



Committee on Energy Resources and the Environment

This session will begin at 1:45 p.m.

Demand Flexibility: Let's Figure it Out Now

Panel I: The Utility Experience

July 17, 2023 | 1:45-2:45pm (CT)

Moderator - Hon. Lillian Mateo-Santos, Puerto Rico

Introduction – Elliott Nethercutt, NARUC Center for Partnerships & Innovation

Panelists

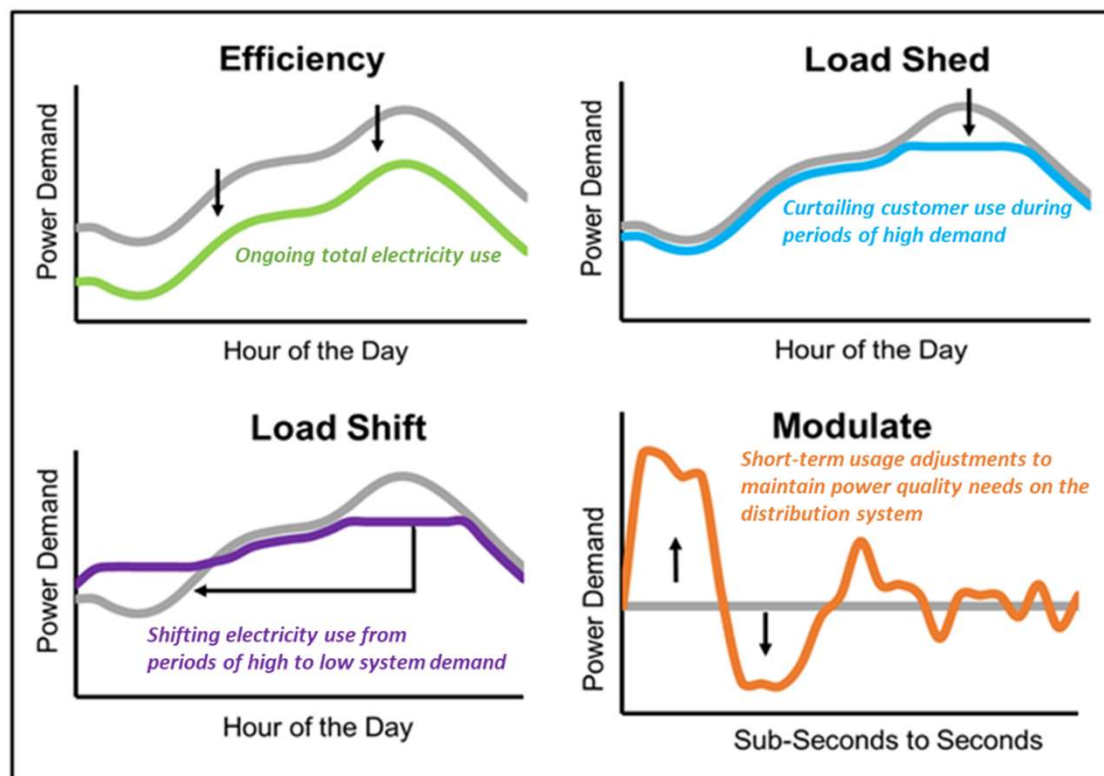
Amadou Fall, Chief Operating Officer, North Carolina Electric Membership Corporation (NCEMC)

Tom Hines, DSM Strategy Consultant, Arizona Public Service

Michael Hubbard, Manager Energy Conservation, Dominion Energy

Yoh Kawanami, Director, Customer Energy Resources Operations, Hawaiian Electric Company, Inc.

What is Demand Flexibility?



