NASEO National Association of State Energy Officials

NATIONAL ASSOCIATION OF REGULATORY UTILITY COMMISSIONERS DEDICATED TO PUBLIC SERVICE 1889

DER INTEGRATION & COMPENSATION INITIATIVE

WEBINAR #3: COMPENSATION OPTIONS FOR AGGREGATED DER GRID SERVICES

January 8, 2024

Problem Statement

Current and anticipated growth of distributed energy resources (DERs) and introduction of aggregated DERs into wholesale markets as a result of Order 2222 is fundamentally changing the way the grid is planned and operated.

Policy makers and regulators will increasingly need to evaluate, consider, and establish the rules and requirements as well as enabling policies and programs to bring these resources online safely and fairly to provide retail and wholesale services.

New myriad technical and economic issues will require new information and tools to make informed decisions related to the connection, technical operation, and compensation of aggregated distributed energy resources---in the distribution, bulk power system, and wholesale energy markets.

DER-I&C Initiative Description

Convene and support state members to understand the impact of their decision making related to the connection, operation, and compensation of aggregated DERs.

NARUC and NASEO will provide information, tools, access to experts, and peer sharing opportunities that assist members with FERC Order 2222 implementation in RTO/ISO regions and State oversight of transmission-distribution-customer (TDC) coordination outside of RTO/ISO regions.

Objectives:

- Inform key state decision makers
- Raise and evaluate risks and opportunities of different decision options
- Bring different perspectives to the table

Advisory Group:

An advisory group of 10 NARUC and NASEO members representing diverse regional perspectives help guide the project.

Curriculum Design 2023-24

The DER I&C Initiative 2023-24 curriculum is designed around three sequential modules

DER I&C
Aggregated DERs

Module 1 – The modern landscape
Learn best practices & lessons from what's being done today

Dec '23 - Jan '24

Module 2 – Hot topics
Collectively explore cutting-edge applications

First Half 2024

Module 3 – Deep dive
Advance a pressing topic through intentional collaboration

Second Half 2024

Module 1: The Modern Landscape

Learn best practices & lessons from what's being done today

Module 1 begins with **three webinars** in December 2023 and January 2024:

- Webinar 1: Aggregated DER Grid Services, December 4, 2023
- Webinar 2: Aggregated DER Valuation, December 18, 2023, 3:00-4:30pm ET
- Webinar 3: Compensation Options for Aggregated DER Grid Services, January 8, 2024, 3:00-4:30pm ET
    - Moderator: Commissioner Riley Allen, VT PUC
    - Expert: Travis Kavulla, NRG
    - Panelist: Pete Polonsky, Hawaii PUC
    - Panelist: Carmen Best, Recurve

All Registrations and Recordings at: **www.naruc.org/cpi-1/energy-distribution/der-integration-compensation/**

Today’s Agenda

<u>Objective</u>: Provide an overview of various compensation approaches, including their strengths and weaknesses, such that decision-makers can evaluate which approaches are best aligned with their context and objectives.

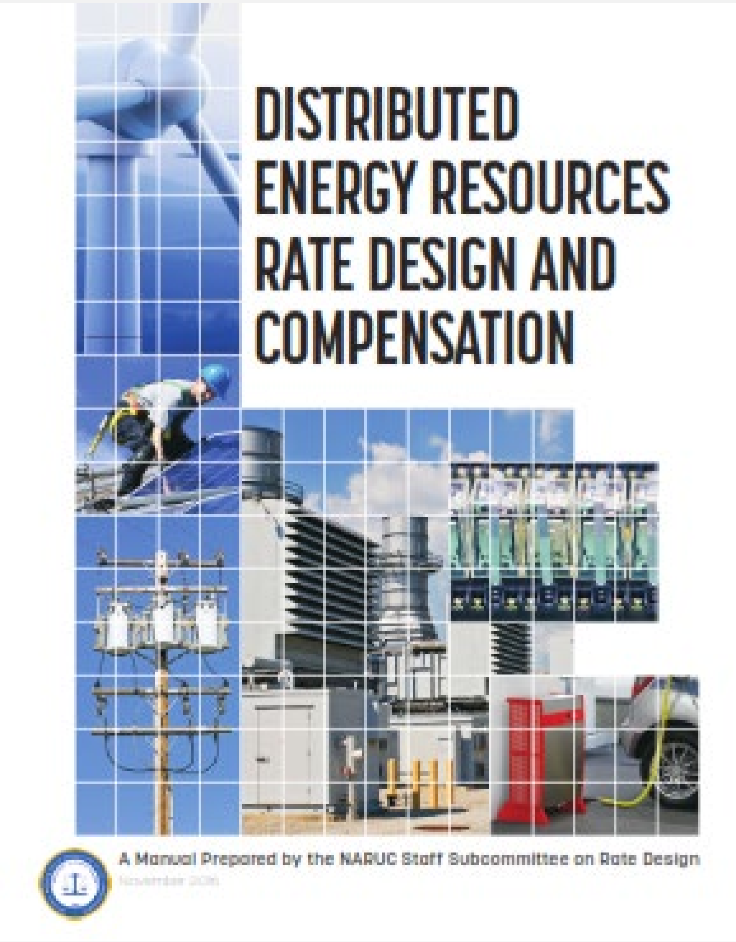
Time (ET)	Agenda
3:00-3:10pm	Welcome and DER I&C initiative Opening remarks: Moderator, Commissioner Allen (VT)
3:10-3:35pm	Presentation on Compensation Options of ADER Grid Services: Travis Kavulla, NRG Q&A
3:35-3:55pm	Panelists: • Pete Polonsky, Hawaii PUC • Carmen Best, Recurve
3:55-4:25pm	Moderated and audience Q&A
4:25-4:30pm	Closing

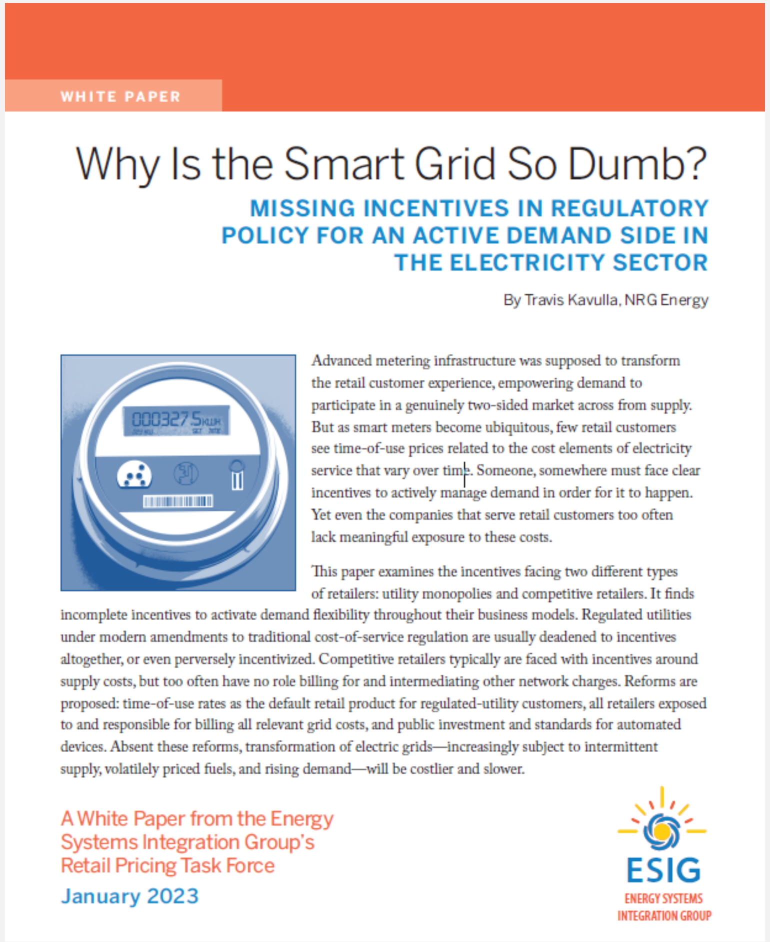
Perspectives on Compensating DER Aggregations

Travis Kavulla
Vice President of Regulatory Affairs, NRG

DER Integration & Compensation Initiative
NASEO & NARUC Jan 8, 2024

Not the First Rodeo…




WHITE PAPER

Why Is the Smart Grid So Dumb?

MISSING INCENTIVES IN REGULATORY POLICY FOR AN ACTIVE DEMAND SIDE IN THE ELECTRICITY SECTOR

By Travis Kavulla, NRG Energy

Advanced metering infrastructure was supposed to transform the retail customer experience, empowering demand to participate in a genuinely two-sided market across from supply. But as smart meters become ubiquitous, few retail customers see time-of-use prices related to the cost elements of electricity service that vary over time. Someone, somewhere must face clear incentives to actively manage demand in order for it to happen. Yet even the companies that serve retail customers too often lack meaningful exposure to these costs.

This paper examines the incentives facing two different types of retailers: utility monopolies and competitive retailers. It finds incomplete incentives to activate demand flexibility throughout their business models. Regulated utilities under modern amendments to traditional cost-of-service regulation are usually deadened to incentives altogether, or even perversely incentivized. Competitive retailers typically are faced with incentives around supply costs, but too often have no role billing for and intermediating other network charges. Reforms are proposed: time-of-use rates as the default retail product for regulated-utility customers, all retailers exposed to and responsible for billing all relevant grid costs, and public investment and standards for automated devices. Absent these reforms, transformation of electric grids—increasingly subject to intermittent supply, volatilely priced fuels, and rising demand—will be costlier and slower.

A White Paper from the Energy Systems Integration Group's Retail Pricing Task Force

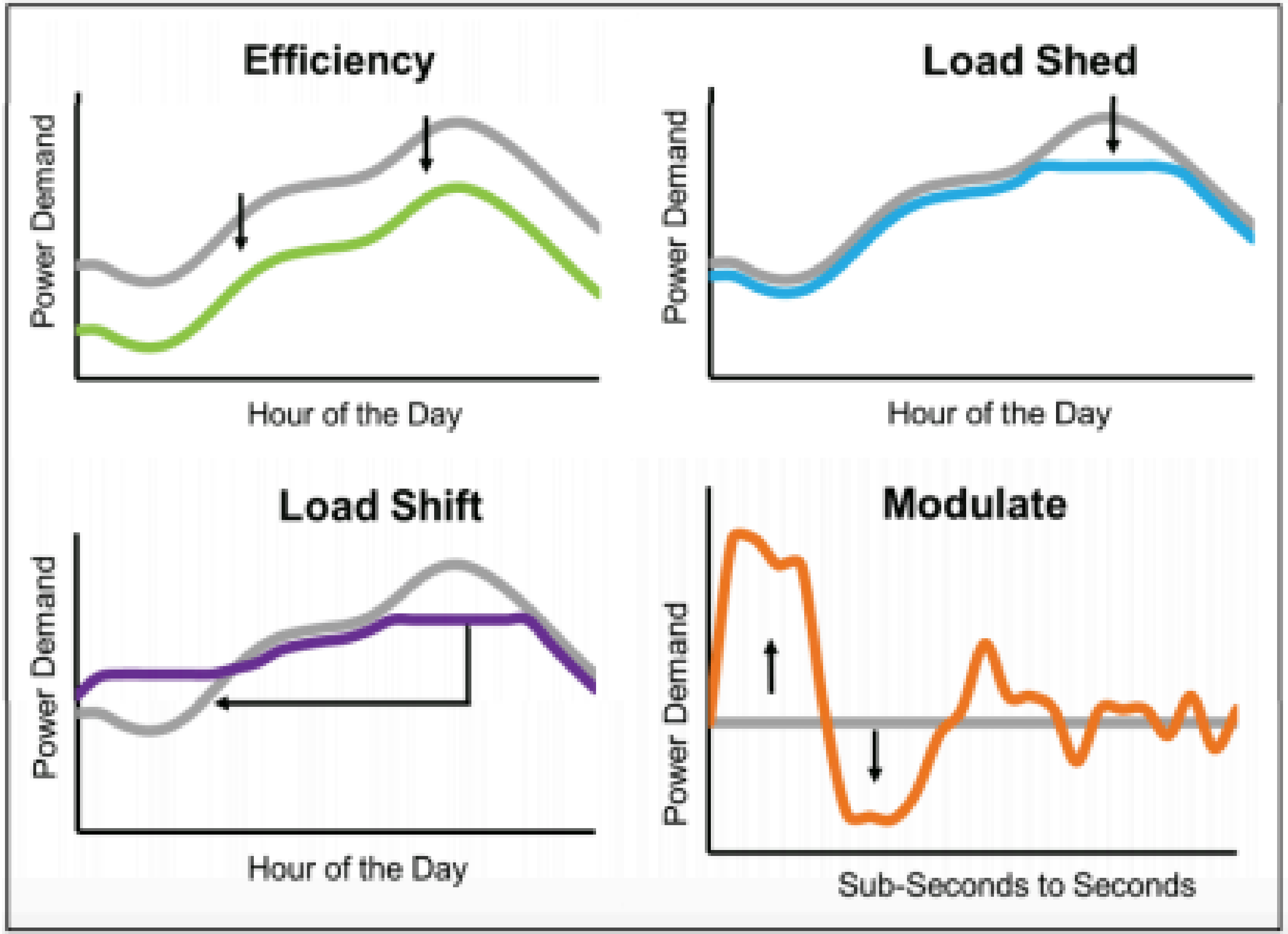
January 2023

ESIG ENERGY SYSTEMS INTEGRATION GROUP

Prices vs. Programs

- The idea that *changing the shape of demand over time* is a worthwhile undertaking for a consumer at all depends on *supply prices that vary over time*
  - Prices in the wholesale market are usually time-variable (e.g., energy & ancillary services) or demand-based (capacity & transmission)
  - Prices in retail market are often flat—they don't reflect the underlying cost characteristics of the wholesale market. But that is slowly changing…
- If ADER doesn't have access to 'Prices', then a regulator/utility can manufacture an indirect way to convey value for DERS' demand-shaping services: A 'Program'

