



2023 CONSUMER SYMPOSIUM

FEB 6, 2023, SAN DIEGO

EMPOWERING CONSUMERS THROUGH THE ENERGY TRANSITION

#SECC2023

Co-located with *DISTRIBUTECH International*

Consumers Vs. the Grid

#SECC2023



Opinion **Dynamics**

Consumers vs. The Grid: Home Electrification

By Jordan Folks

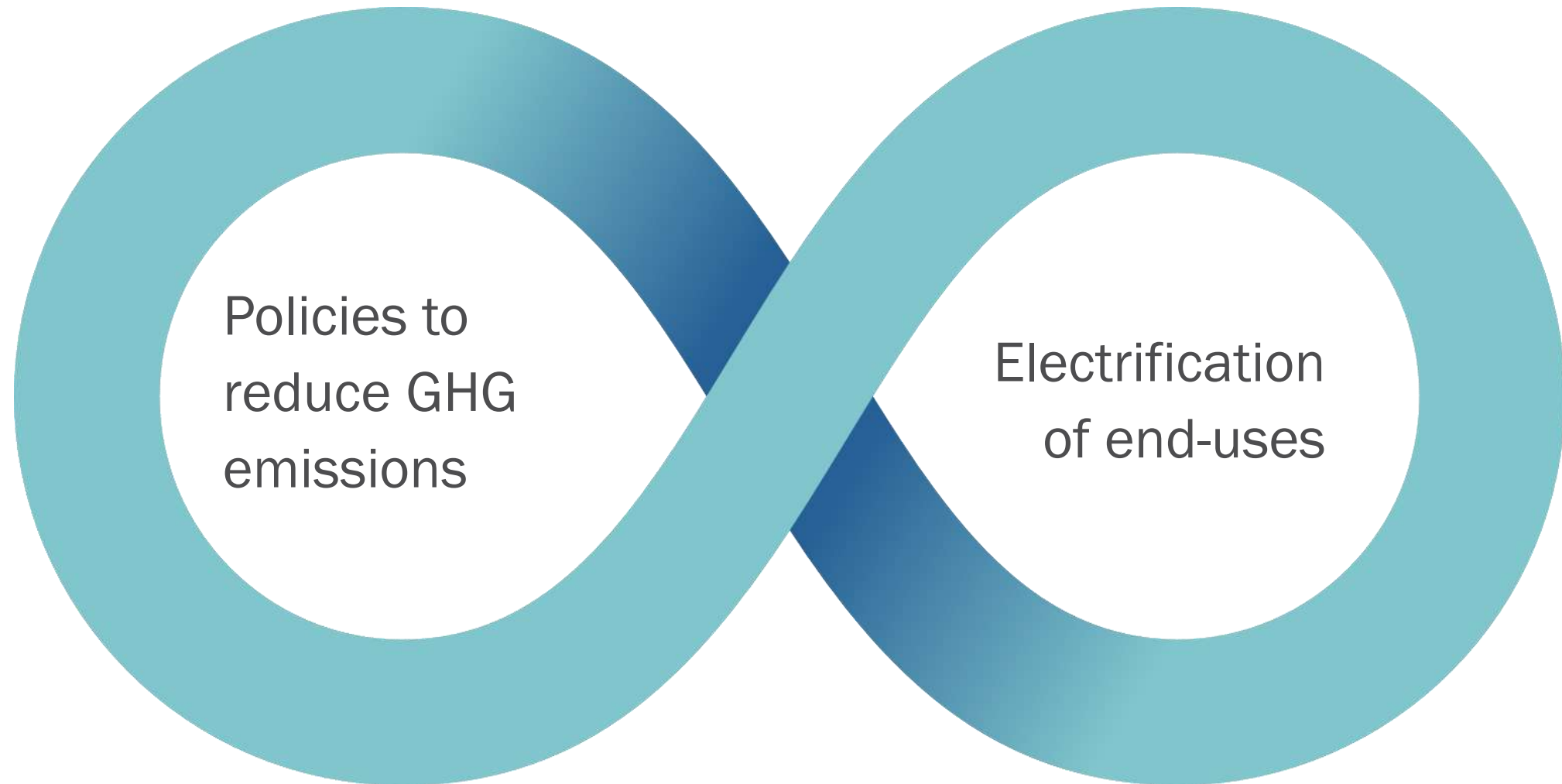
Associate Director

Presentation for Smart Energy Consumer Collaborative's
Consumer Symposium at DISTRIBUTECH International®

February 6, 2023



Electrification: A Panacea?



Heat Pumps to the Rescue!