Source: DOE/LBNL, modified by NARUC staff

Managing More Complex Demand-Side Resources

- **Virtual Power Plants (VPPs):** an aggregation of small-scale, distributed energy resources, including PVs, Non-utility storage, EV chargers, and smart/responsive devices (water heaters, thermostats, etc.)
- **Distributed Energy Resources Management System (DERMS):** platforms to aid distribution system operators in the management of grids with high levels of distributed energy resources
- **Advanced Metering Infrastructure (AMI):** a two-way communication system to collect detailed metering information throughout a utility's service territory. AMI can be used to provide more advanced measurement and verification (M&V) of data

Demand Flexibility Considerations for Utilities

- Financial incentives, rate of return (fixed charge vs. alternative rate design)
- Refining rate structures so that customer prices reflect shifting utility investments
- How will DF compliment the changing generation mix?
- Interplay with integrated resource plans (IRP)
- Alignment with distribution system plans and other grid modernization initiatives
- Consideration for rapid electrification (EV charging)
- Leveraging measurement & verification tools; improved data granularity and visibility
- Coordination with regional grid operators; involvement with market design



Demand Flexibility: Let's Figure it Out Now: The Utility Experience (Panel I of II)

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Demand Flexibility: Let's Figure it Out Now

The Utility Experience

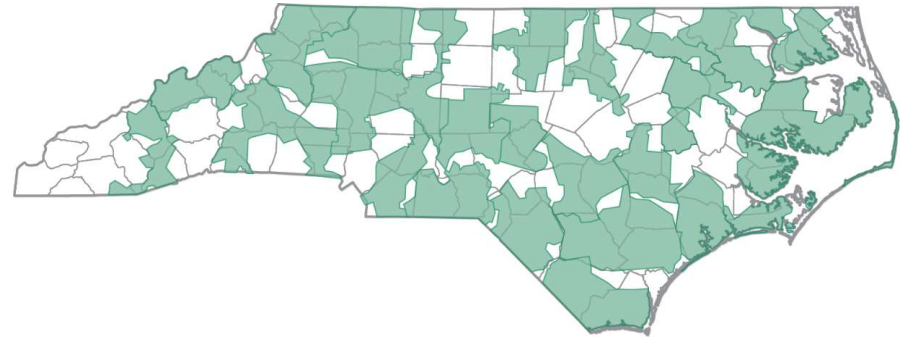
NARUC Summer Policy Summit - July 17, 2023

Amadou Fall – NCEMC COO



NC Electric
Cooperatives

Your Touchstone Energy® Cooperatives 



1 M

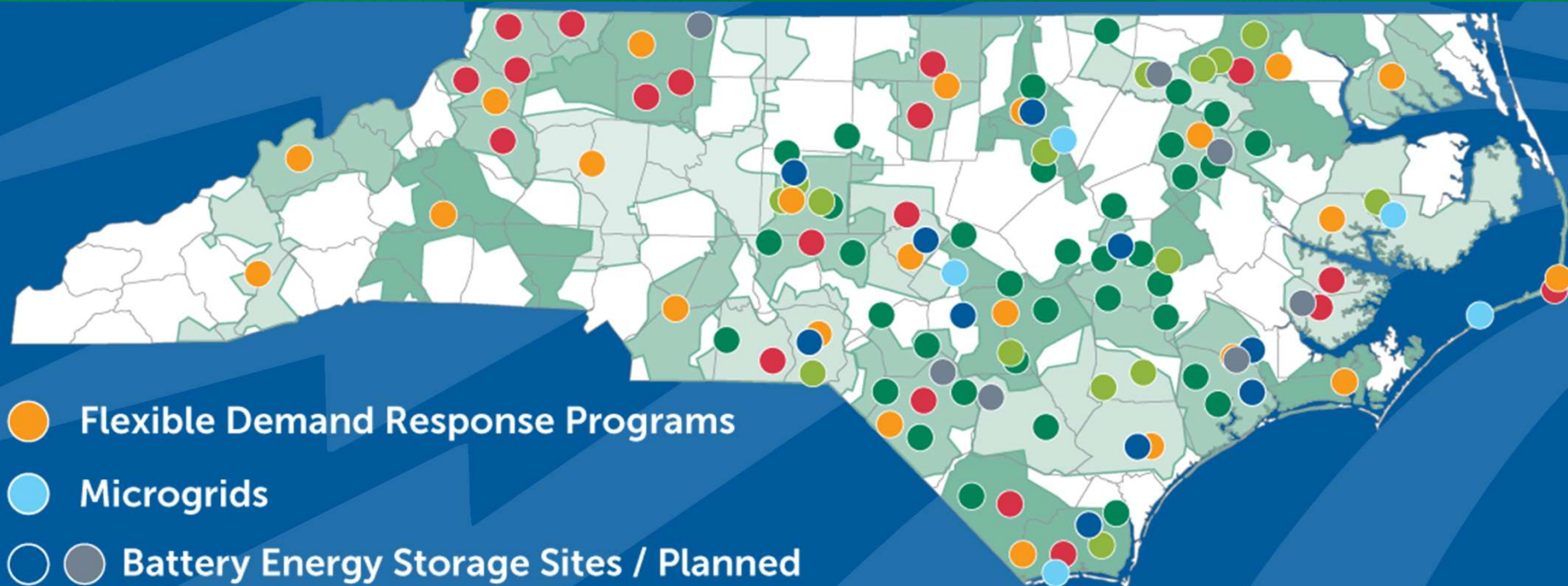
Households and businesses served by NC Electric Cooperatives

