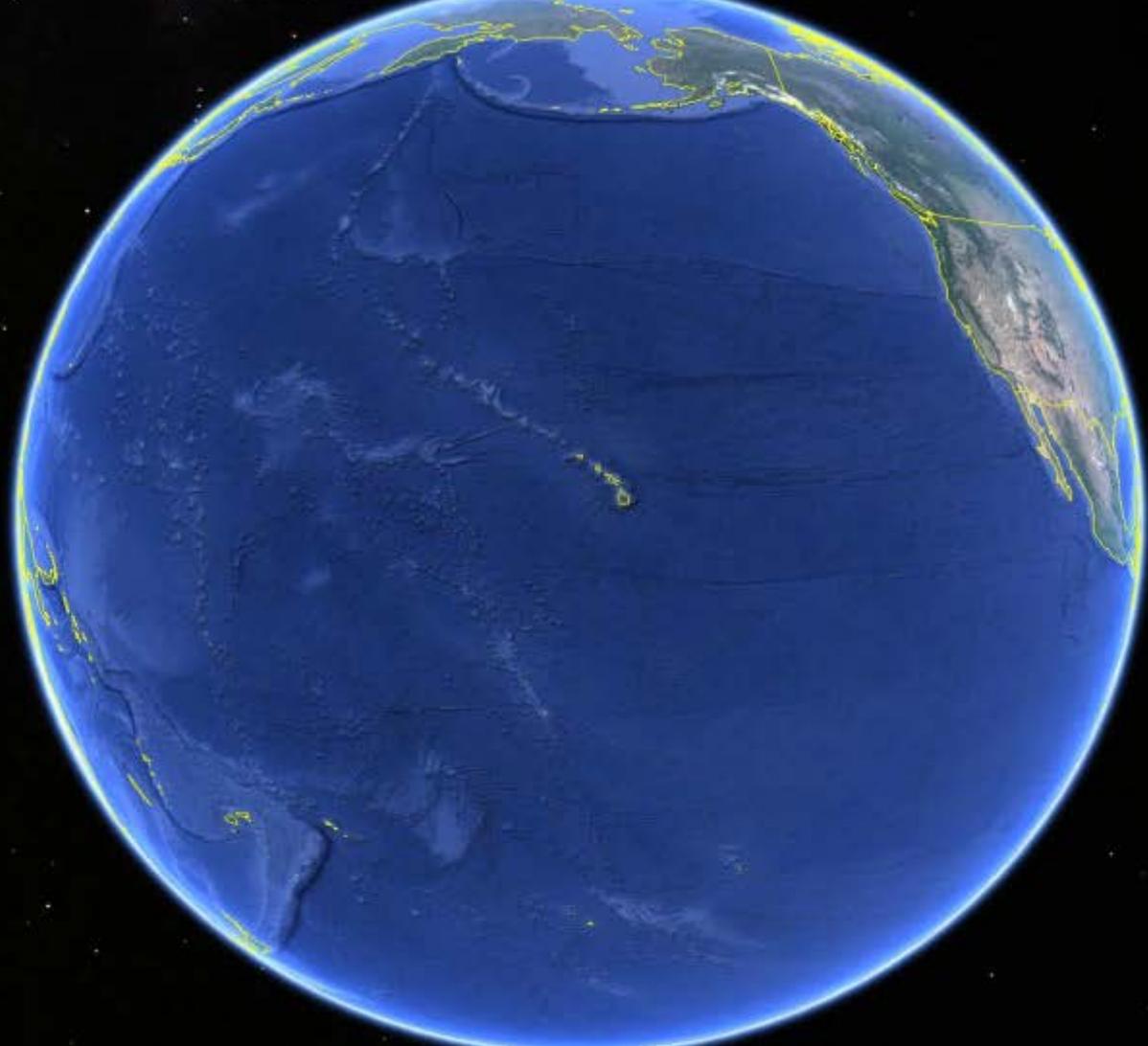


EERE National Lab Impact Summit

Hawaiian Electric's Renewable Energy Progress

Colton K. Ching
Vice President Energy Delivery
Hawaiian Electric



Hawaiian Electric: 3 Electric Utilities, 5 Separate Grids

Maui Electric

Serves islands of Maui, Molokai, and Lanai

Customers: 68,000

Generating capability: 284 MW

Peak Load (Maui): 190 MW

Hawaiian Electric