Water heating

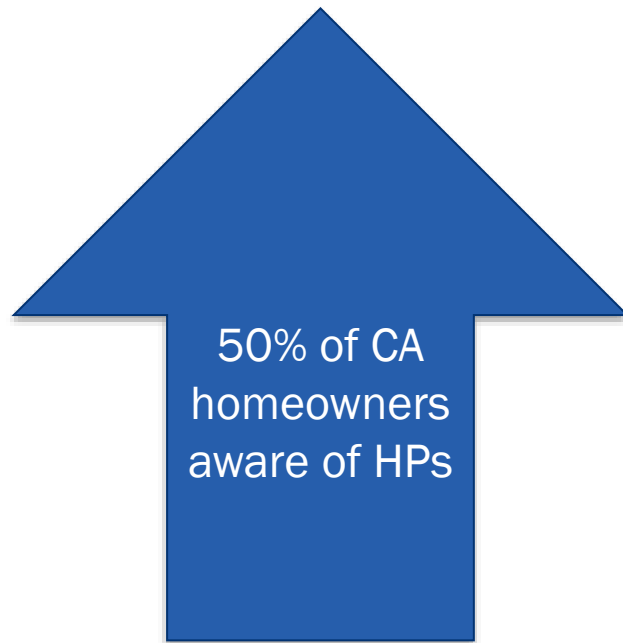


Space heating/cooling

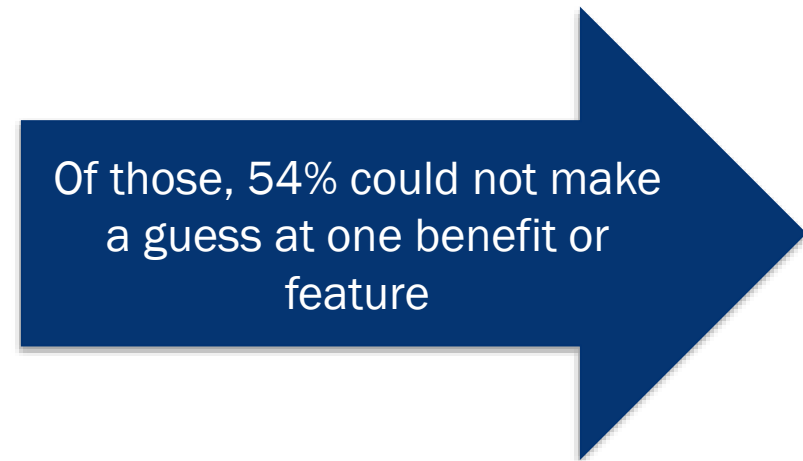


“Heat Pumps?” Never heard of them...

Growing Customer
awareness of HVAC Heat
pUmps



Still Very Limited
Awareness of HVAC Heat
pUmps





Opinion **Dynamics**



CUSTOMER MOTIVATIONS & BARRIERS

Heat Pump Purchase Motivators



Solar PV reduces operational cost



Indoor air quality, health, and safety



Reduce reliance on fossil fuels, help environment



Long warranties

“


“We hesitated for years to get A/C for our San Diego home. With rising temperatures and working from home, having A/C became a priority. To maximize our use of solar energy and reduce our carbon footprint, we went with the heat pump system.
– California heat pump customer

”



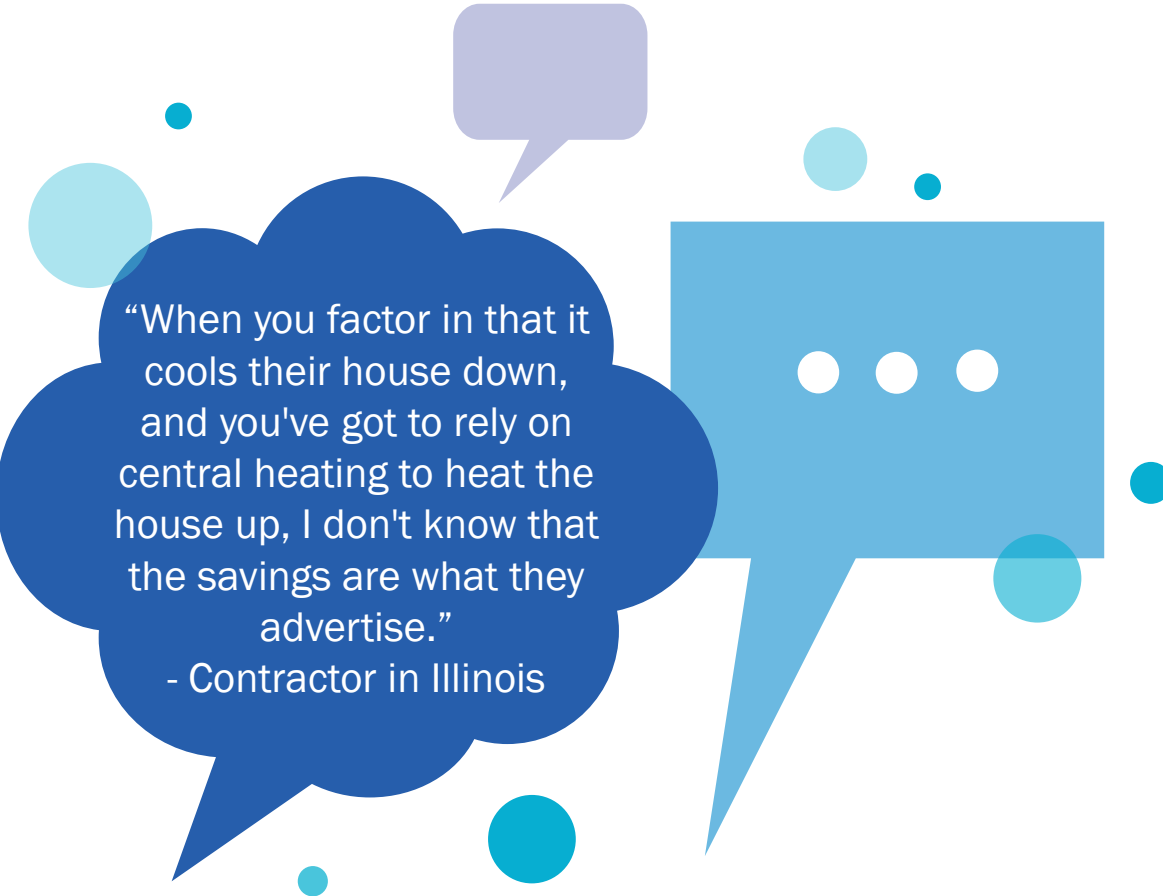
Concerns with HVAC Heat Pumps

- Upfront cost
- Increased utility bills/operational cost
- Unreliability of electric supply
- Perceived need for back-up heat
- Fears over short measure lifespan
- Space constraints for compressor
- Noisy operation
- Aesthetic concerns with DHP heads
- Adequate electric service / panel space



“The Western states do not experience our frigid temperatures. It's not life or death [for them]. Here, it is. Somebody could die if you don't have it right.”
- Contractor in Illinois