93

Counties we work in around the state of North Carolina

26

Distinct member-owned, not-for-profit cooperatives



Program Name	Connect to Save	Customer-owned Generation	Substation Batteries (BESS 1.0)
Eligible Customers and # Enrolled	Residential customers with central electric HVAC	Residential and C&I	Member co-op substations
End Use Equipment	Direct installed smart thermostat (Ecobee, Nest, or Honeywell)	Existing fossil-fired whole home or C&I scale generators	2 hour duration lithium-ion batteries: 2.5 MW/5 MWh and 5MW/10MWh
Dispatch Type	Utility	Utility	Utility
Grid Services Provided	Peak management, resource adequacy	Peak management, resource adequacy	Peak management, resource adequacy
Timing/Duration of Operation	Any day/time; two hour notice; +/- 3 degrees for 3 hours; pre-cooling / pre-heating used if available; max 6 events in a month; max 48 events per year	Any day/time; 1 hour notice; min duration 1 hour; max duration 8 hours; annual limit of 60 hours	~8 events per month. Nov to Mar 2 hour duration due to shorter system peak window. Apr to Oct 3 hour duration due to longer system peak window
Compensation and Penalties	\$50 annual gift card to customer if they opt out <=5 times	\$/kW-mo capacity payment to member co-op who then passes a portion to customer. Non-performance subject to claw back.	\$/kw-mo credit to member co-op host Additional credit paid based on MW reduction at time of monthly billing peak (aka performance credit).
Est Annual Results (kW, kWh, \$)	13,000 devices installed, avg load reduction 18 MW	64 MW load reduction	40 MW load reduction for 2 hours



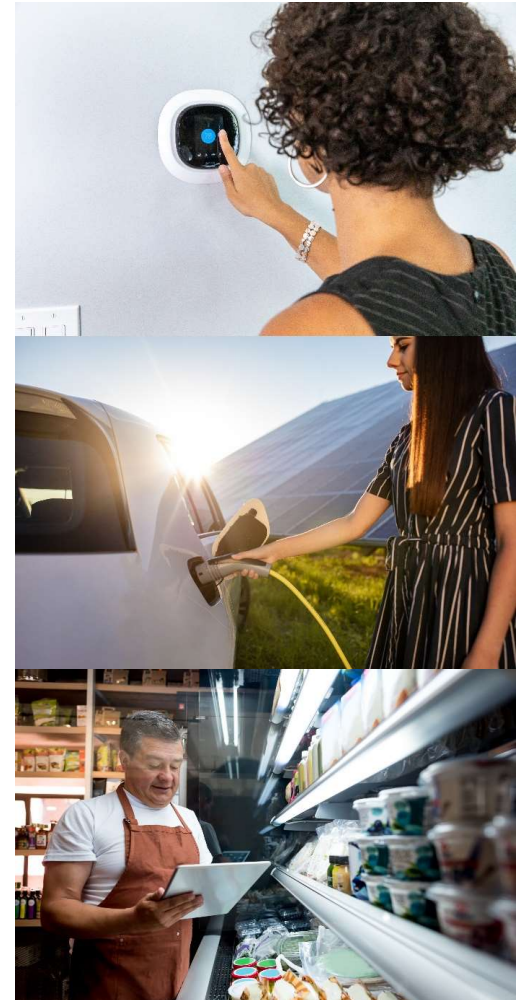
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APS Overview