Ways in which DERs can shape demand on the grid

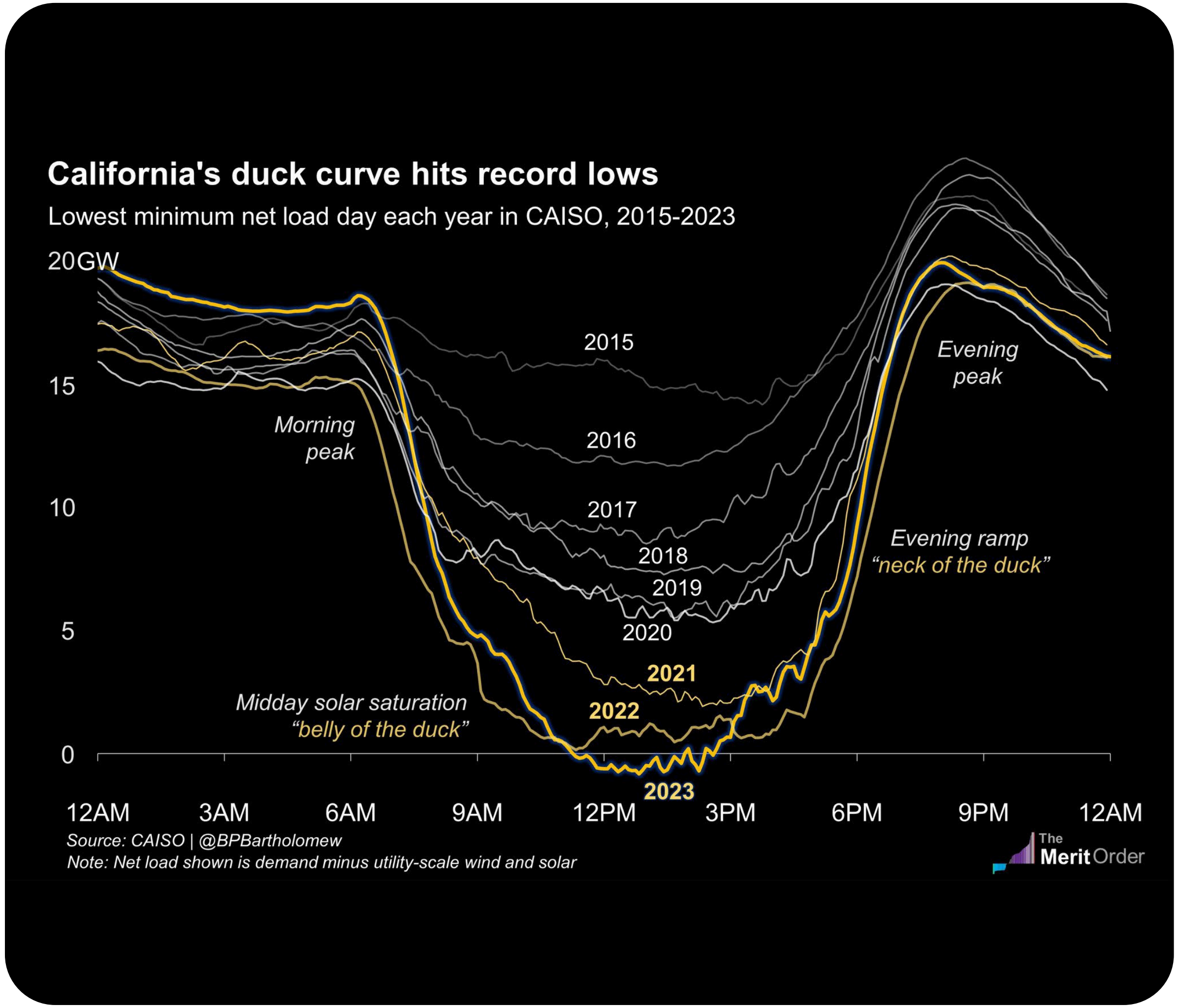


Source: U.S. Department of Energy

Supply Growing More Volatile and Peaky, as Demand Grows …Will Prices Reflect That?

Demand side of market has increasingly obvious role to play

- "Retail rate design reduces the amount of capacity procured and triples the capacity contribution of solar in the electrification scenario."
  - PJM, Energy Transition in PJM: Emerging Characteristics of a Decarbonizing Grid (May 17, 2022)
- "The Pilot results indicated that customers, both overall and low- and moderate-income customers specifically, responded to the rate by shifting usage off-peak … by 9.3 percent to 13.7 percent in the summer months and by 4.9 percent to 5.4 percent in the winter months."
  - Staff, MD PSC, Re: PC44 Rate Design Work Group Leader's Report and Recommendations on Full-Scale Time of Use Rate Offerings (June 3, 2022)
- New York's Climate Leadership Council estimates a $41B cost to deep decarbonization with 'uncontrolled' electrification -- $28B with efficient rate design



Prices:
Retail Rates & Wholesale Markets

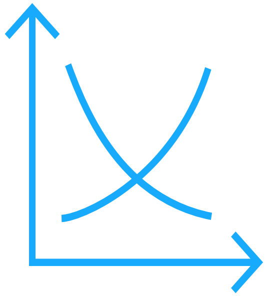
So What Are ‘Prices’?

Retail rates are prices

Ratemaking a process by which to collect a utility’s embedded cost structure

A century-old problem in utility regulation is how to align rates more to marginal cost to allow demand to participate

In places with retail competition, the supply portion of the bill is not subject to ratemaking & marginal-cost principles apply



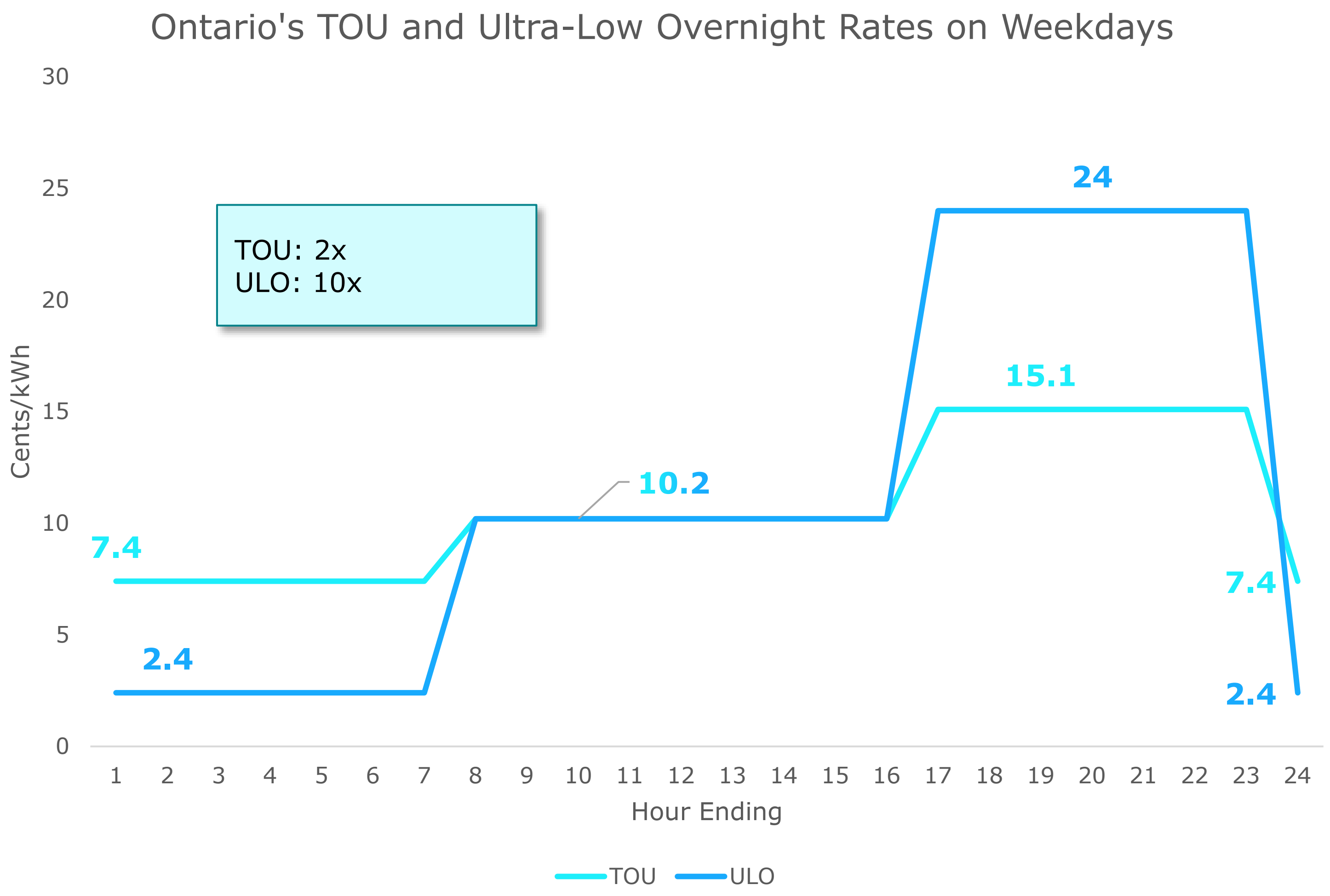
Wholesale markets set price by auction, bilateral trade, or ratemaking

RTO energy auctions and bilateral trading usually are reflective of marginal costs

Transmission rates for wholesale service are based on embedded cost of service but are usually demand-based (e.g., billed based on a transmission customer’s peak demand)

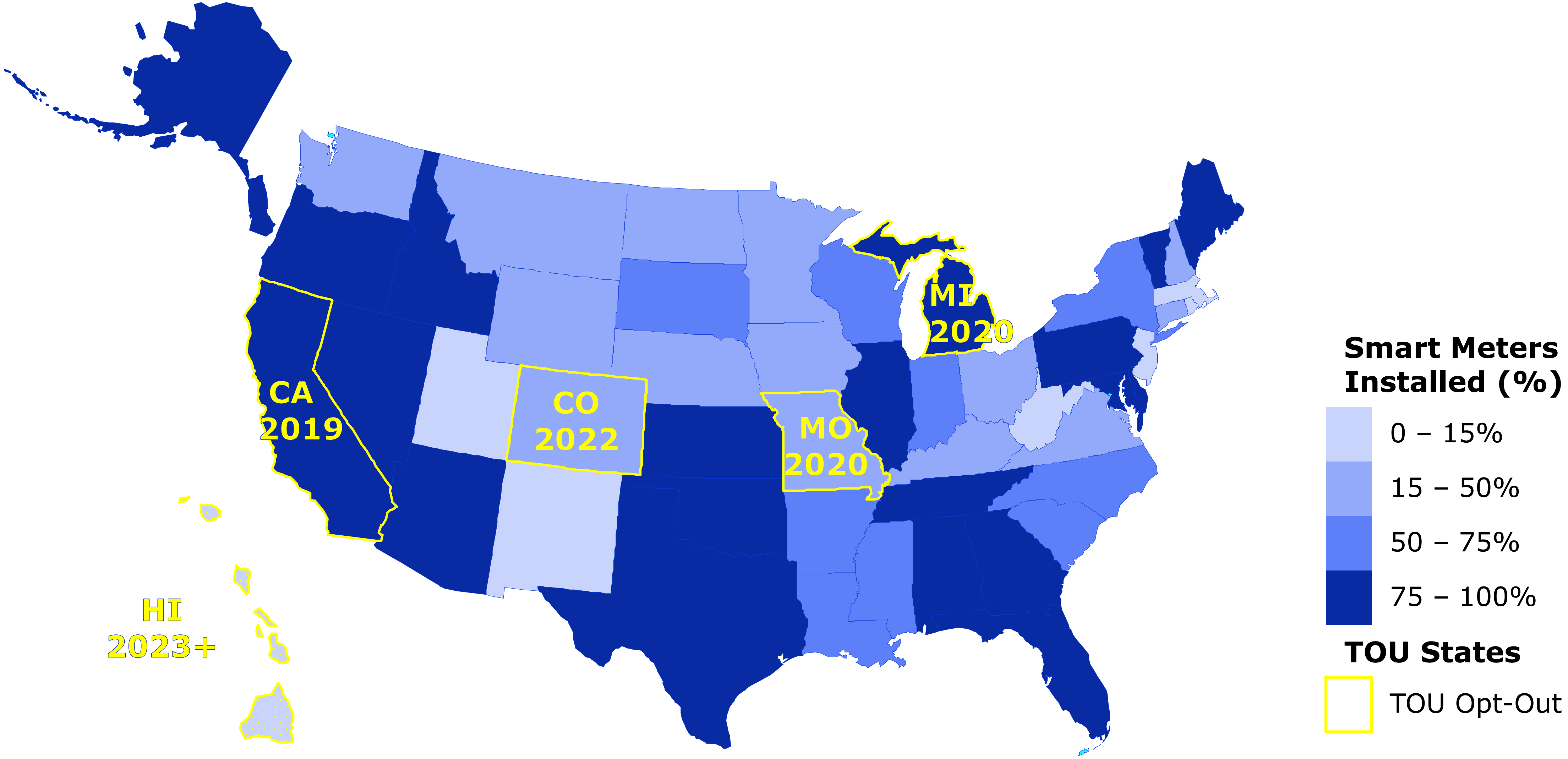
Prices: Time-of-Use Rates

- Time-of-use rates have been theorized for a century, and in effect in some places for many decades
- TOU rates are evolving to be peakier, reflective of evolving cost structure & new sources of demand (e.g., EVs)
- The deployment of Advanced Metering Infrastructure allows TOU to be billed more accurately, at more granular intervals, ubiquitously across the customer base



Source: Ontario Energy Board, circa May 2022. [Link].