Concerns with Heat Pump Water Heaters



“When you factor in that it cools their house down, and you've got to rely on central heating to heat the house up, I don't know that the savings are what they advertise.”
- Contractor in Illinois

- Upfront cost
- Ambient space and temperature needs
 - Cools ambient space
 - Asset in CA garages
 - Bad in IL basements
- Slow recovery rate
- Adequate electric service / panel space

Biggest Resistance to Electrification is in Cooking



Preference
for gas



INDUCTION

Limited
awareness of
induction



Store & retailer
staff also
unfamiliar



Sufficient
electrical
capacity





Opinion **Dynamics**



CUSTOMER
ENGAGEMENT

Customer Engagement Strategies

- Generous rebates and incentives
 - Led to oversubscription of HVAC HP programs in NY, CO, CA
- Contractor sales training
 - Can be effective sales agents to customers
- Loaner programs for induction burners
 - From libraries, utilities, or local governments



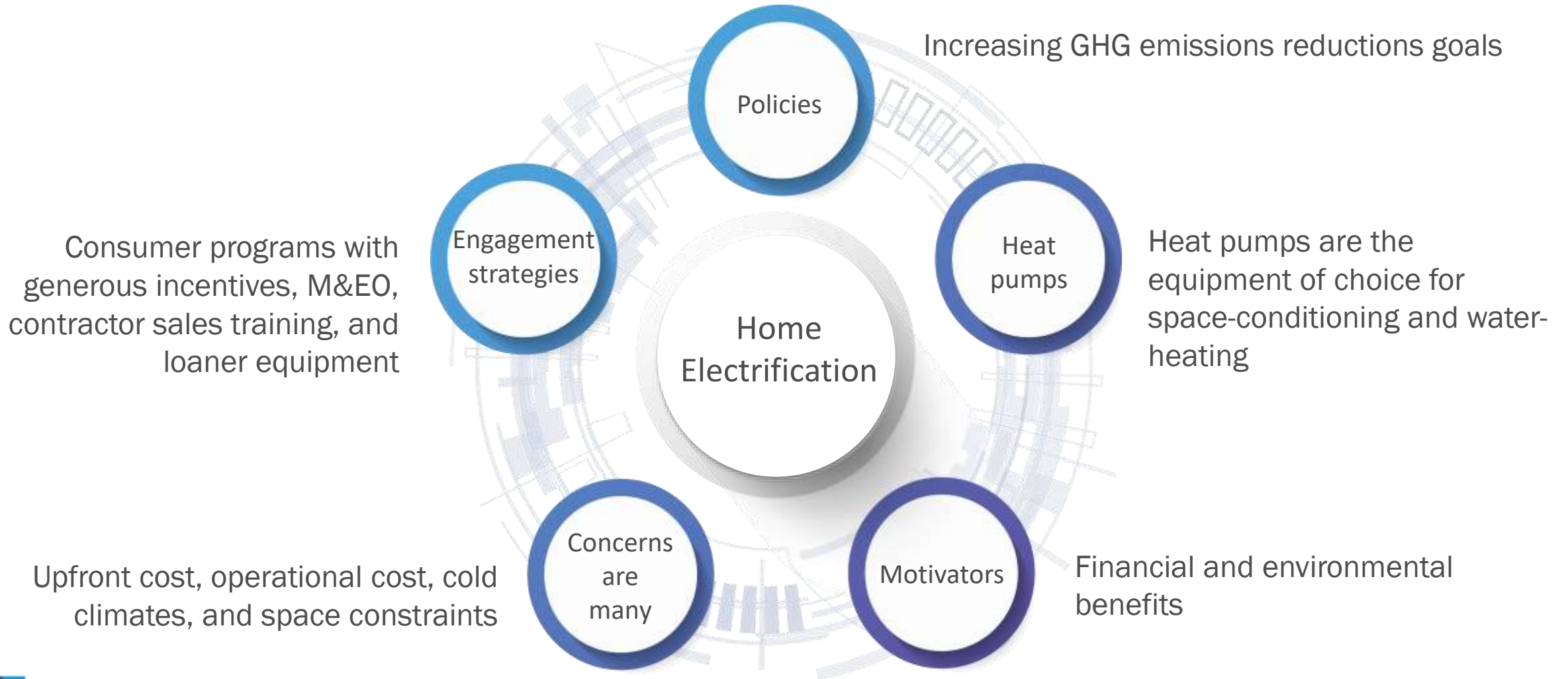


Opinion **Dynamics**



SUMMARY

Summary of Customer Context with Home Electrification





Opinion **Dynamics**

Jordan Folks

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Orchestrating DERs at SMUD

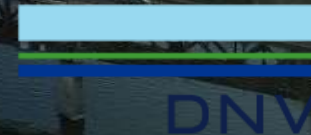
SMUD's My Energy Optimizer DER Programs

February 6, 2023

Charlie Buck
Sr. Business Planner, Load Flexibility
SMUD

Chelsea Liddell
Sr. Data Scientist
DNV

Powering forward
Together





Agenda

- SMUD 2030 Zero Carbon Plan
- Current DER Efforts
- MEO Partner Design
- MEO Partner 2022 Results
- Looking Ahead: Challenges and Thorny Questions for the DER Industry

About SMUD

We're Community-Owned and Not-For-Profit




1.5
million
in our service area

900
sq. miles
service area

Customers
residential + business:
628,952
(as of Dec. 31, 2017)

Number of SMUD
employees:
2,293



10,473 miles
of power lines we own



SMUD's Zero Carbon 2030 Vision



1st CA utility to reach 20% eligible renewable energy.