Serves island of Oahu

Customers: 297,000

Generating capability: 1,756 MW

Peak Load: 1,150 MW

Kaua'i Island
Utility Cooperative

9.8%*

Hawaiian Electric 13.0%*

Maui Electric 13.0%*

Hawai'i Electric Light 11.0%*

Hawaii Electric Light

Serves island of Hawaii

Customers: 81,000

Generating capability: 293 MW

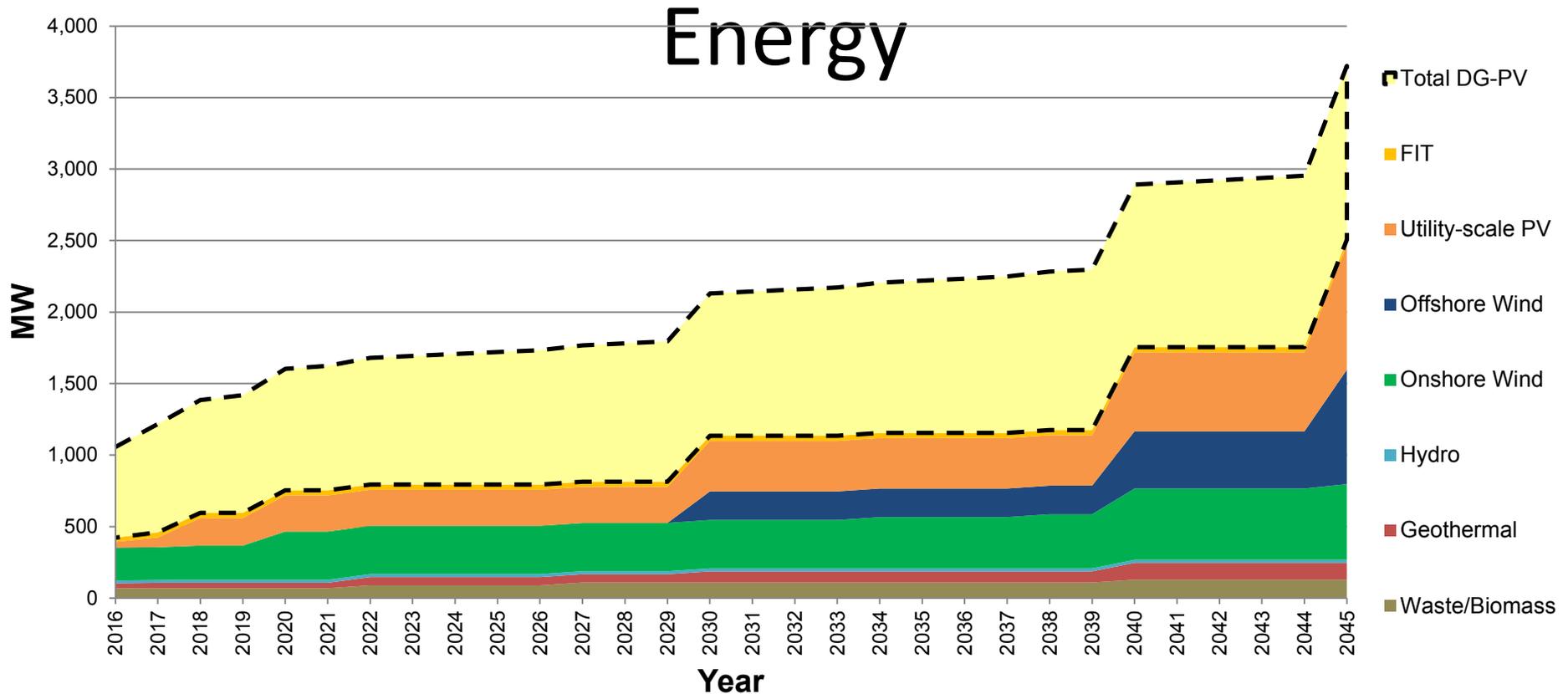
Peak Load: 190 MW



*As of 9/30/15. †As of 12/31/14.