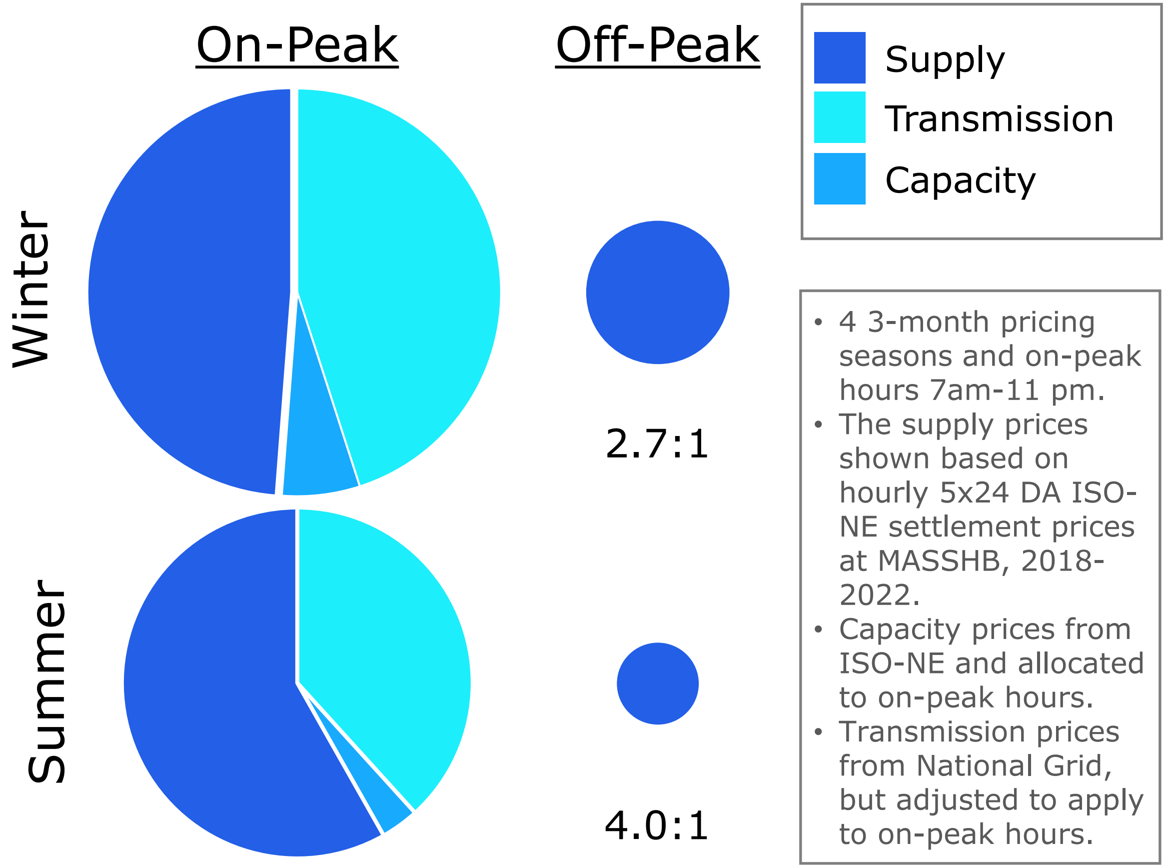
In USA, Smart Meters Widely Deployed… Only 5 States Use Them for Default Retail Pricing



Adapted from: Cooper and Shuster, "Electric Company Smart Meter Deployments: Foundation for a Smart Grid," Institute for Electric Innovation, April 2021, p. 3.

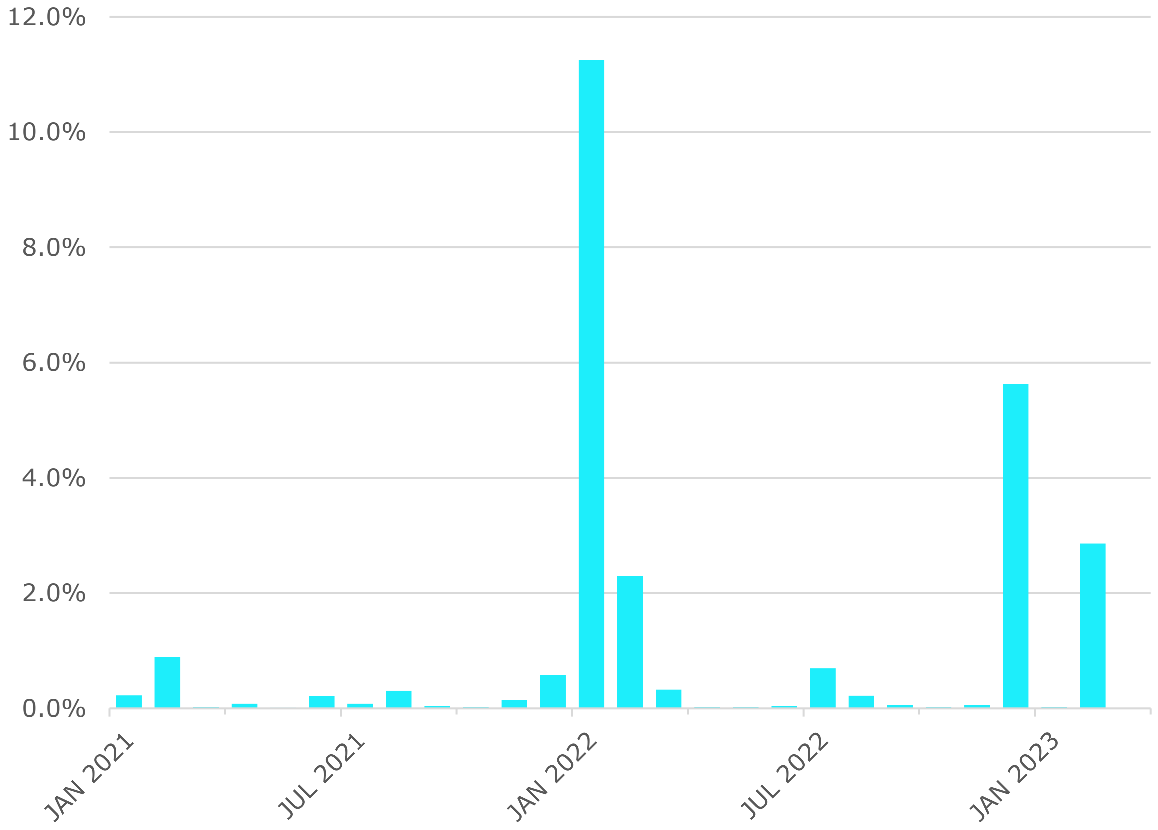
What Goes Into a Time-of-Use Rate?

Illustrative National Grid MA TOU Rate



- 4 3-month pricing seasons and on-peak hours 7am-11 pm.
- The supply prices shown based on hourly 5x24 DA ISO-NE settlement prices at MASSHB, 2018-2022.
- Capacity prices from ISO-NE and allocated to on-peak hours.
- Transmission prices from National Grid, but adjusted to apply to on-peak hours.

Oil-fired generation as a % of total supply in ISO-NE 01/21 to 03/23

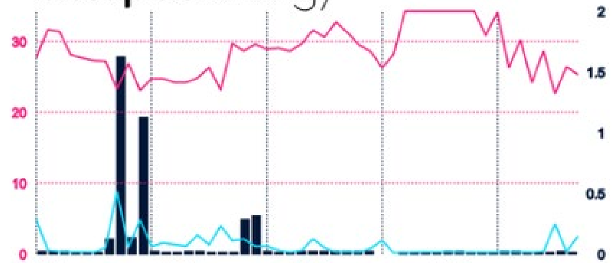


Real-Time Pricing, a.k.a. Dynamic Rate

Incoming

octopus energy

Sunday
26th February 2023



For electricity meter

Total cost
£ 1.05

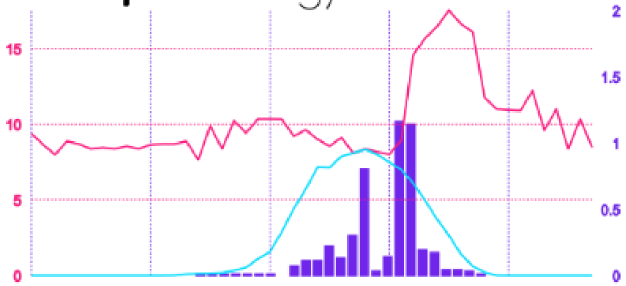
Total consumption
4.17 kWh

Weighted average unit rate
25.14 p / kWh

Period	Rate p / kWh	Consumption kWh	Cost p
00:00 - 00:30	27.68	0.02	0.554
00:30 - 01:00	31.66	0.02	0.633
01:00 - 01:30	31.39	0.02	0.628
01:30 - 02:00	28.09	0.01	0.281
02:00 - 02:30	27.65	0.01	0.277
02:30 - 03:00	27.28	0.01	0.273
03:00 - 03:30	27.19	0.12	3.263
03:30 - 04:00	23.32	1.62	37.778
04:00 - 04:30	26.86	0.13	3.492
04:30 - 05:00	23.10	1.12	25.872
05:00 - 05:30	24.73	0.02	0.495
05:30 - 06:00	24.73	0.01	0.247
06:00 - 06:30	24.20	0.01	0.242
06:30 - 07:00	24.20	0.02	0.484
07:00 - 07:30	24.82	0.02	0.496
07:30 - 08:00	26.33	0.01	0.263
08:00 - 08:30	23.12	0.01	0.231
08:30 - 09:00	29.70	0.01	0.297
09:00 - 09:30	28.64	0.28	8.019
09:30 - 10:00	29.59	0.31	9.173

octopus energy

Monday
1st May 2023



For electricity meter

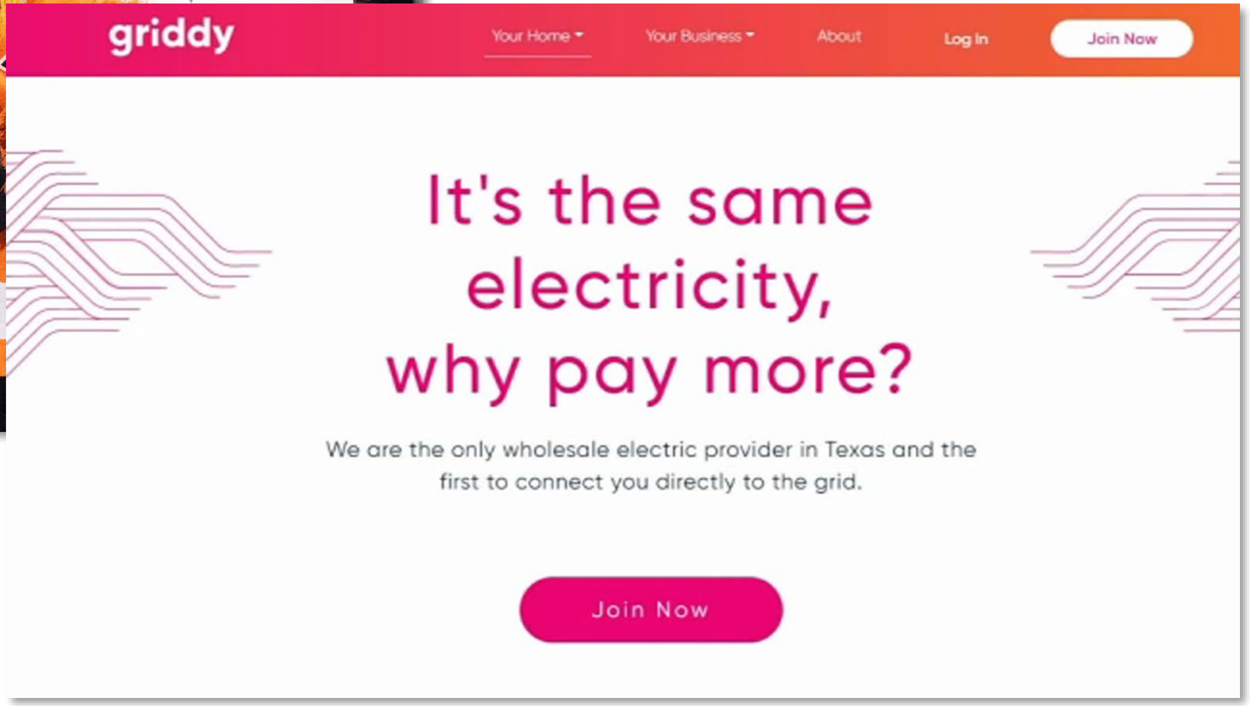
Total rebate
£ -0.52

Total export
4.76 kWh

Weighted average unit rebate
-10.83 p / kWh

Period	Rebate p / kWh	Export kWh	Rebate p
00:00 - 00:30	9.39	0.00	0.000
00:30 - 01:00	8.64	0.00	0.000
01:00 - 01:30	7.98	0.00	0.000
01:30 - 02:00	8.87	0.00	0.000
02:00 - 02:30	8.68	0.00	0.000
02:30 - 03:00	8.36	0.00	0.000
03:00 - 03:30	8.44	0.00	0.000
03:30 - 04:00	8.36	0.00	0.000
04:00 - 04:30	8.54	0.00	0.000
04:30 - 05:00	8.36	0.00	0.000
05:00 - 05:30	8.64	0.00	0.000
05:30 - 06:00	8.68	0.00	0.000
06:00 - 06:30	8.68	0.00	0.000
06:30 - 07:00	8.87	0.00	0.000
07:00 - 07:30	7.64	0.01	-0.076
07:30 - 08:00	9.88	0.01	-0.099
08:00 - 08:30	8.36	0.01	-0.084
08:30 - 09:00	10.22	0.01	-0.102
09:00 - 09:30	9.41	0.01	-0.094
09:30 - 10:00	10.33	0.01	-0.103
10:00 - 10:30	10.33	0.01	-0.103
10:30 - 11:00	10.32	0.00	0.000
11:00 - 11:30	9.20	0.07	-0.644
11:30 - 12:00	9.62	0.11	-1.058
12:00 - 12:30	8.99	0.11	-0.989
12:30 - 13:00	8.54	0.22	-1.879
13:00 - 13:30	9.11	0.13	-1.184
13:30 - 14:00	8.07	0.30	-2.421
14:00 - 14:30	8.36	0.80	-6.688
14:30 - 15:00	8.16	0.03	-0.245