2010



33% renewable energy with 50% carbon-free – cleaner than most U.S. utilities

2020



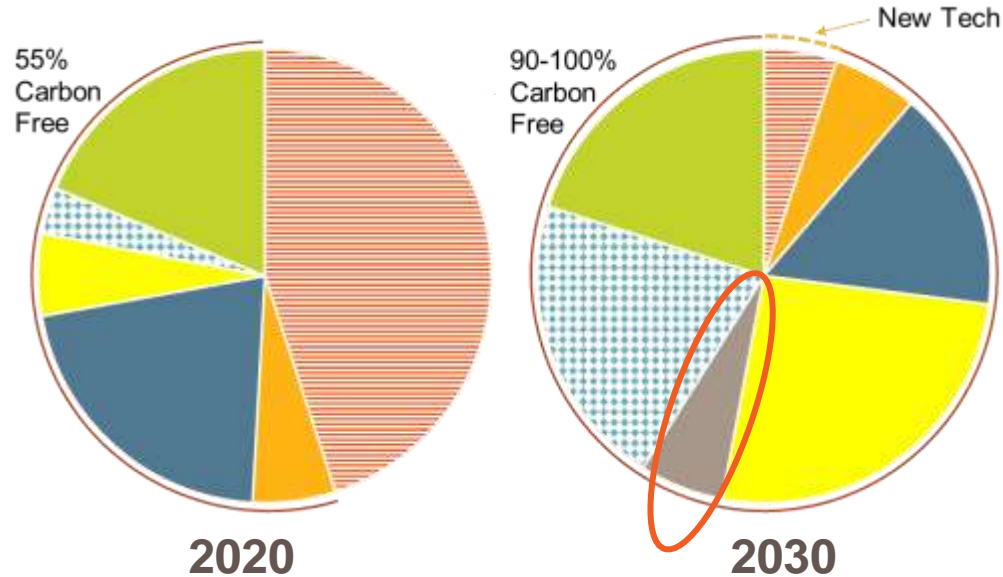
100% zero carbon – most ambitious goal of any large utility in the U.S.

2030



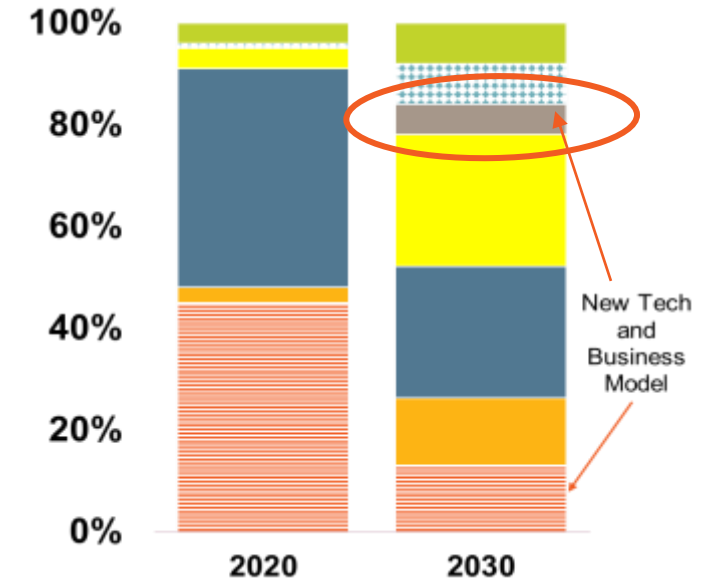
DERs and SMUD's 2030 Zero Carbon Plan

Energy



Capacity

(to serve peak load)



Current SMUD DER Efforts

- Multi-DER Virtual Power Plant
- Vehicle to Grid & EV Managed Charging
- Storage Based Virtual Power Plant
- Heat Pump Water Heater Pilot



My Energy Optimizer Partner Level

Who?

~15,000 residential customers by June 1, 2023.

Smart Thermostats.
Battery storage will be added in 2023.
EV Chargers TBD

What?

How much?

Thermostats: \$25 upon enrollment + end of season gift \$25 + CPP (select customers)
Storage: \$150/kWh (\$1,500 max) upon enrollment + CPP

Storage lead generation launched 3/1 alongside the Solar & Storage Rate.
Thermostat soft launched April 22.
Peak Events & CPP recruitment launched July 1.

When?

Peak Event Details

Total
Devices
Enrolled

6,807 devices enrolled during final Peak Event.