Arizona's largest and longest serving utility, serving 1.3 million customers in 11 of Arizona's 15 counties

- **Balanced Resource Mix**
 - High penetration of rooftop and utility scale solar
 - Member of regional Energy Imbalance Market (EIM)
 - Customer sited resources provide up to 25% of total resource needs by 2035 (2020 IRP)
- **Successful Customer Adoption of TOU Rates**
 - >60% of residential customers have opted for TOU or TOU+Demand rates
- **Clean Energy Commitment**
 - Deliver 100% clean and carbon free energy by 2050 (currently >50% clean)
 - Clean, affordable, reliable and customer focused
- **Award Winning Portfolio of Customer DSM Programs**
 - Use multiple tools to drive demand flex (behavioral, rate responsive, direct dispatch DR)
 - Reduce peak, lower emissions, integrate renewables, load shift, pilot ancillary services
 - Customer centric delivery approach – drive value and ease of participation
- **DSM Portfolio Accomplishments**
 - Reported 322 MWs/354,000 MWhs savings, \$42 million in net benefits in 2022
 - National awards – AESP, ENERGY STAR, ESIG, PLMA, SEPA



APS Demand Flexibility Customer Programs

Program Name	Cool Rewards	Peak Solutions	Battery Pilot	Water Heater Controls	Energy Saving Days
Eligible Customers and # Enrolled	Residential 78,000 T-stats	C&I ~80 customer sites	Residential ~665 homes	SF/MF Residential ~2000 homes/apts	320K Residential voluntary opt out
End Use Equipment	HVAC/Smart T-stats	HVAC/Process/Misc	Batteries	Elec Water Heaters	Misc/All
Dispatch Type	DR events, EnergyHub	Customer responds to DR event calls	Rate response, DR events	Rate response, load management	Voluntary calls on peak days
Grid Services Provided	Peak demand, reliability	Peak demand, reliability	Load shifting, peak demand, solar integration, location, ancillary	Load shifting, peak demand, solar integration	Peak demand, reliability
Timing/Duration of Operation	Up to 20x/summer, 2-3 hour events	Up to 18x/summer, up to 5 hour events	Up to 100x/year, up to 4 hour events	Daily management around TOU rates	Up to 5x/summer, focused on peak
Compensation and Penalties	\$75 sign up, \$35/yr No penalties for opt outs	~\$40/kW + \$.09/kWh (PFP)	\$500/kW up to \$3750/home for 3- year commitment	Free device/install for MF properties	None
Est Annual Results (kW, kWh, \$)	123 MWs	52 MWs in 2022	< 1 MW	1 MW	5.5 MWs