A Cautionary Tale from Texas

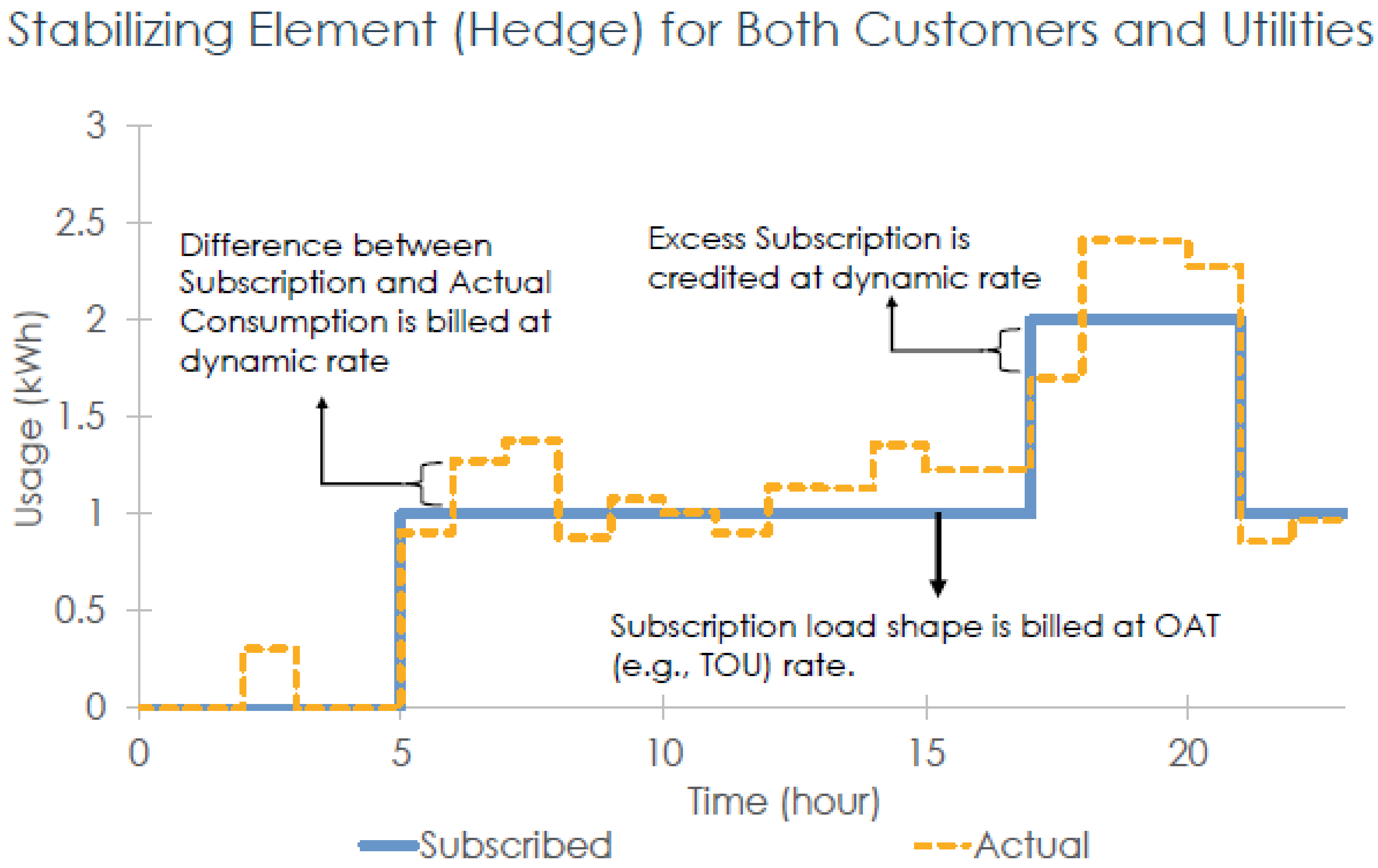


- Griddy (not to be confused with Gritty) offers a cautionary tale
- Griddy, an ERCOT Retail Electric Provider, offered to pass through wholesale energy pricing directly to retail customers for a small monthly subscription fee
- Catastrophically failed during Winter Storm Uri when wholesale prices = $9,000/MWh
- Griddy, an exception that proves the rule: *Intermediaries* bear an important role standing between wholesale market & retail customers

17

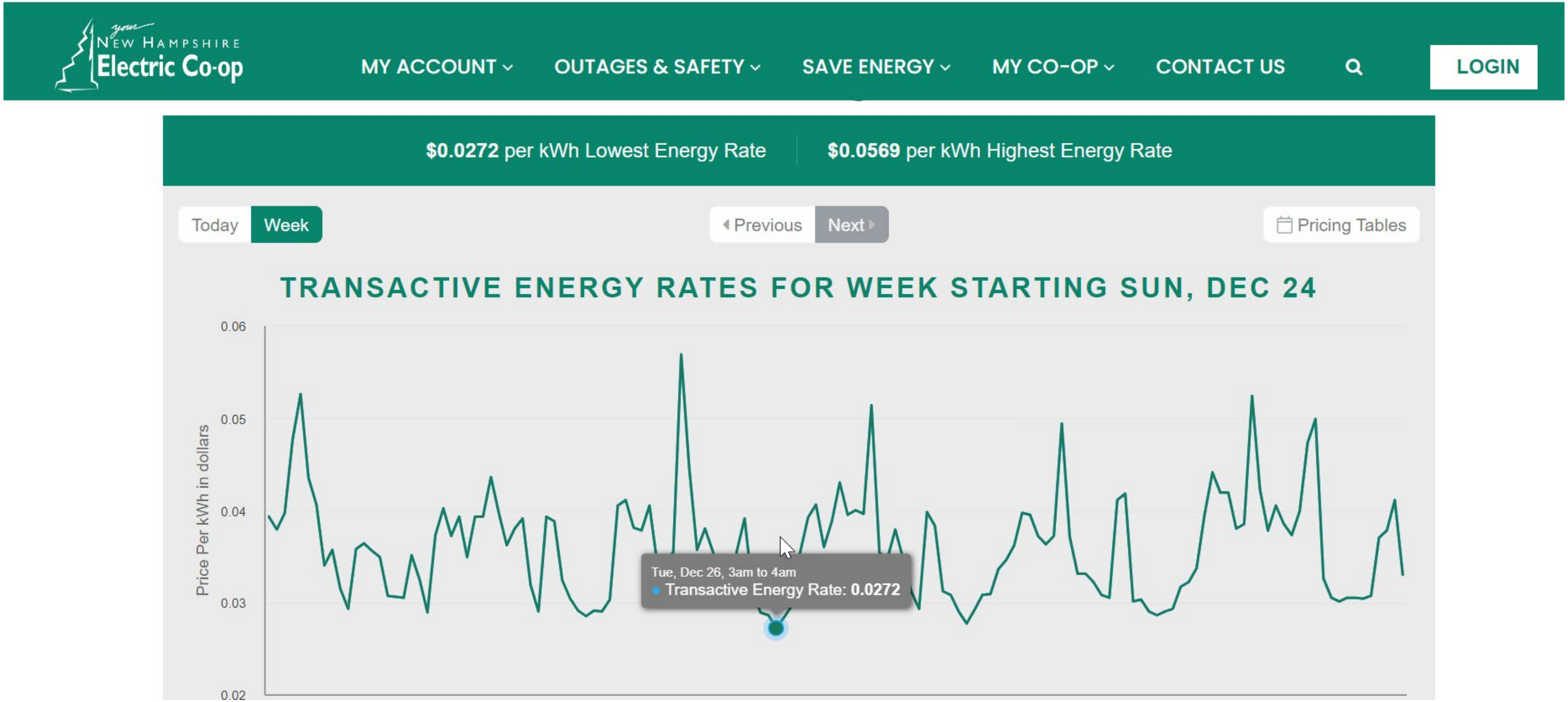
Monthly Subscriptions

- Subscriptions offered by utility
- Third party aggregators/brokers could evaluate offers and manage risk
  - Hedges
  - Comprehensive device management



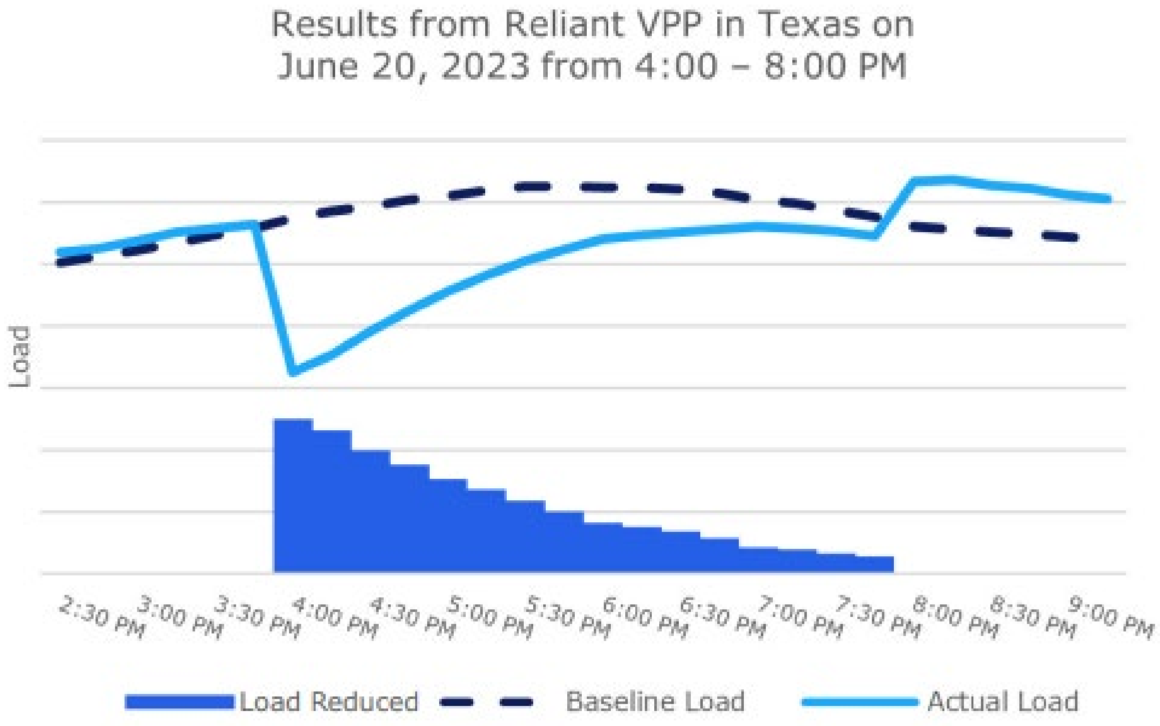
Source: California Public Utility Commission, Demand Response and Retail Rates Sections, Energy Division, "Workshop: CalFUSE Whitepaper & Staff Proposal," July 21, 2022, slide 48. Link.

Device-Specific Dynamic Rates



Competitive Retailers' Offerings

- Reliant (NRG retailer) has been able to engage its customers in demand response through smart thermostats in two ways:
  - Direct Load Control: Average 20-30% reduction in customer demand during the period thermostat is controlled.
  - Behavioral DR: Customers who actively participate lower their demand by approximately 10-15%.
- Reliant's standalone thermostat ADER program has grown 40% in 4 years.



- Customers are also increasingly adopting other DERs like battery storage. A customer in a detached single-family home that has smart HVAC controls paired with battery storage can reduce demand by up to 40-100% (on average) over a four-hour period, depending on the size of their battery.

So What About Wholesale Pricing?

- FERC Order 719 (2008) allows Demand Response to be aggregated for sale into RTOs
  - DR aggregators may sell energy, capacity, ancillary services into RTO auctions
- FERC allowed states to forbid third-party aggregators from participating in RTOs
  - MO recently lifted its ban, while MN recently decided not to lift its ban