Events

15 Peak Events totaling 47 hours were delivered.

Season

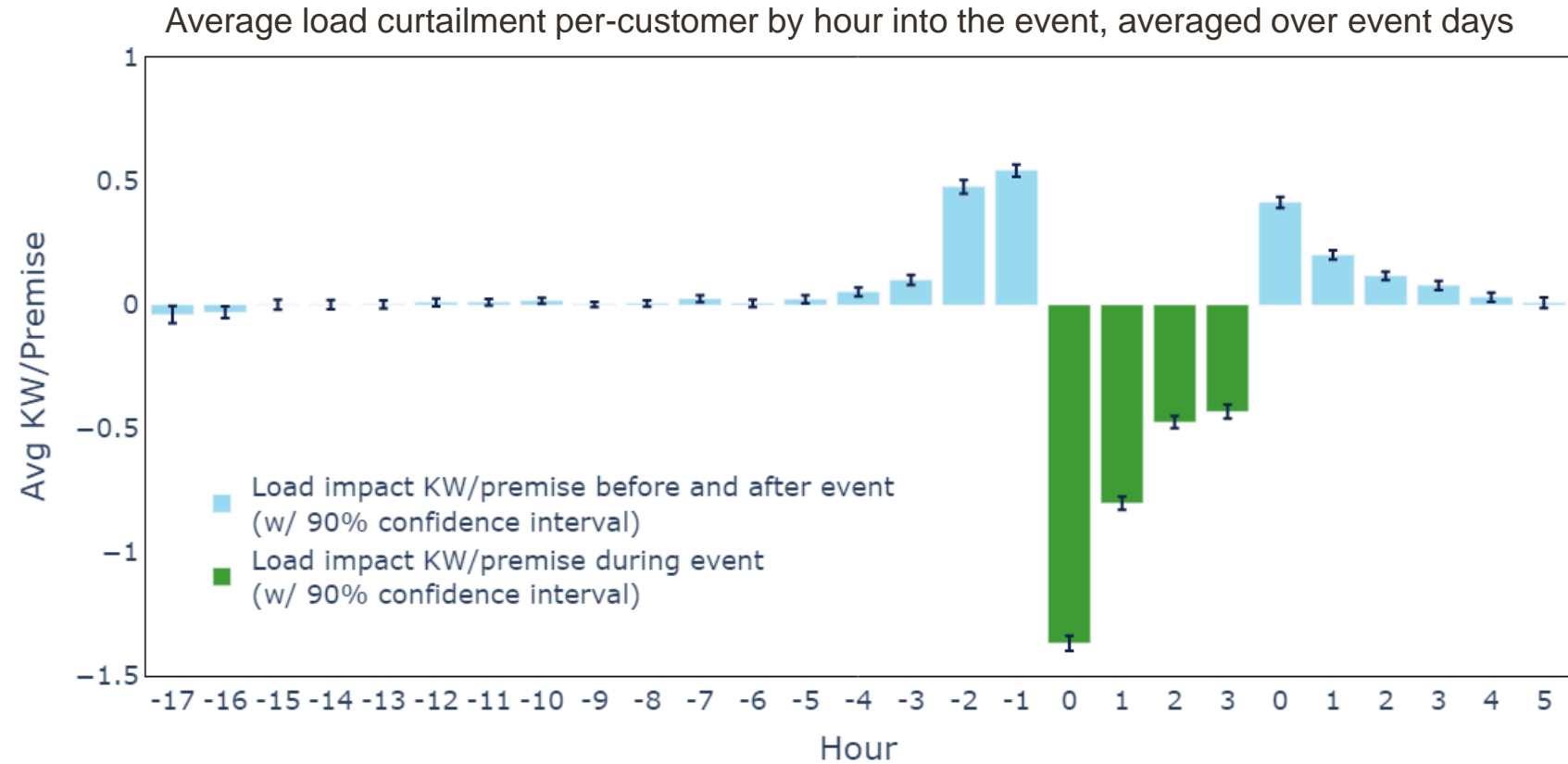
15 Peak Events were delivered in less than 2 months.

Opt
Outs

Average opt out rate 23.6%.

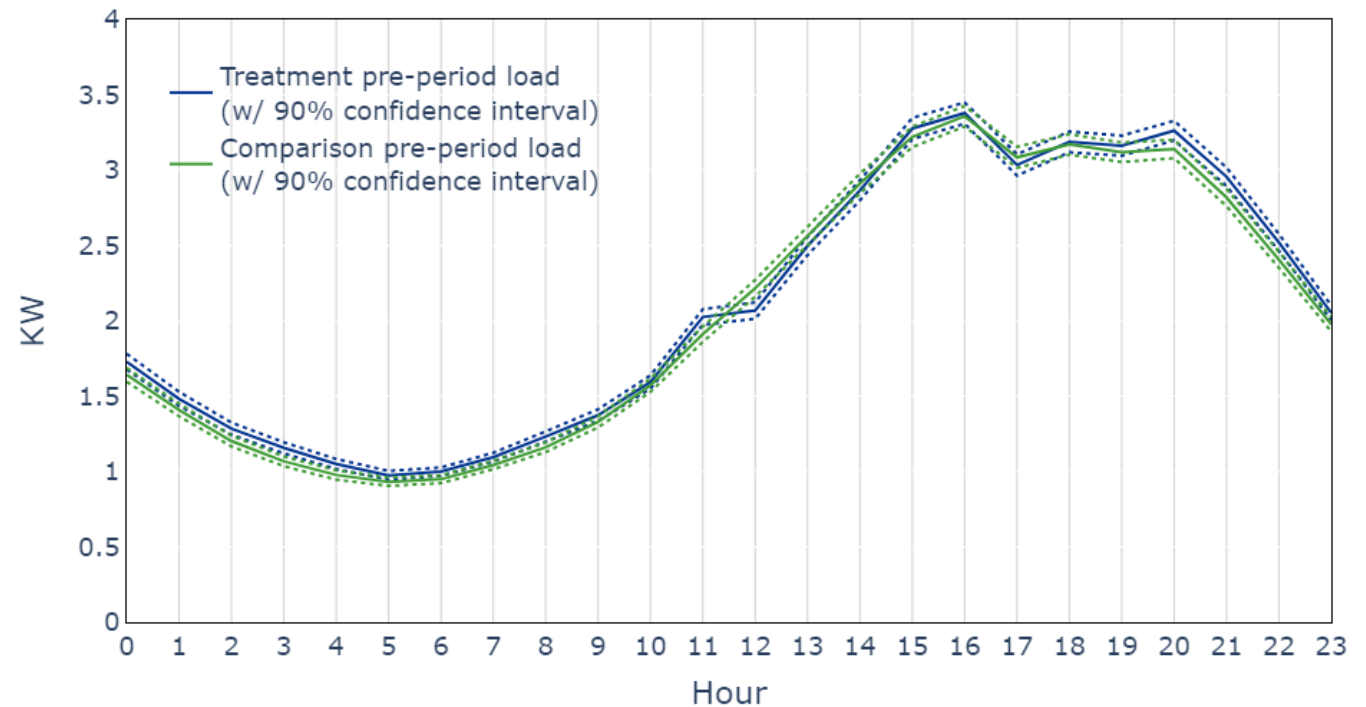
My Energy Optimizer Partner 2022 Results