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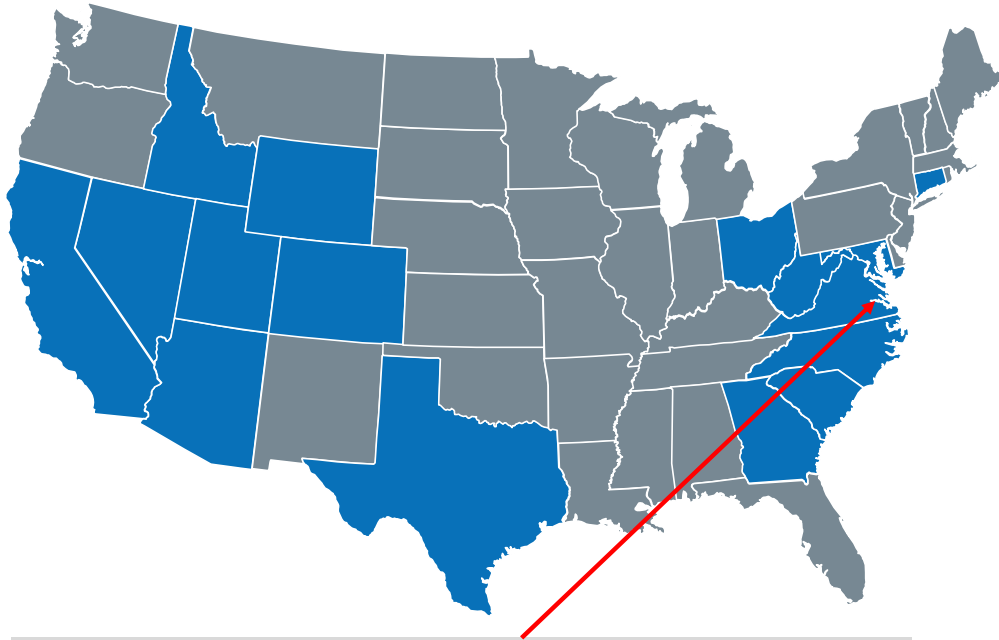
Dominion Energy

(Virginia and North Carolina)

Electric Demand Response Programs

7-17-23

Dominion Energy



Dominion Energy Virginia / North Carolina

- ~2.7M customers
- 20,600 MW of generation
- 66,000+ miles of power lines
- 10,000+ employees & contractors

Corporate

About Us

- Headquartered in Richmond, VA
- Operating in 16 states and serving more than 7 million customers with electricity or natural gas
- Committed to Net Zero emissions by 2050
- 2nd largest solar fleet in the U.S.

2022 Highlights

- ~\$1.4 billion spend with veteran, women, and diverse businesses
- Donated \$45 million in the communities where we operate
- Our employees volunteered 95,000 hours of their time

Residential Demand Response Programs



1 AC Cycling (Smart Cooling Rewards) **RECENTLY CLOSED**

- Cycling of HVAC units: 4-hour events, up to 30 events or 120 hours during summer months (June – Sept.)
- Enrollment: ~100,000+ customers. Final year ~54,500 participants.
- Incentive: \$40. Reduced to \$35 to maintain cost effectiveness.
- Operated: 2010-2022
- Results: Initial 1kW+/participant; final year diminished to 0.49kW

2 Wi-Fi Thermostat Demand Response

- Cycling of thermostat: 4-hour events, up to 45 events, must participate in 75% of hours called; focus summer months
- Enrollment: ~5300 (increasing dramatically with recent product additions)
- Incentive: \$35 first year; \$10 each year thereafter
- Results: 0.94 kW/participant (recent EM&V)

Residential Demand Response Programs



3

EV Demand Response

- Cycle qualifying EV Chargers (Internet connected and activated by manufacturer); 4-hour events; 45 max per year; 15 max per month
- Enrollment: 686 first year. Target of ~3600 over 15 years
- Incentive: \$40 annually
- Anticipated Results: 0.165MW to 1.67MW over 15 years

4

Water Savings (heat pump water heater)

- Cycling of water heater: 4-hour events, up to 45 events, must participate in 75% of hours called; focus summer months
- Enrollment: ~237 (recently launched). Range of 2,600 to 48,000 over 15 years
- Incentive: \$40 first year; \$10 each year thereafter
- Anticipated Results: 0.894MW to 23.6MW over 15 years

Commercial Demand Response Programs

1

Commercial Distributed Generation

- Curtailment load by operating backup generation; 4-hour events up to 120 hours
- Enrollment: ~21 customers
- Eligibility: minimum demand of 200kW with on-site backup generation
- Incentive: monthly customer payment (\$5.12/kW-month + fuel payment + variable O&M adder)
- Operated: 2012-present
- Results: 6.6MW