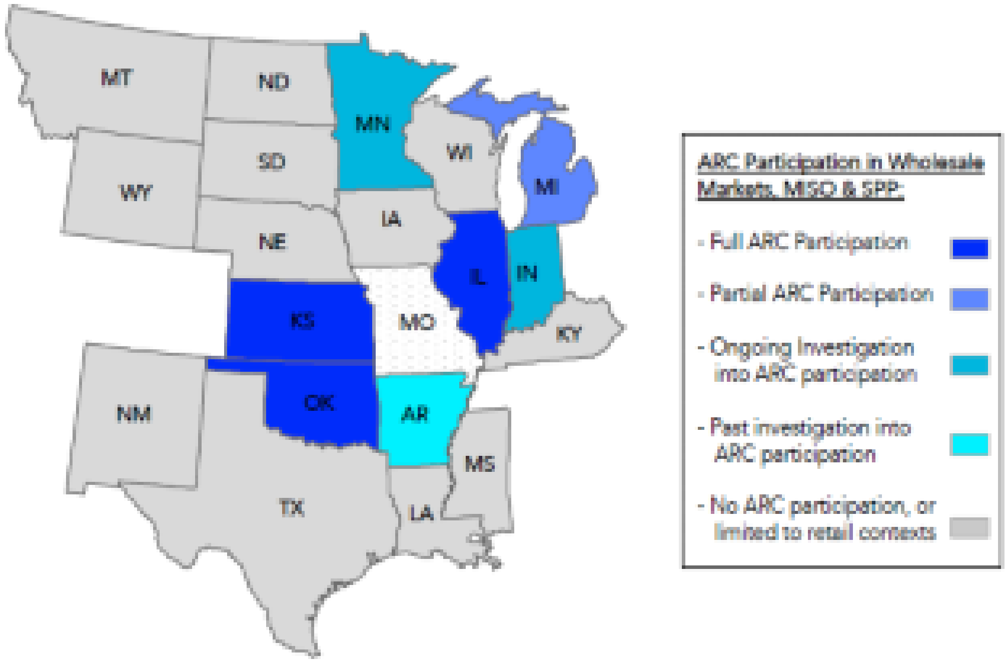


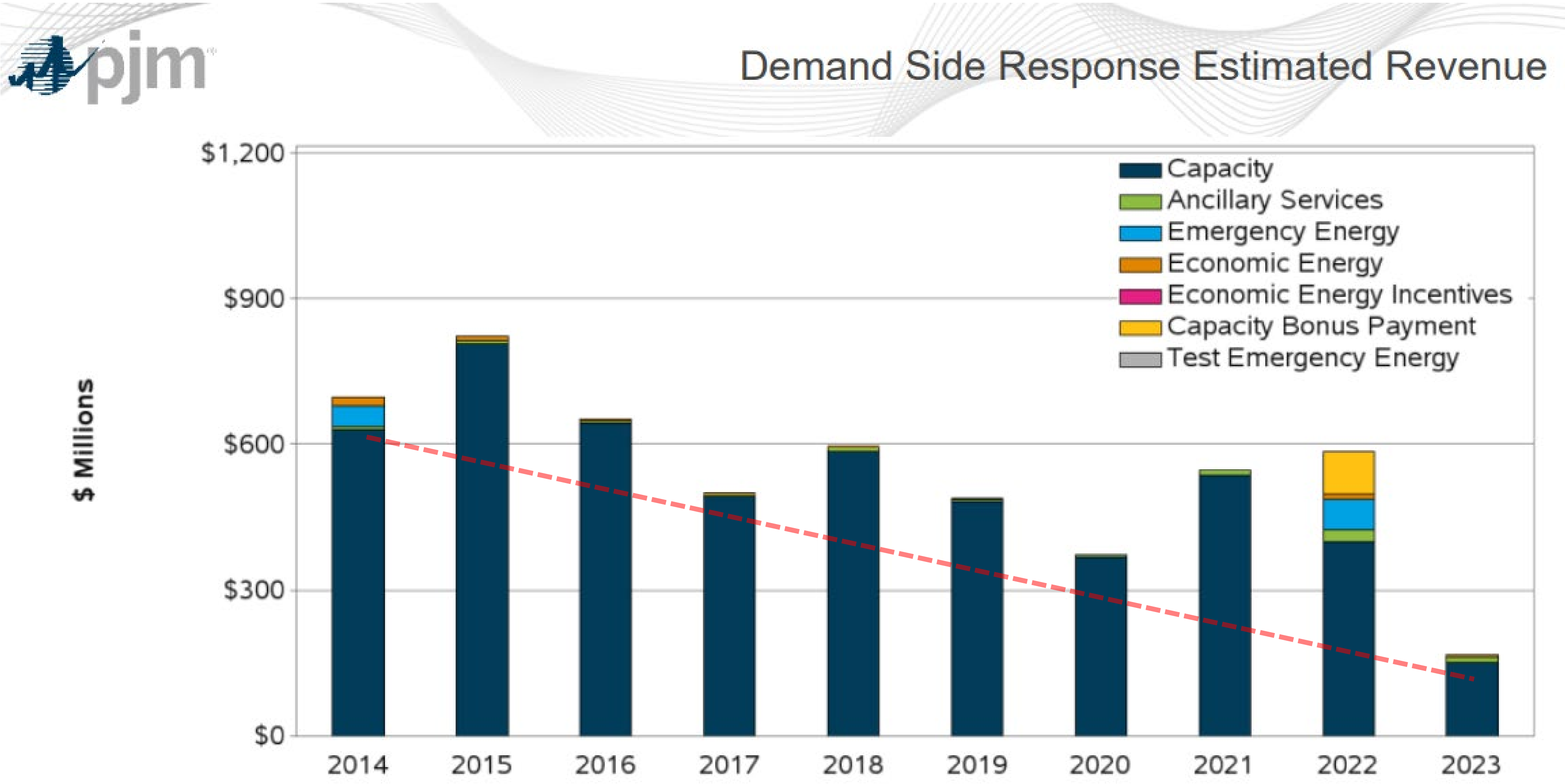
Figure ES - 1. Status of organized wholesale market participation rules for aggregators of retail customers in MISO and SPP states

Source: Sydney P. Forrester, Cole Triedman, Sam Kozel, Cameron Brooks, and Peter Cappers, Lawrence Berkeley National Laboratory, *Regulation of Third-Party Aggregation in the MISO and SPP Footprints*, p. iv. [Link](#).

Declining Wholesale Revenues for Demand Products

- Participation in eastern markets dominated by capacity products
  - Follow the money!

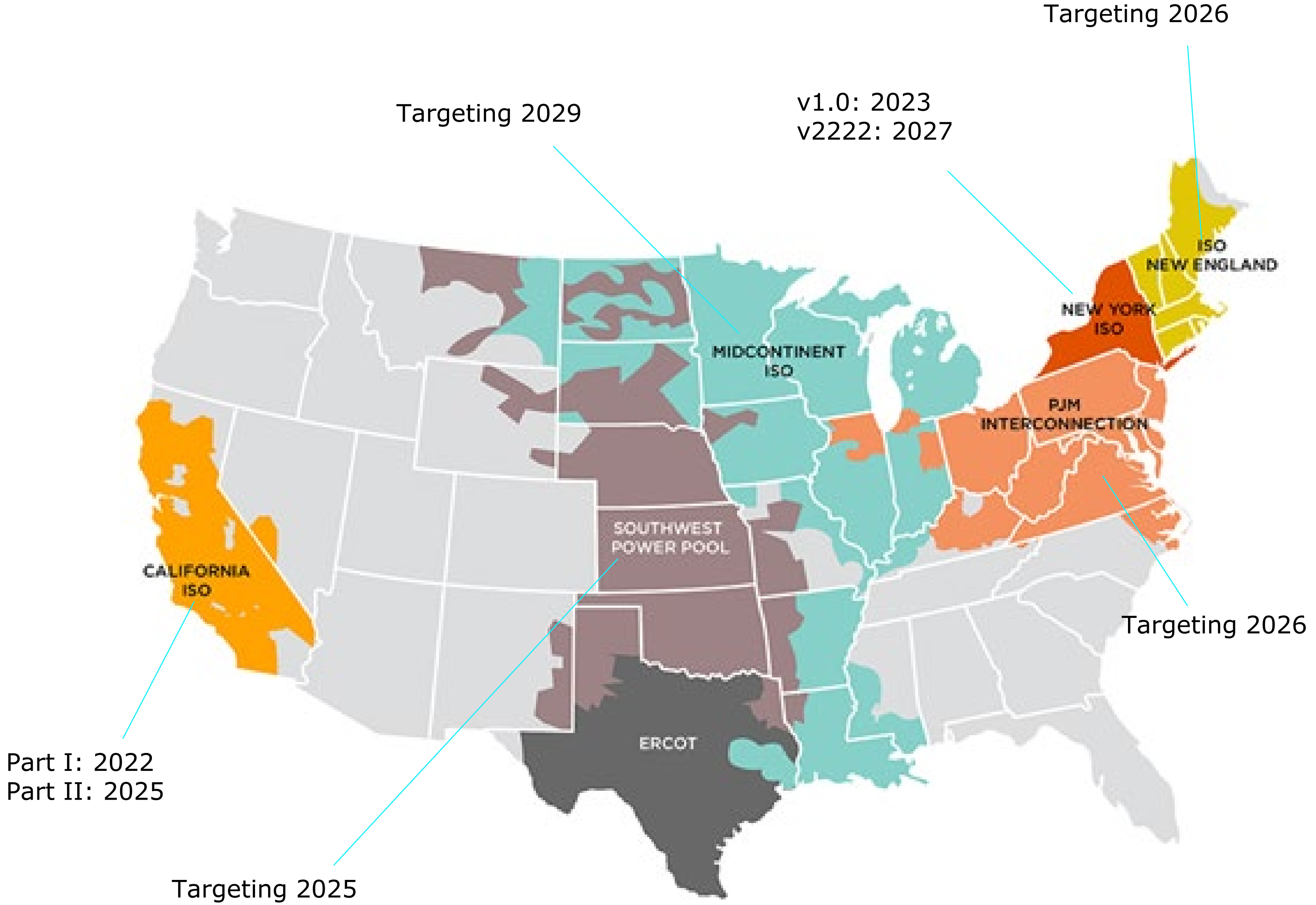
- "Classic" revenue streams for demand products are trending down as capacity prices fall and energy markets are tempered



Source: PJM, "Markets Report," MC Webinar, November 13, 2023, slide 40. Link. Trend-line added.

Order 2222

- Extends Order 719 principles of market access for DR to ADER
- No state opt-out
- Applies *only* in RTO footprints (so not West or Southeast)
- RTOs all over the map on implementation timeline



The Price Is Right?

- ‘Price’-oriented ADER business models require prices that express marginal cost and grid needs – rather than being flat and non-time-varying
  - Most retail rates continue to be flat

- Requires that prices, collectively, express the full range of value of ADER
  - E.g., DER may not earn transmission avoided-cost benefit if regulator sets transmission retail pricing flat (regardless of upstream demand-related rate design)

- Retail competition and RTOs are useful, if not necessary, for ‘Price’-oriented ADER
  - Multiple competitive retailers will evolve to cater to and compete for DER-adopting customers, and pace of innovation > utility regulation
  - RTOs markets present some barriers, but more open than non-RTO, vertically-integrated utilities
  - If Retail Competition/RTOs don’t exist to express prices, then diverse and time-varying utility rate offerings can be a path for “Price”-based ADER

Programs

An Alternative or Supplement to Incomplete Prices

- So perhaps you don’t think that prices are a good way to efficiently allocate scarce resources

- You can always stand up a ‘Program’ instead to do what ‘Prices’ do
  - May be particularly appropriate where there are specific needs for ADER (like local distribution system congestion)

- Typically rely on incumbent utilities to finance them with ratepayer subsidies
  - Also examples where competitive retailers offer rebates for activating customer DER, or
  - Where RTOs solicit (outside the typical markets they run) for particular needs

Subsidy for Device in Exchange for Utility Control

- The most common type of 'Program' which uses ratepayer funding to incentivize customer adoption of DER (in this case, a smart thermostat)
- Compensation not directly aligned to value of energy, capacity, transmission
- Gives utility right in pre-specified conditions to dispatch ADER remotely through its DERMS provider

pepco℠ AN EXELON COMPANY | Energy Wise Rewards

CYCLING OPTION	TEMPERATURE INCREASE	ANNUAL REWARD*	INSTALLATION CREDIT**	TOTAL REWARDS FOR YOUR FIRST 12 MONTHS*
50%	1-3 DEGREES	$40	$40	UP TO $80
75%	2-4 DEGREES	$60	$60	UP TO $120
100%	4-7 DEGREES	$80	$80	UP TO $160

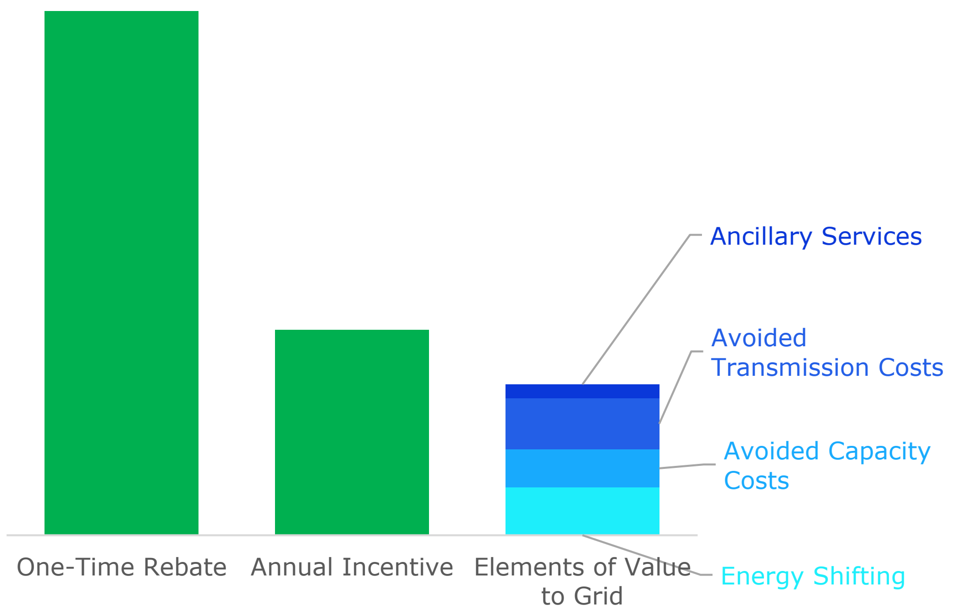
Some Utilities Also Extending this Program to Batteries

GREEN MOUNTAIN POWER

Benefiting you and Vermont

You save money by joining GMP's BYOD program. If you enroll a battery for ten years, we'll give you an upfront payment of $850 per kW of storage enrolled for three hour discharge, $950 per kW for four hour discharge. If you're retrofitting an existing solar system in one of the areas of the state where extra storage will help the grid most, we'll give you an extra $100 per kW. Plus, get the benefit of knowing your device is helping to cut carbon emissions and costs for all GMP customers!

Illustrative Payments to Battery DERs under Different Programs/Prices



Risk to ratepayers

Risk to DER owners

Source: While the graph is illustrative, the One-Time Rebate column is based on the participation of a Powerwall 3 in Green Mountain Power's BYOD program (link), and the Annual Incentive column is based on National Grid's ConnectedSolutions program. The final column illustrates the different ways a battery could participate on the grid.

Pay for Performance

- An alternative to an up-front subsidy in exchange for capacity rights to ADER is a pay-for-performance model
- To the right is an example from National Grid's "Connected Solutions"
- Again, the benefit paid under this program is a value approved by regulators based on an approximation, and not directly connected to more dynamic 'Prices'

Connect with a battery storage partner.

Energy-sharing events through our ConnectedSolutions program call on your battery system to automatically discharge during peak demand days, which occur as follows:

- From June 1 – September 30
- Between 3pm - 8pm
- No more than 60 times each summer
- A maximum of 3 hours per event
- You can opt out at any time

Incentives

Participating customers will receive an incentive every year based on the performance of their battery system at a rate of **$275 per kW** performed between June 1 and September 30. On average, customers have received $1,500 per year.