- Average Peak Reduction: 0.86 kW/participant
- Total MW (avg): 3.71
- Significant drop-off (69%) from Hour 1 to Hour 4: 1.37 kW to 0.43 kW



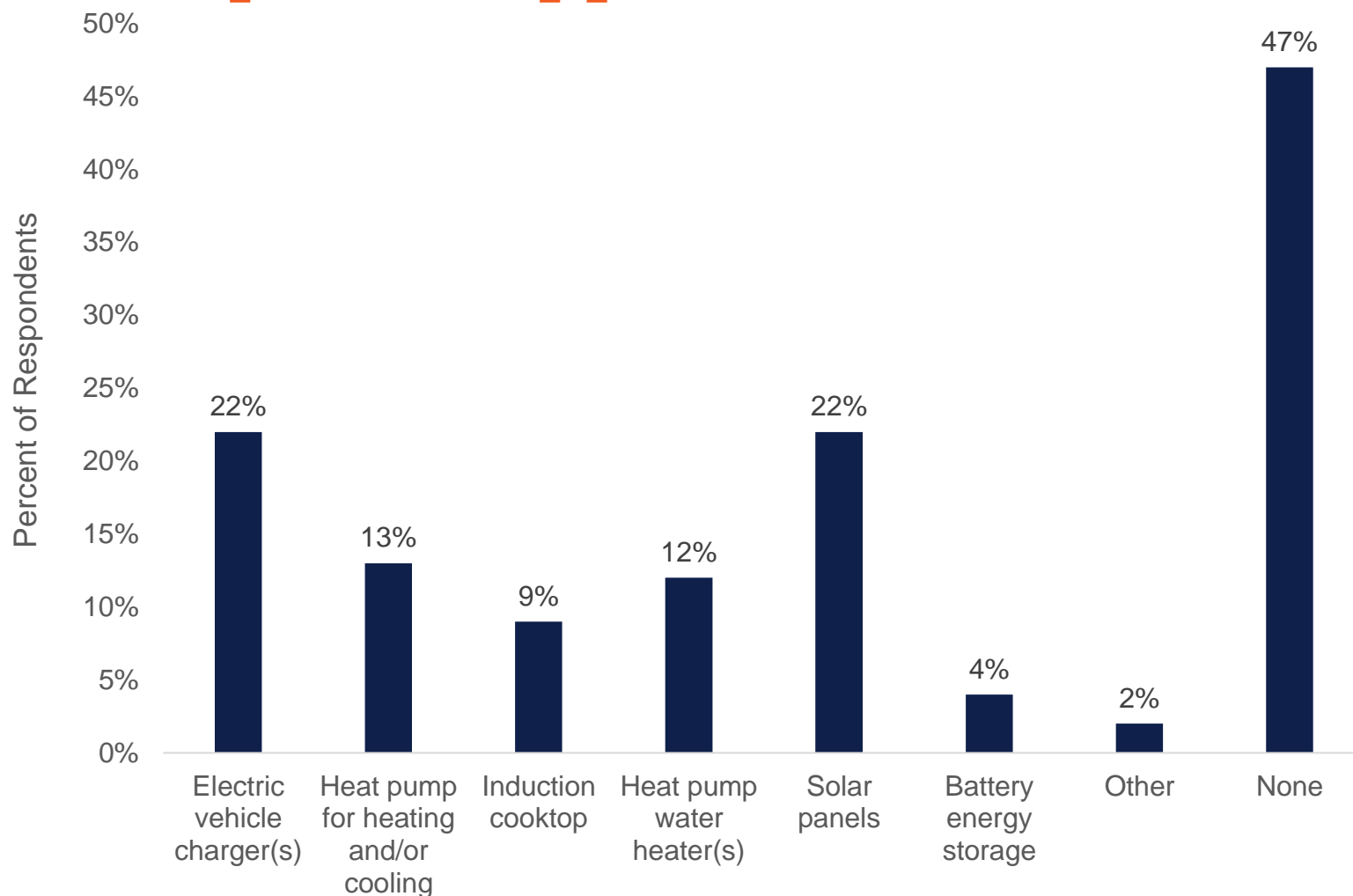
Advanced Methods Mean More Participants

- SMUD wants all willing customers to participate
- Usually accurate evaluation requires a control group that does not change behavior
- A matched control group allows accurate evaluation while allowing all willing customers to fully participate