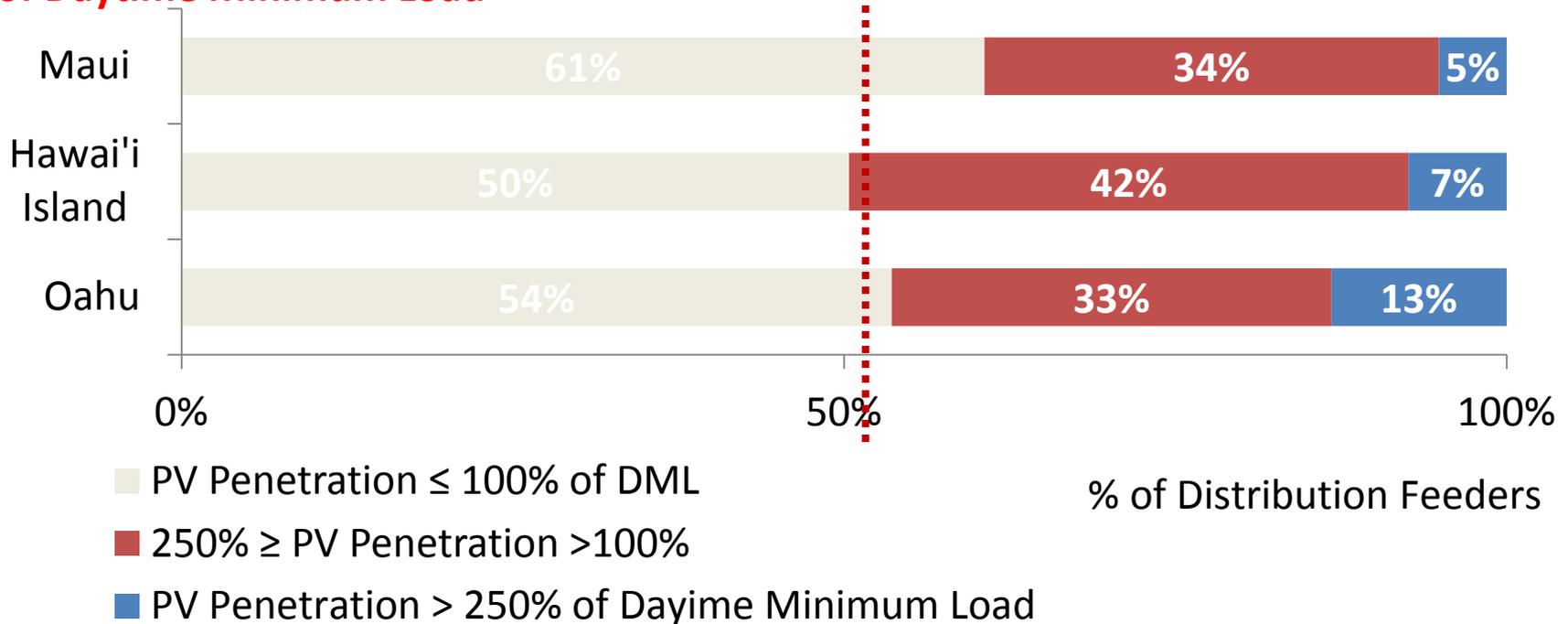
National data courtesy of Solar Electric Power Association.