The incentive rate is locked in place for the first five summers the customer is enrolled in ConnectedSolutions with all new systems. Your battery system performance will vary based on size, configuration, internet connectivity and other factors.

Certain RTOs Have ‘Programs’ for DER as Well

ERCOT has a small, standalone capacity market for Demand Response, known as Emergency Response Service (ERS), which exists outside its ordinary energy markets

EMERGENCY RESPONSE SERVICE (ERS)

ERCOT offers two types of Emergency Response Service: 10 Minute and 30 Minute.

	10 MINUTE DEMAND RESPONSE PROGRAM (ERS 10)	30 MINUTE DEMAND RESPONSE PROGRAM (ERS 30)
Notification	Customers will be notified of an event via email, phone, text and/or electronic signal per customers' instructions and must fully curtail within 10 minutes of start of event.	Customers will be notified of an event via email, phone, text and/or electronic signal per customers' instructions and must fully curtail within 30 minutes of start of event.
Minimum Size	No minimum size; accounts of under 100 kW curtailment will be aggregated.	
Participation	4 month contract periods starting February, June and October. Each period contains 6 optional time slots: weekdays 5-8AM(Time Period 1), 8AM-1PM (Time Period 2), 1-4PM (Time Period 3), 4-7PM (Time Period 4), 7-10PM (Time Period 5), and weekends/nights/all other hours including ERCOT holidays (Time Period 6).	
Enrollment Deadline	One month before each contract period (January 1st, May 1st, September 1st).	
Distributed Generation	Can participate independently or in conjunction with Load.	
Metering/Direct Load Control (DLC)	Each account must have at least a 15 minute interval or smart meter (per ERCOT) and may also require CPower's monitoring solution, which provides one-minute usage data.	
	Customers over 1 MW of curtailable load must have DLC via CPower's monitoring solution (CPower's requirement).	No DLC requirement
Number & Duration of Load Response Events	Customers may be called to curtail load for up to 12 hours per contract period.	
Testing	At a minimum, a 15-30 minute test event will be called once per year absent successful event deployment.	
Capacity Payments	Customers are paid based upon the clearing price, contract capacity and participation hours.	
Settlements	Customers receive payments within 60 days of the end of the contract period.	
Compliance	Customers must meet their performance obligations during events and test events, and must meet their availability requirements all other committed times.	
Consequence of Non-compliance	Availability and performance factors are taken into consideration and can reduce payments. Non-performance	

Source: CPower

Comparing ‘Programs’ and ‘Prices’

	Programs	Prices
What	• Utility subsidies for device adoption • Procurements for targeted needs	• Time-varying retail rates • Wholesale/RTO: Capacity, Energy, A/S auctions + Trans. rates
How	• Regulatory process defines avoided-cost value	• Rate design • Market design
Business Model	• ADER a utility vendor	• ADER more of a free agent
Pros & Cons	• A clear value target • Limits to quantity and pace	• More open market • Less stable revenue • Questions on how to monetize

The two can be complementary, especially when ‘Prices’ fail to convey ADER a particular value that is not appropriately priced (e.g., distribution or transmission)

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DER Grid Service Compensation in Hawaii

Pete Polonsky, Utility Analyst, Hawaii PUC

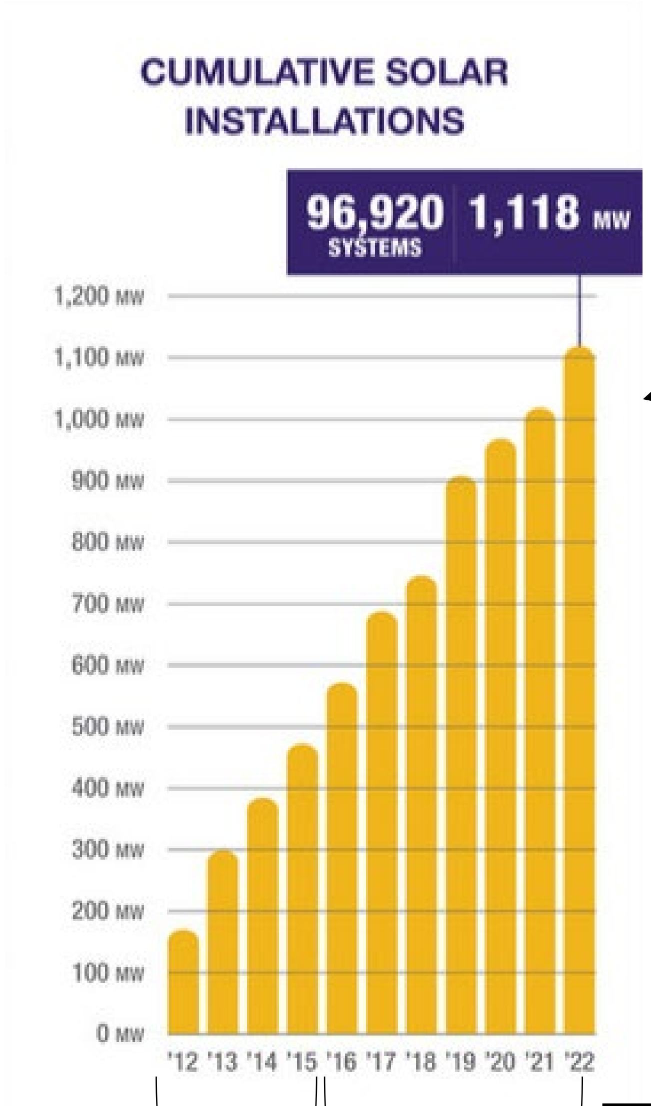
Presentation for the NARUC-NASEO DER I&C Initiative

January 8th, 2024

Disclaimer

This presentation does not represent the view of the Hawaii Public Utilities Commission in any capacity and is offered purely for educational purposes based on the development of DER policies in Hawaii. Information shared here is also publicly available via the Commission’s eServices website, largely in Docket No. 2019-0323.

The Hawaii Context

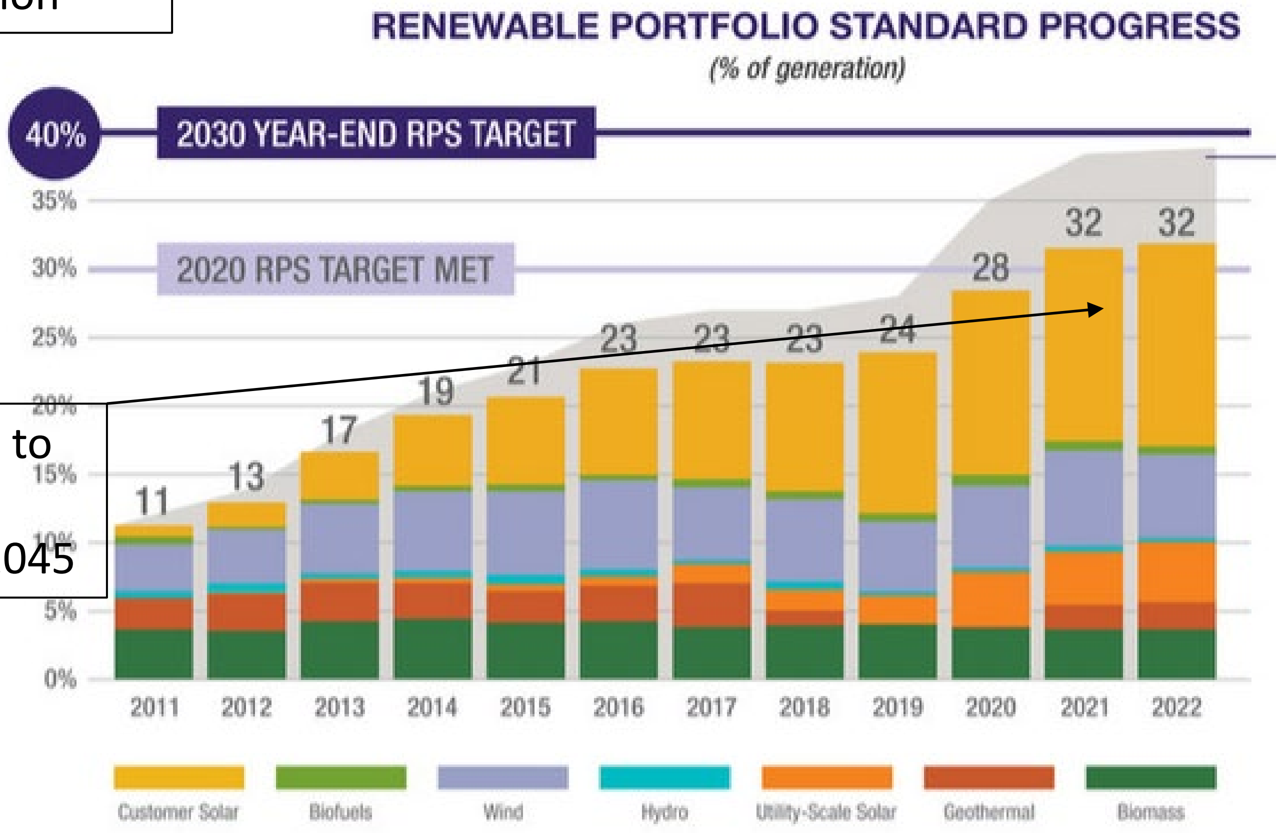


High rooftop solar penetration

Net Energy Metering

Post-NEM Programs

Next-Gen Programs



Long way to go to get to 100% renewables by 2045

https://www.hawaiianelectric.com/clean-energy-hawaii/sustainability-report

Battery Bonus Program

Why? An emergency need for replacement resources as the last coal plant on Oahu was required to retire in September 2022, and upcoming solar-plus-storage projects were significantly delayed, leading to concerns about reliability during the evening peak.

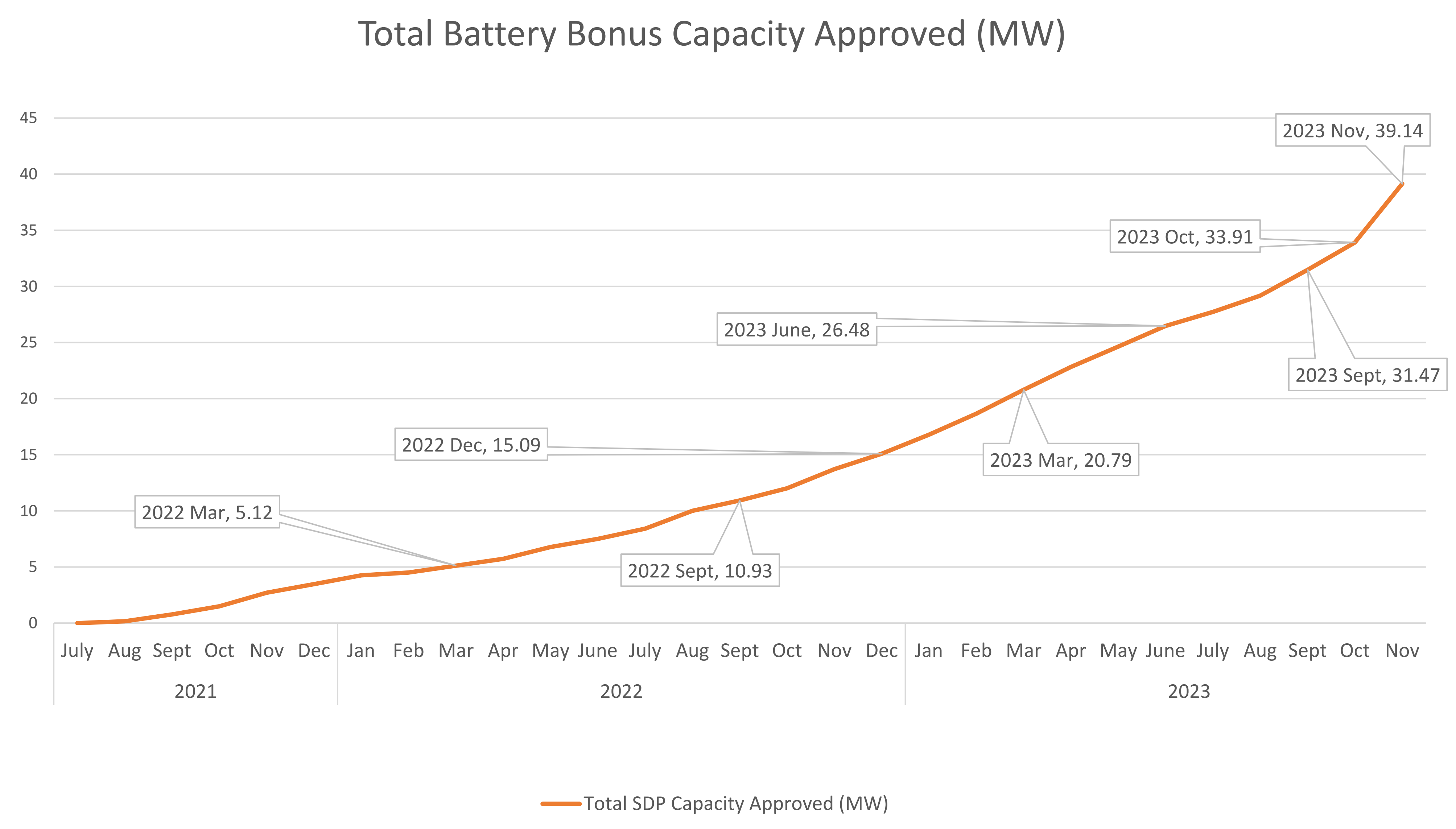
What? A customer program that provides incentives for customers installing a new battery, connected to rooftop solar, and requiring the customer to discharge the battery for two consecutive hours during the evening peak every day for 10 years.

How? Within the Commission's proceeding to investigate distributed energy resource policies for Hawaiian Electric, the parties modeled a variety of program options to determine a range of values and incentives for the program.