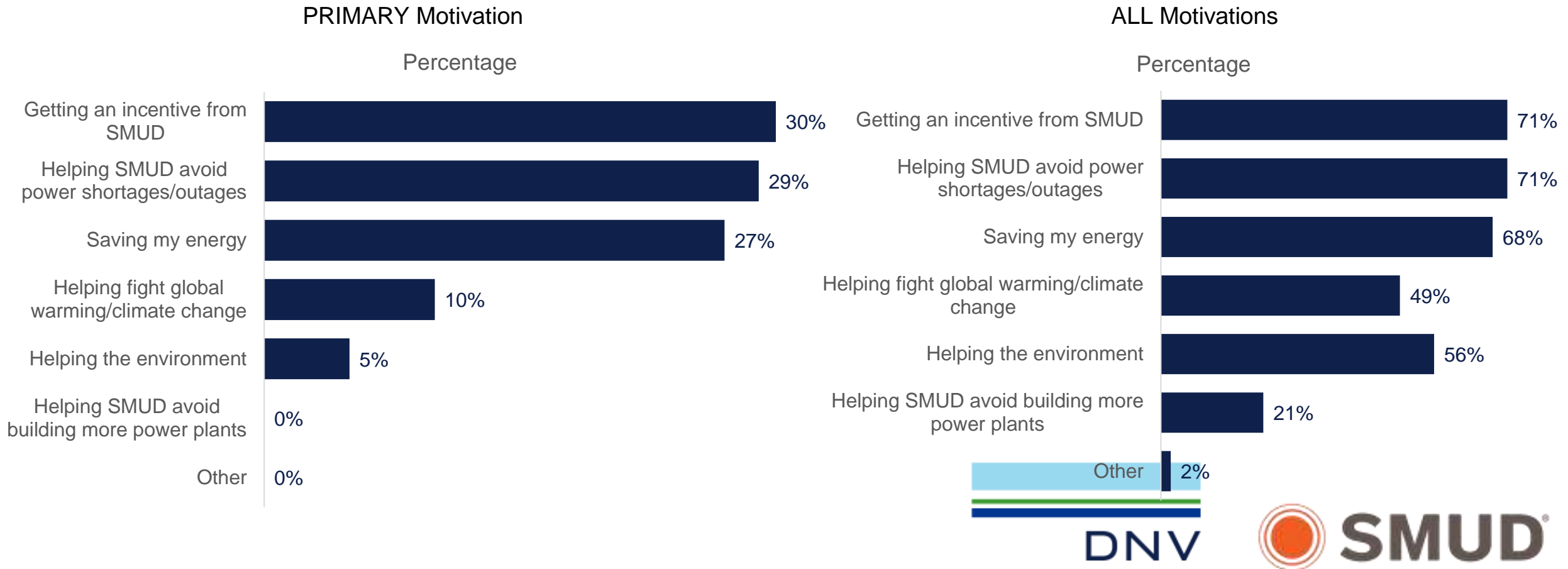
Early Adopters Present Multiple DR Opportunities

- Many early thermostat DR participants also have other technologies with DR potential
- They tend to be early adopters of these technologies
- For example 22% of year one thermostat program participants have EVs, as compared to about 2-3% of Sacramento households
- Opportunity for additional participation



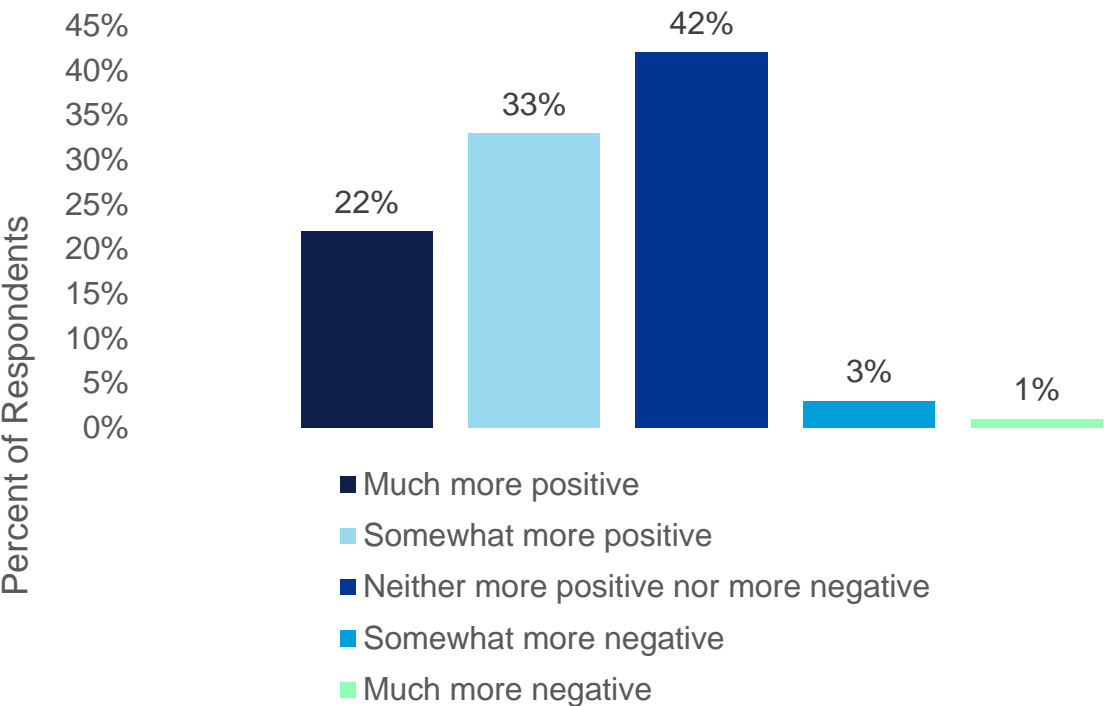
Incentives Are Only Part of Customer Motivation

- Many customers had motivations other than receiving incentives.
- Possible bias in responses, but still...
- Likely opportunity for participation with lower incentives