Programs Filed with Commission

1 **Peak Time Rebate** (pending approval; final order by Aug. 13)

- Enable residential customers to reduce energy consumption during peak periods. Alerts via text, email, voicemail, web notices. Post communications as well.
- Enrollment: 500,000 over 5 years
- Incentive: \$1.25/kWh saved; assumes 50% participation of customers per event; estimated \$28 per year for 10 events.
- Anticipated Results: ~2.5% energy reduction; estimated 195.6MW coincidental summer reduction by year 5

2 **EV Telematics Pilot** (pending approval; final order by Aug. 13)

- Cycle EV via car's telematics (only while home)
- Enrollment: Target of 1,000 customers
- Similar savings anticipated as EV Charger DR program



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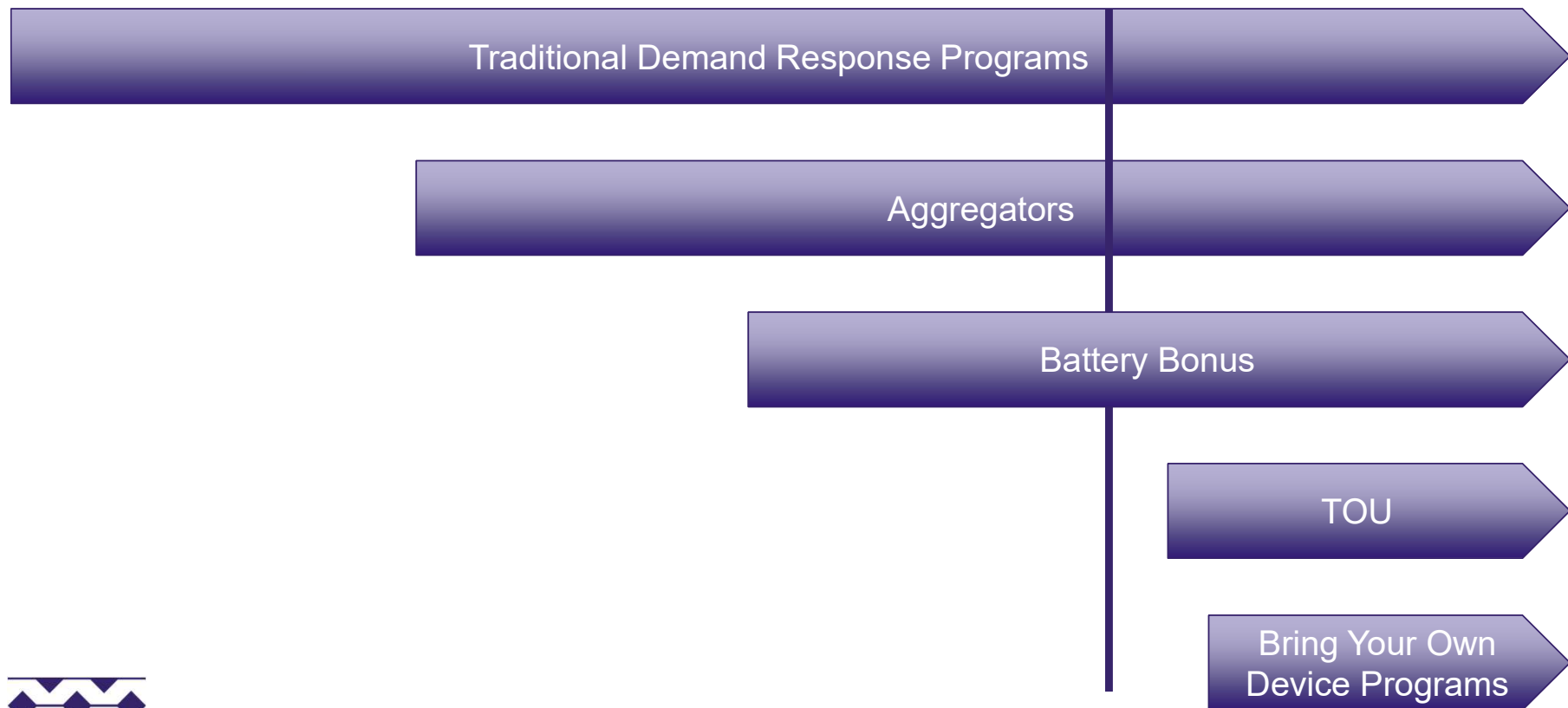
TOGETHER