Battery Bonus Incentives

1) Upfront incentive: $850/kW of customer's capacity commitment
2) Monthly capacity payment: $5/kW of capacity
3) Retail rate energy export credit for exports during program for first 3 years of enrollment

Example: for a 5-kW battery system, a customer receives $4,250 upfront, $25/month for 10 years, and a bill credit of ~$60 per month for 3 years.


Total Battery Bonus Capacity Approved (MW)
45
40
35
30
25
20
15
10
5
0
2023 Nov, 39.14
2023 Oct, 33.91
2023 Sept, 31.47
2023 June, 26.48
2023 Mar, 20.79
2022 Dec, 15.09
2022 Sept, 10.93
2022 Mar, 5.12
July Aug Sept Oct Nov Dec
2021
Jan Feb Mar Apr May June July Aug Sept Oct Nov Dec
2022
Jan Feb Mar Apr May June July Aug Sept Oct Nov
2023
Total SDP Capacity Approved (MW)

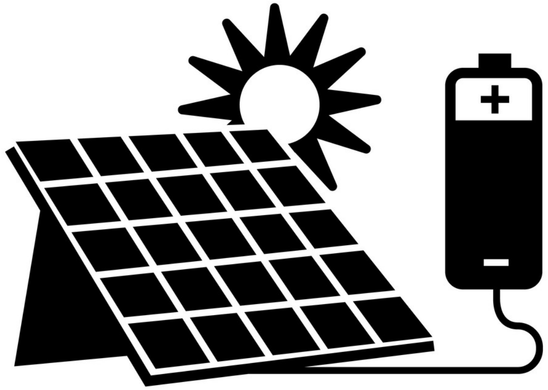
Next-Gen DER Programs, Launching March 1st

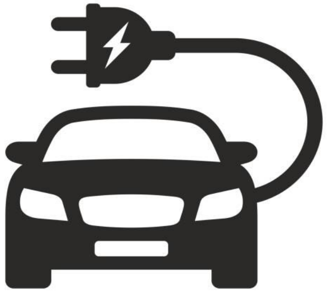
Smart DER Program

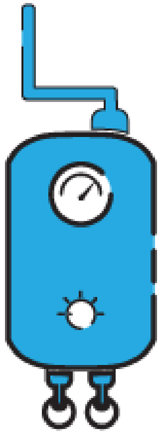
- Replaces all NEM and post-NEM DER programs as the basic program
- Non-export option and export option
- Open to all renewable customer-sited generation
- Export option provides time-varying compensation for export
- Oahu rates:
  - Daytime (9am-5pm): $0.135/kWh
  - Evening Peak (5pm-9pm): $0.329/kWh
  - Overnight (9pm-9am): $0.189/kWh

Decision & Order No. 40418, December 4th, 2023

Next-Gen DER Programs, Launching March 1st







Bring-Your-Own-Device Program

- Replaces Battery Bonus as a supplemental, optional tariff for grid service compensation
- Three "levels" with distinct operational requirements and incentives
  - Level 1: Flexible User Dispatch
  - Level 2: Utility Dispatch
  - Level 3: System Grid Services
- Similar incentive structure to Battery Bonus:
  - Upfront: $100/kW, up to 5 kW
  - Monthly: $5-10/kW
  - Energy Export Credit at the evening peak Smart DER rate
- Three-year customer commitment

Decision & Order No. 40418, December 4th, 2023

Compensation for Long-Term DER Programs

Modeling Efforts

- Hawaiian Electric adapted modeling efforts from the utility planning process for use in DER program development
- Several iterations of modeling occurred with feedback from the Commission and other stakeholders
- Modeling evaluated the impact on the grid of freezing DER installations at today’s levels

DER Value Streams

- The Commission outlined 8 applicable DER value streams that should be reflected in DER compensation:
  - Energy Generation Impacts
  - Capacity Impacts
  - RPS Compliance Impacts
  - GHG Emissions Impacts
  - Grid Services
  - Transmission System Impacts
  - Distribution System Impacts
  - Resilience Impacts

Compensation for Long-Term DER Programs

Finalizing Incentives

- The Commission “mapped” the results of the modeling efforts to the identified DER value streams, and used the modeling results to establish additional incentives
- Not all DER value streams are represented clearly in the incentives, so...

Update Framework

- …the Commission established an update framework for the new programs
- Updates every three years after program launch
  - Export rates
  - Incentives
  - Interconnection requirements
  - Eligible technologies
  - Operational requirements

Alignment with Other Initiatives

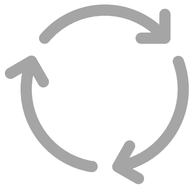
Grid Service Purchase Agreements

Integrated Grid Planning Process

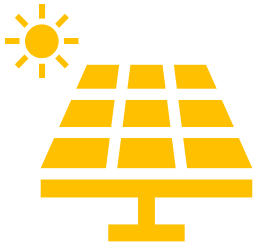
Energy Equity and Justice Docket

Key Takeaways: Program Design

Develop DER incentives that balance the value DERs provide to the grid with the need to support a robust DER market.



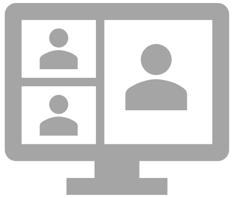
Embed iteration and evolution in program design, especially as electric grids are actively evolving.



Acknowledge the role of DERs in utility planning processes and the role of utility planning in program development so that plans and programs are consistent.

Key Takeaways: Stakeholder Process

Push for compromise between stakeholders (e.g., utilities and solar advocates).



Get stakeholders together in the same room to address the merits of each other’s arguments.

Engage stakeholders early and often to avoid delays in the process when stakeholders do not feel heard or consulted.

More Information

Hawaii PUC’s website on DER programs:
https://puc.hawaii.gov/energy/der/programs/

Hawaiian Electric’s website on customer renewable programs:
https://www.hawaiianelectric.com/products-and-services/customer-renewable-programs

Mahalo!

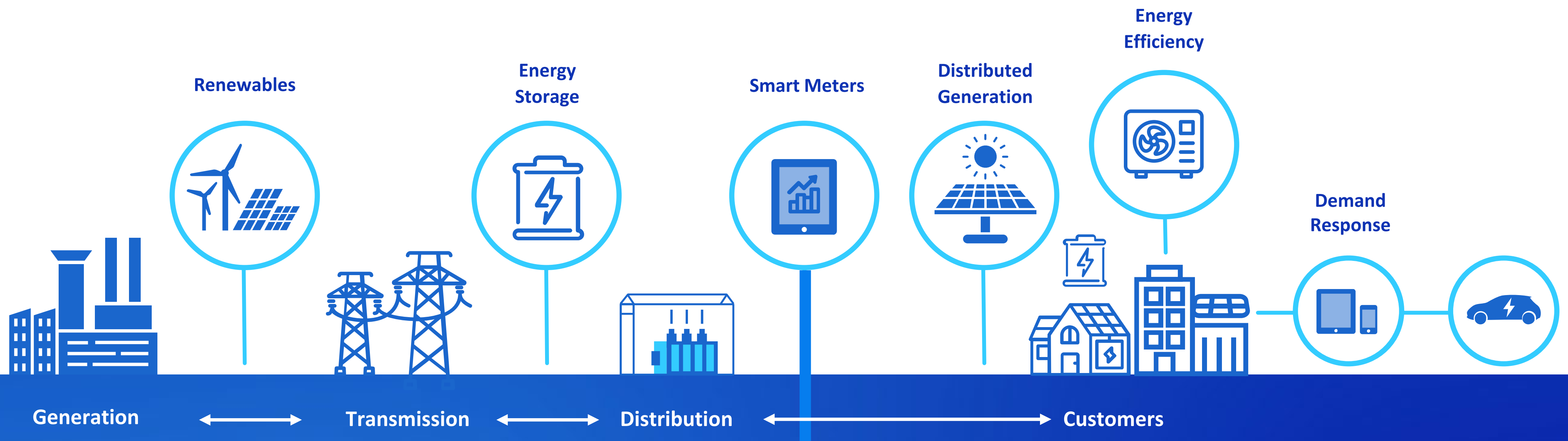
RECURVE

Demand Flexibility
Platform

VPP Marketplace
FLEXmarket

Compensation Should Recognize Supply and Demand

Supply ≡ Demand



Supply: Energy Resources

Demand: Load Modifying Resources

System Benefits from Demand-Side Resources

Load Modifying Resources (LMR)

- 15% price advantage over supply-side*
- Hedges market peak energy events
- Modifies forecast to support resource adequacy
- Provides benefits to local customers
- Incorporate the full value stack

Supply-Side

Market Resources

- Energy
- Capacity
- Ancillary
- Transmission
- Distribution
- Cap and Trade
- Ghg Adder Rebalancing
- Methane Leakage
- Losses
- **Non-Grid Priorities**
  - ❏ Equity
  - ❏ Resiliency

Demand-Side

Load Modifying Resources Enable the Full Values Stack

DEMAND FLEXMARKET

* IEA US Supply-Side Reserve Margins: https://www.eia.gov/todayinenergy/detail.php?id=39892