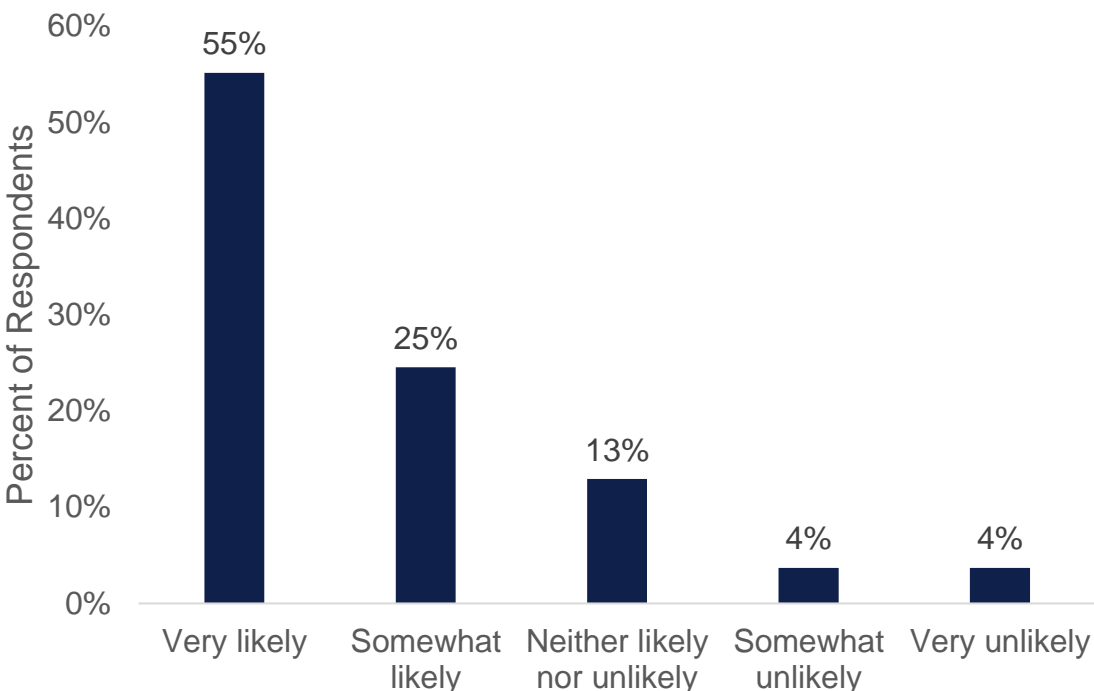


Customers Happy with Participation

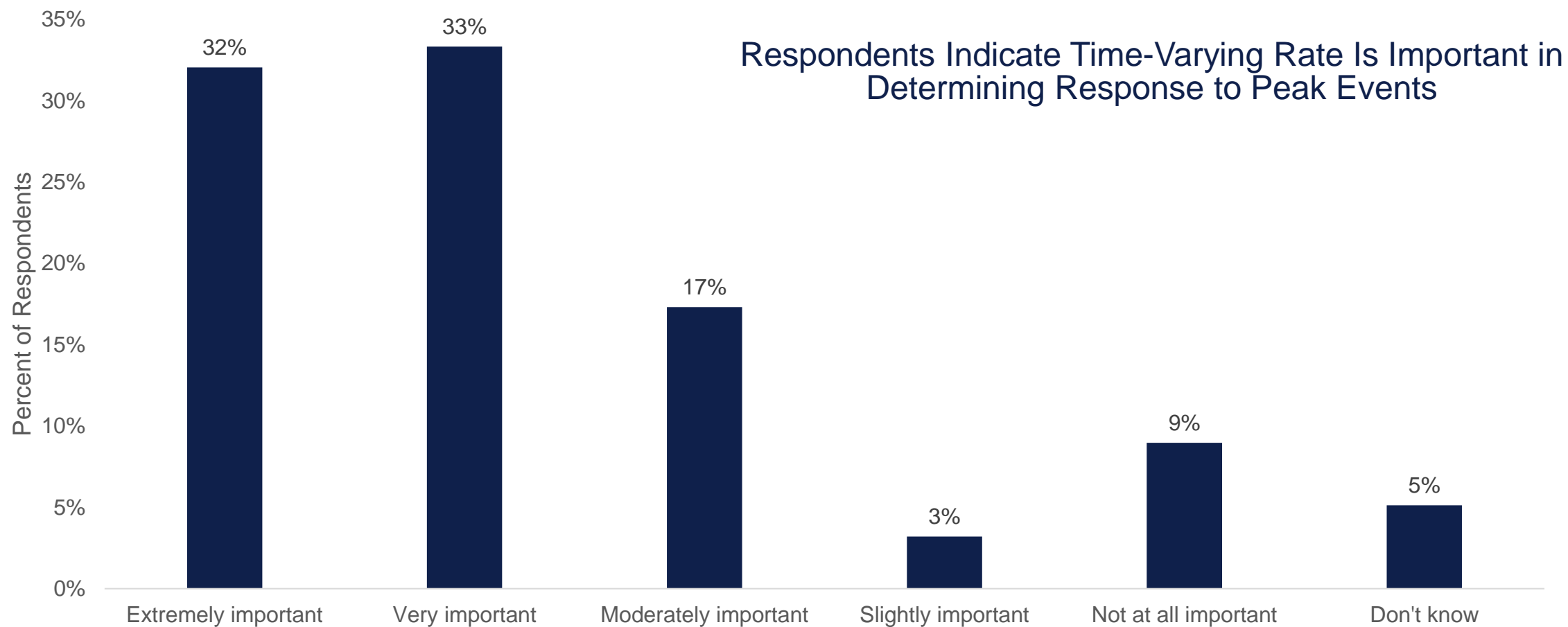
Opinion of SMUD Following Program Participation



Likelihood to Recommend Program to Someone Else



Time-Varying Rate Important for Event Response



DER Aggregation Challenges

1

Functionality

Rumors of market maturity have been mildly exaggerated. Orchestration underdeveloped.

2

OEM/Vendor Relationships

Diversity of OEMs necessitates multiple vendors to cover entire market

3

Cost-effectiveness

Current aggregator and incentive costs reduce or negate utility procurement savings from DERs

4

Internal Alignment

DERs require unprecedented collaboration across utility departments

5

Shifting Value Proposition

From bulk RA avoidance to granular distribution investment deferral



Big Picture Questions for the DER Industry

- How do we compensate DER customers cost-effectively?
 - Upfront incentives
 - Ongoing payments for performance
 - *Rate/pricing-based compensation (e.g. CPP, RTP)
- How do we truly treat DERs as a resource in the *real* world?
 - Reliability (resource firmness) and predictability (e.g. forecasting)
 - Today: Avoid resource adequacy purchases (still nascent)
 - Tomorrow: distribution investment deferral (mostly theoretical)
- How quickly can the DER industry develop the needed capabilities?
 - Gap between industry capabilities and thought leadership
 - Software community needs to step up
- What is reasonable to ask of customers, and what's too much?



Questions?



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Together.





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