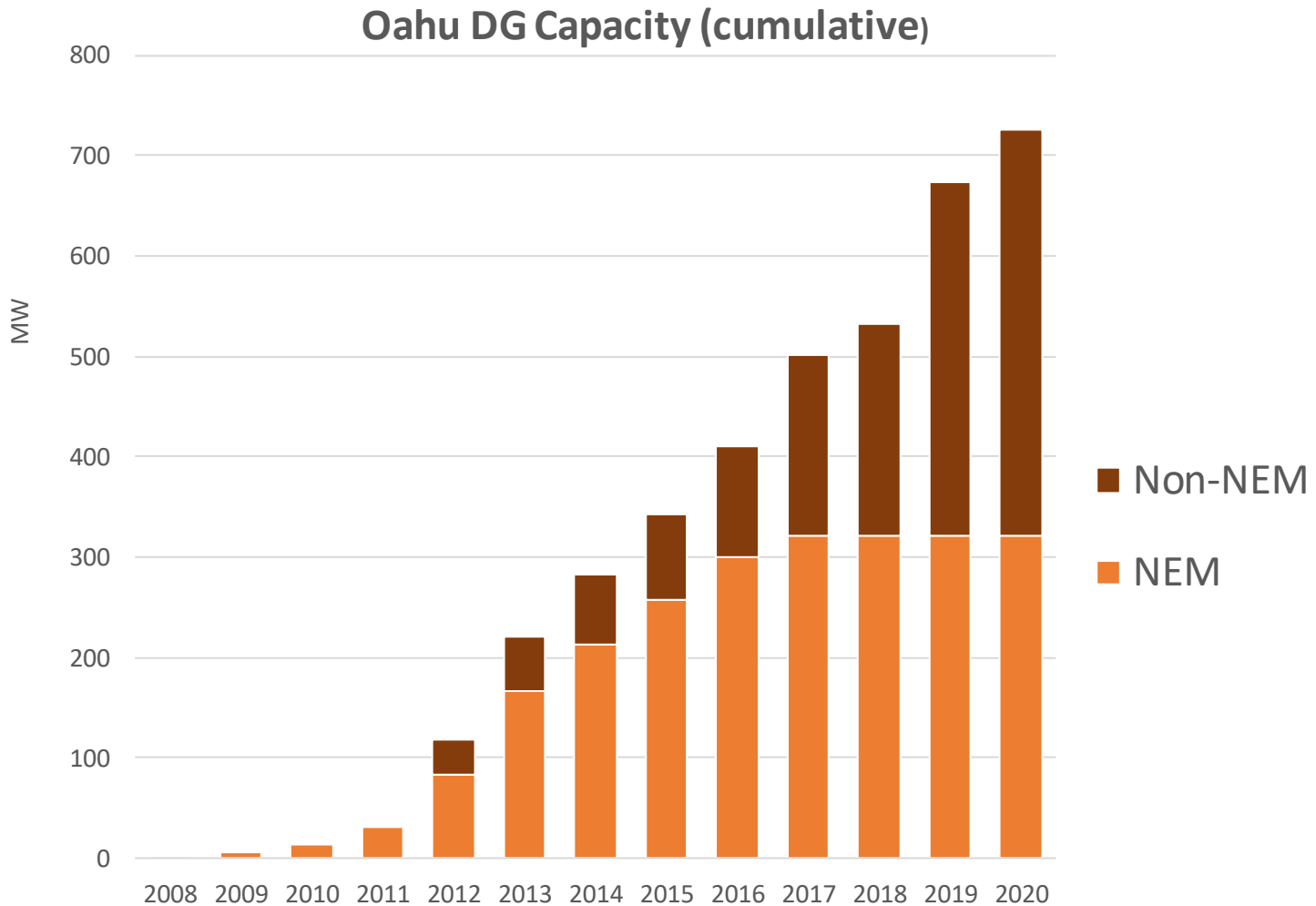
Smart Export

Designed for customers with batteries

No credit during daylight hours; lower export credit other hours

\$25 minimum bill

Continued DG Growth



Longer-Term Options



Need for further improvements



Export credits still very rough approximation of value to grid

- Little temporal differentiation
- No locational differentiation on islands



Prices for consumption from grid not time-differentiated



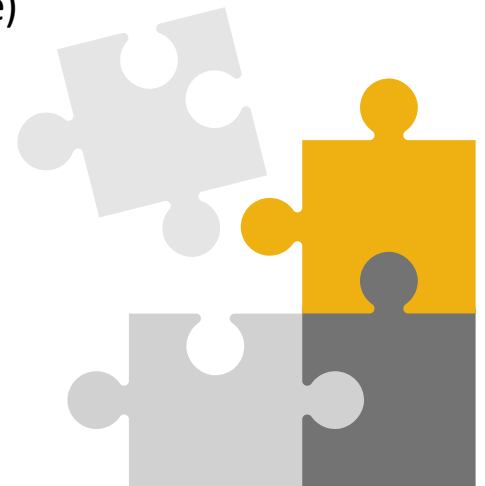
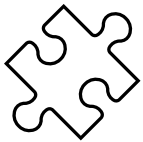
Little incentive to provide advanced grid services



New docket: 2019-0323

2019-2021: Advanced Rate Design & DER Programs

- Advanced rate designs (for consumption and more?)
- Investigate compensation of DERs for
 - Energy
 - Capacity
 - Ancillary services (reserves, regulation, frequency response)
- Need production cost and capacity expansion modeling
 - Long-run marginal costs of new resources
 - Short-run marginal energy costs
 - Operating reserves and regulation requirements
- Missing piece: Incremental T&D benefits or costs
 - Avoided T&D not yet valued (need location-specific values)
 - Incremental costs poorly tracked



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