BUILDING A STRONGER HAWAII



Hawaiian
Electric

Hawaiian Electric – Past , Present and Future



Traditional Demand Response Programs

	RDLC	SBDLC	CIDLC	Fast DR
Island	Oahu	Oahu	Oahu	Oahu / Maui
Customer Type	Residential	Small & Med Business	Commercial & Industrial (C&I)	C&I
# enrolled	33,000	160	30	30
Equipment Type	Water Heater, A/C	Water Heater, A/C	Industrial loads, generators	HVAC, pumps, batteries, generators
Dispatch	Utility – immediate	Utility – 1hr notification	Utility – 1hr notification	Utility – 10 min
Services Provided	Peak load reduction, Fast Frequency Response (FFR)	Peak load reduction, FFR	Peak load reduction, FFR	Peak load reduction
Duration	1 hour	1 hour	1 – 4 hours	1 hour
Compensation	\$3/mo – water heater \$5/mo – A/C	\$3/mo – water heater \$5/tonnage – A/C	\$5/kW - \$10/kW \$0.50/kWh	\$5/kW - \$10/kW \$0.50/kWh
Current status	13 MW	1 MW	11 MW	9 MW



DLC = Direct Load Control

Aggregators

	OATI, Swell	OATI, Swell	Swell
Island	Oahu	Maui	Hawaii
Customer Type	Residential, C&I	Residential, C&I	Residential
# enrolled	2,400 customers	400 customers	50
Equipment Type	Water Heaters, batteries	Batteries, water heaters	Batteries
Dispatch	Utility – immediate	Utility – immediate	Utility – immediate
Services Provided	Capacity Load Build, Load Reduction, and FFR	Capacity Load Build, Load Reduction, and FFR	Capacity Load Build, Load Reduction, and FFR
Duration	4 hours	4 hours	4 hours
Compensation	\$3 - \$13 /kW	\$3 - \$13 /kW	\$3 - \$13 /kW
Current status	3 MW	1 MW	0.2 MW



Battery Bonus Programs

Island	Oahu	Maui
Customer Type	All	All
# enrolled	3,900	500
Equipment Type	Batteries	Batteries
Dispatch	Scheduled everyday	Scheduled everyday
Services Provided	Peak load reduction (6-8pm)	Peak load reduction (6-8pm)
Duration	2 hours	2 hours
Compensation	\$850/kW (one-time) \$5/kW + export adj.	\$850/kW (one-time) \$5/kW + export adj.
Current status	12 MW (27 MW)	0.5 MW (4 MW)



Bring your own device (BYOD) programs

	Level 1 – Flexible User Dispatch	Level 2 – Utility Dispatch	Level 3 – System Grid Services Program
Island	Oahu, Hawaii, Maui, Lanai, and Molokai	Oahu, Hawaii, Maui, Lanai, and Molokai	Oahu, Hawaii, Maui, Lanai, and Molokai
Customer Type	All	All	All
# enrolled	0	0	0
Equipment Type	Batteries initially	Batteries initially	Batteries initially
Dispatch	Scheduled everyday	Utility – 24 hr notice	Utility – 24 hr notice
Services Provided	Capacity Load Reduction	Capacity Load Reduction	Capacity Load Build, Load Reduction
Duration	2 hours	1 – 2 hours	2 – 4 hours
Compensation	TBD	TBD	TBD
Current status	Program to start 11/1	Program to start 11/1	Program to start 11/1





Mahalo



Thanks for attending.
The next session begins
at 3:15 p.m.