We will need a diverse set of resources in 2045 to achieve 100% Renewable



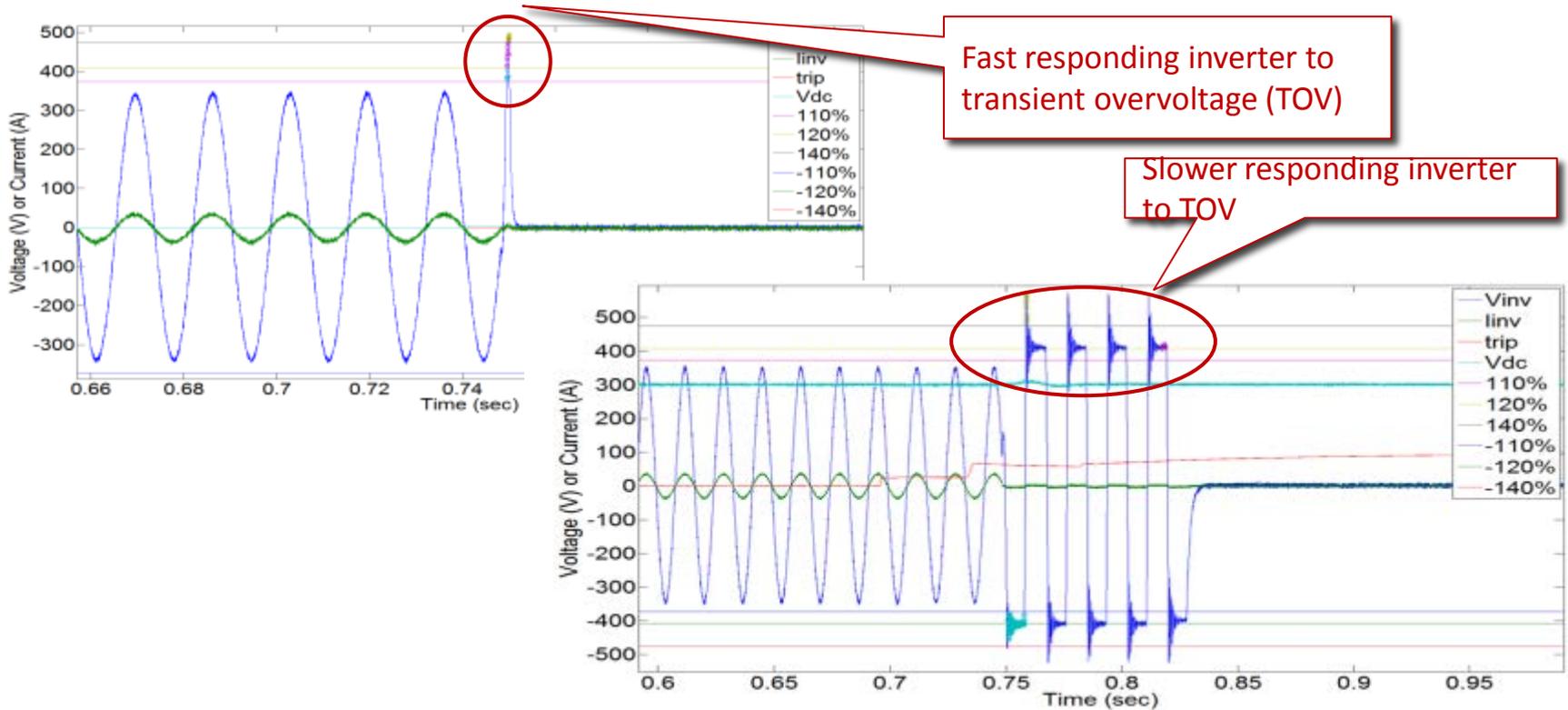
Reverse power flow is the new normal

Hawaiian Electric Companies Distribution Feeder PV Penetration of Daytime Minimum Load



Approaching the point where 50% of circuits backfeed at the substation

Technology Adoption Cycle: Idea > Design > Test > Deploy Utilizing DOE Labs and Resources



On-Going NREL Advanced Inverter Testing

Anti-Islanding	Activation Required 10/1/15
TrOV-2	
Full Voltage Ride-Through	
Full Frequency Ride-Through	
Fixed Power Factor	Activation Required 1/1/2016
Volt-VAR	Capable of being updated within 12 months after UL 1741 Supplement A is approved
Ramping	
Soft Start Reconnect	
Frequency/Watt ⁽¹⁾	
Volt/Watt	
Remote Reconnect/Disconnect	
Remote Configurability	