Additional Benefits from Demand-Side Resources

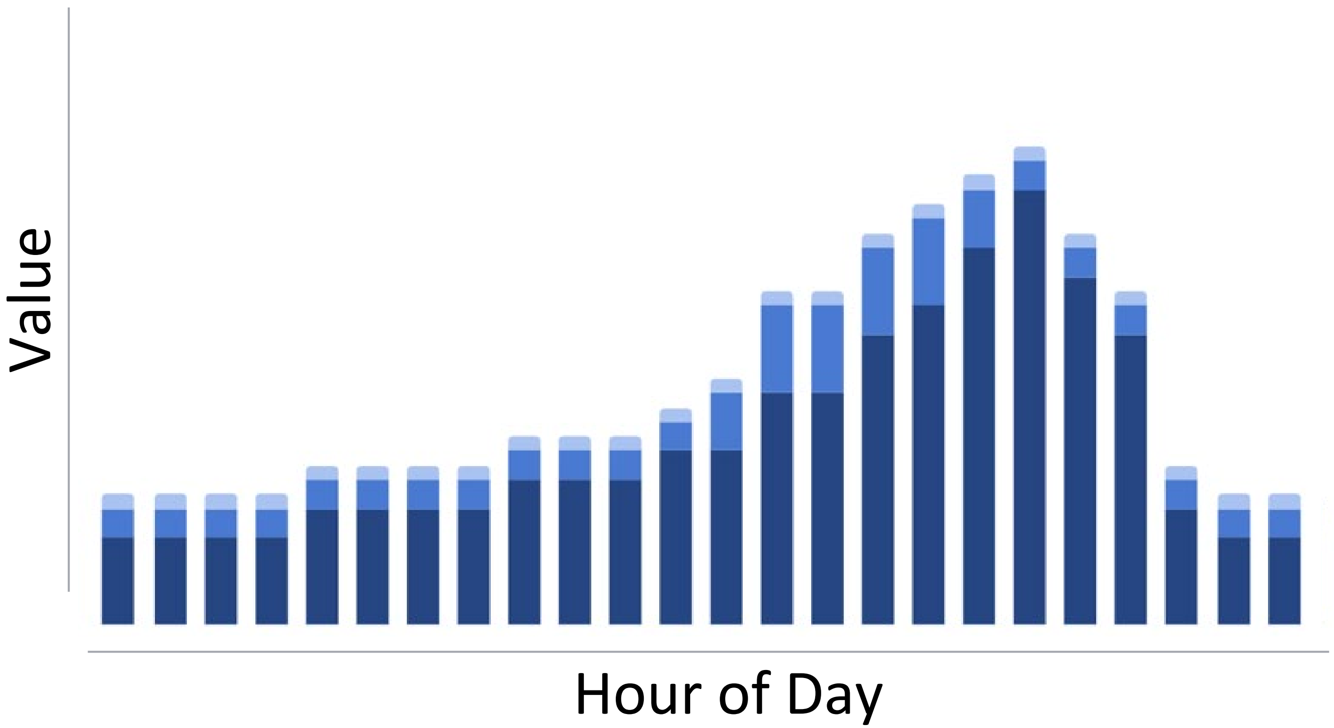
Quantify value

Avoided Energy & Capacity Costs

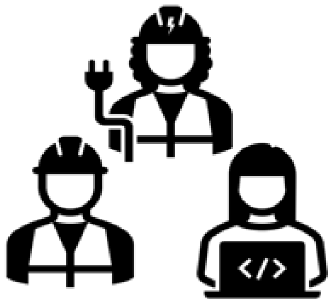
Air Quality / Carbon

Equity / Resilience

Provide time-valued price signal



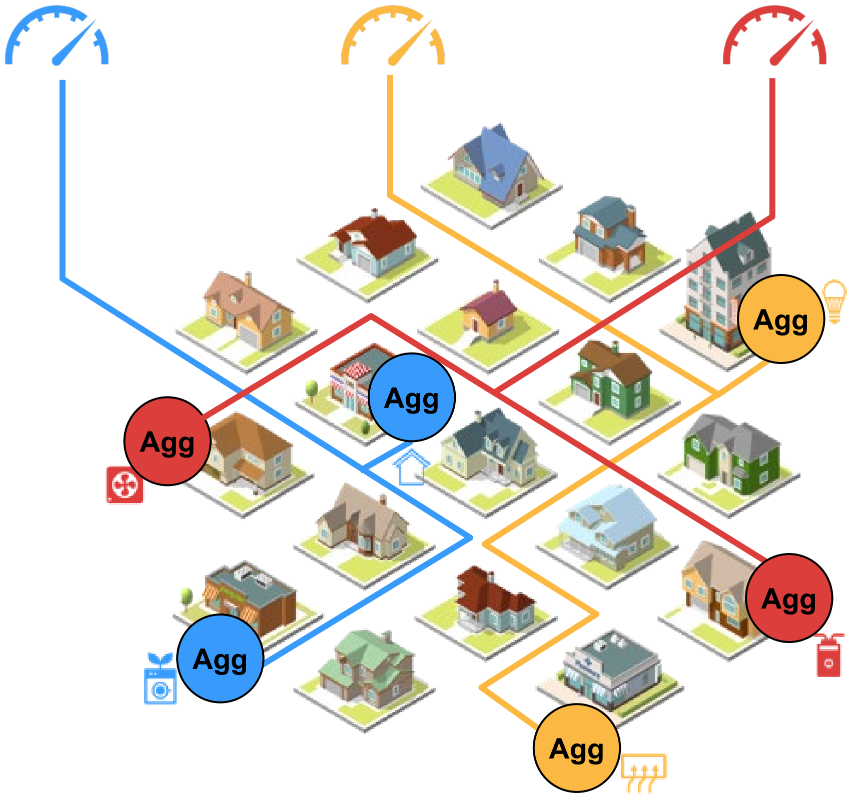
Enable Aggregators



Support Customers

Operationalize with Open "Market Access" Model

DEMAND FLEXMARKET

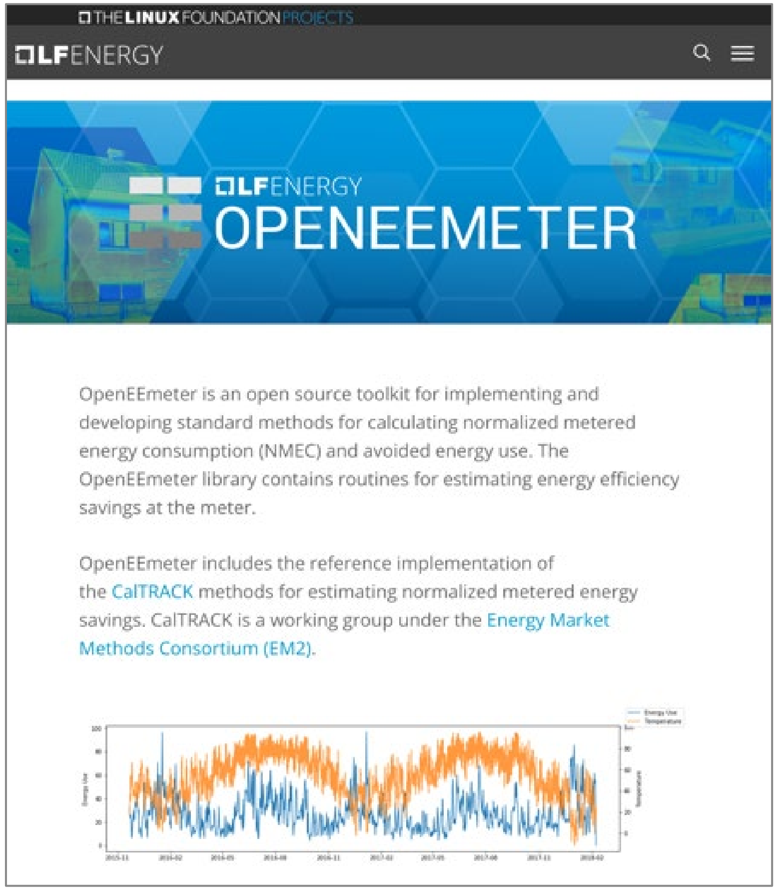


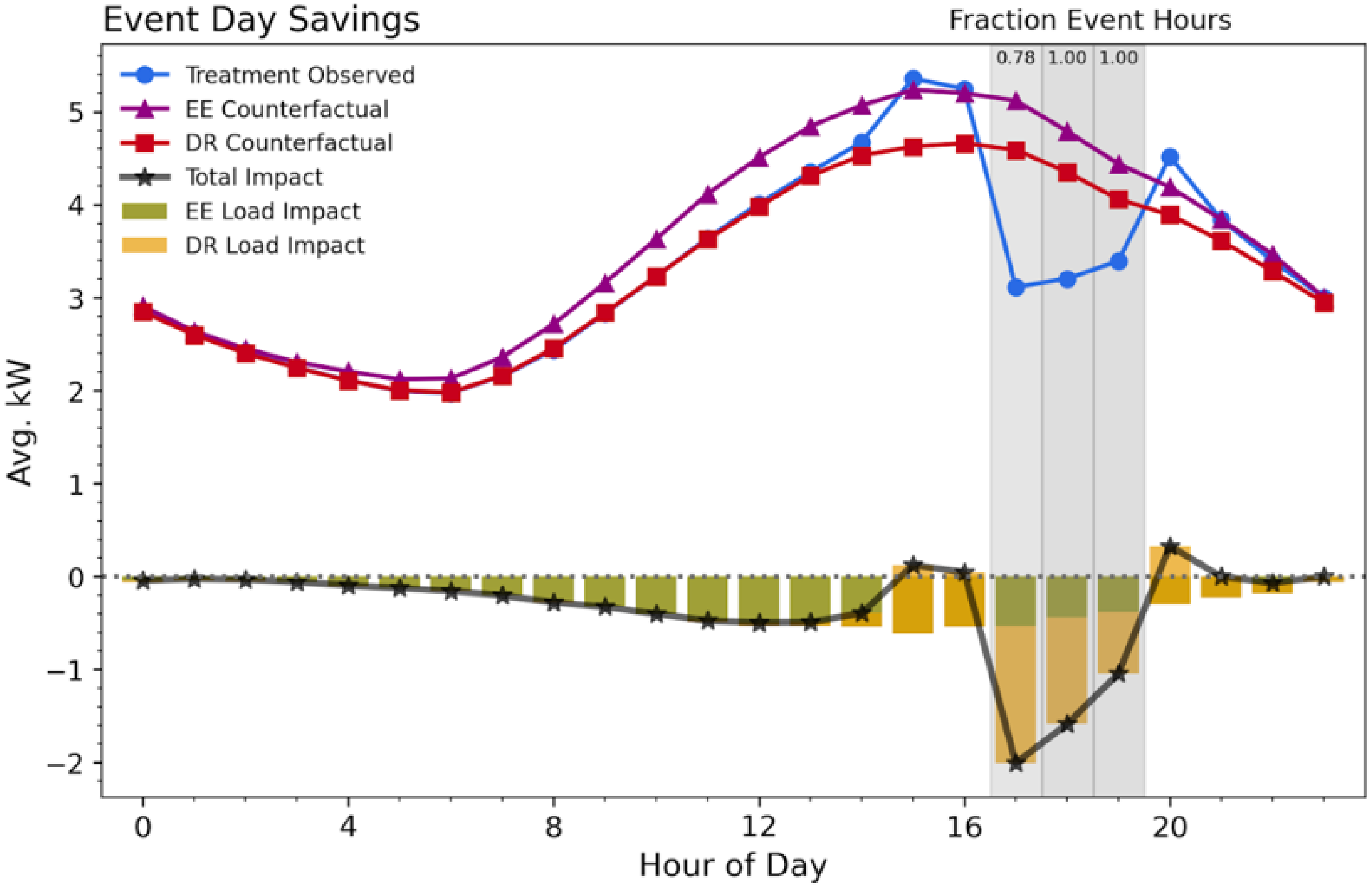
an open, **pay-for-performance** marketplace where aggregators receive incentive **payments for demonstrated impacts** at the customers energy meter using transparent consistent measurement & verification.

"The market access approach also allows for incorporating innovative measures into energy efficiency programs, since this approach allows experimentation with measures and customer offerings without going through lengthy solicitation processes. Also, the market access approach can be used to enable integrated demand side management (IDSM) opportunities." CPUC [D.23-06-055]

Open-Source Measurement & Verification at the Meter

Proven accurate methods and code available publicly





U.S. DEPARTMENT OF ENERGY

NREL

DEMAND FLEXMARKET

Market Sponsor

Load-Serving Entity

Contract

Recurve

Open-source advanced M&V Platform

LF ENERGY OPENEEMETER

Flexibility Purchase Agreements

Aggregators

Install innovative projects to reduce energy use

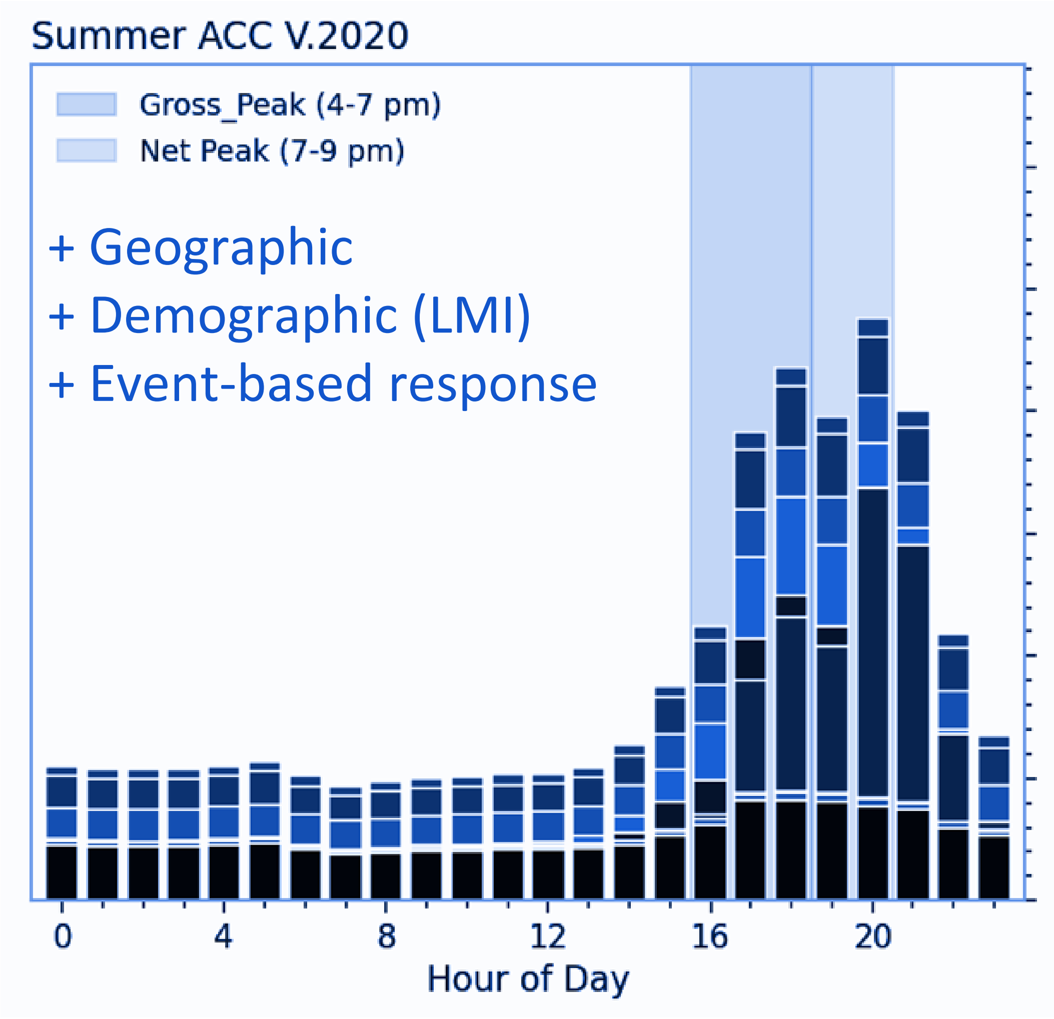
Services

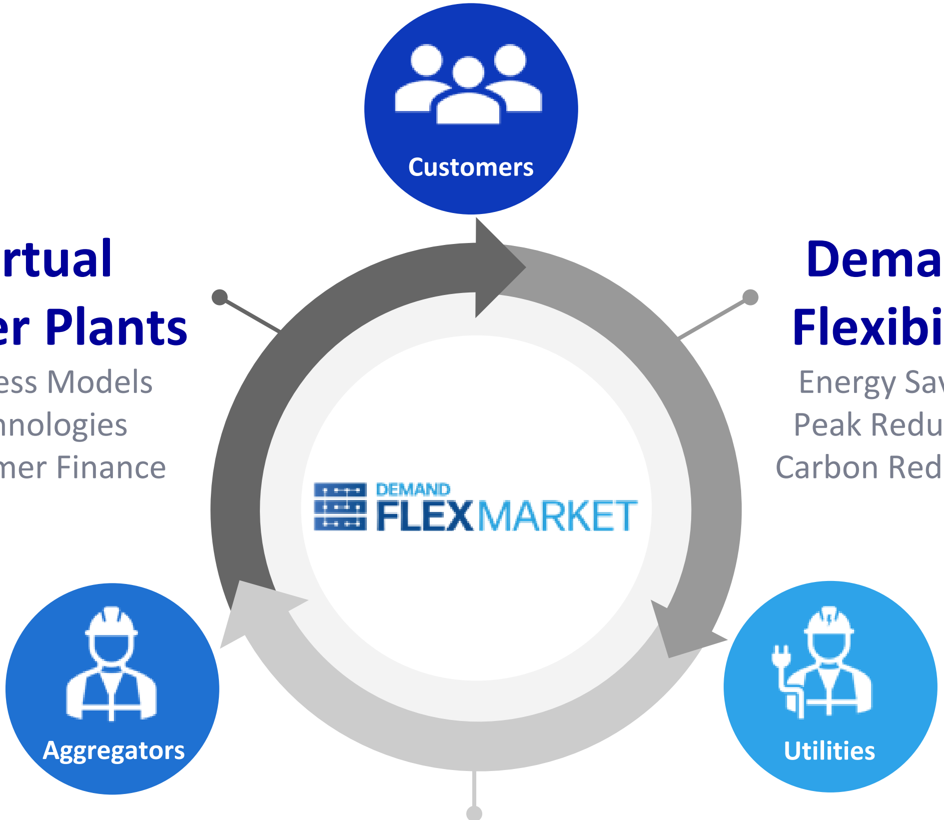
Customers

High performing homes and businesses

Compensation to Providers Mirrors Avoided Cost++

Price Anchored in Hourly Avoided Cost





Virtual Power Plants

Business Models
Technologies
Consumer Finance

Demand Flexibility

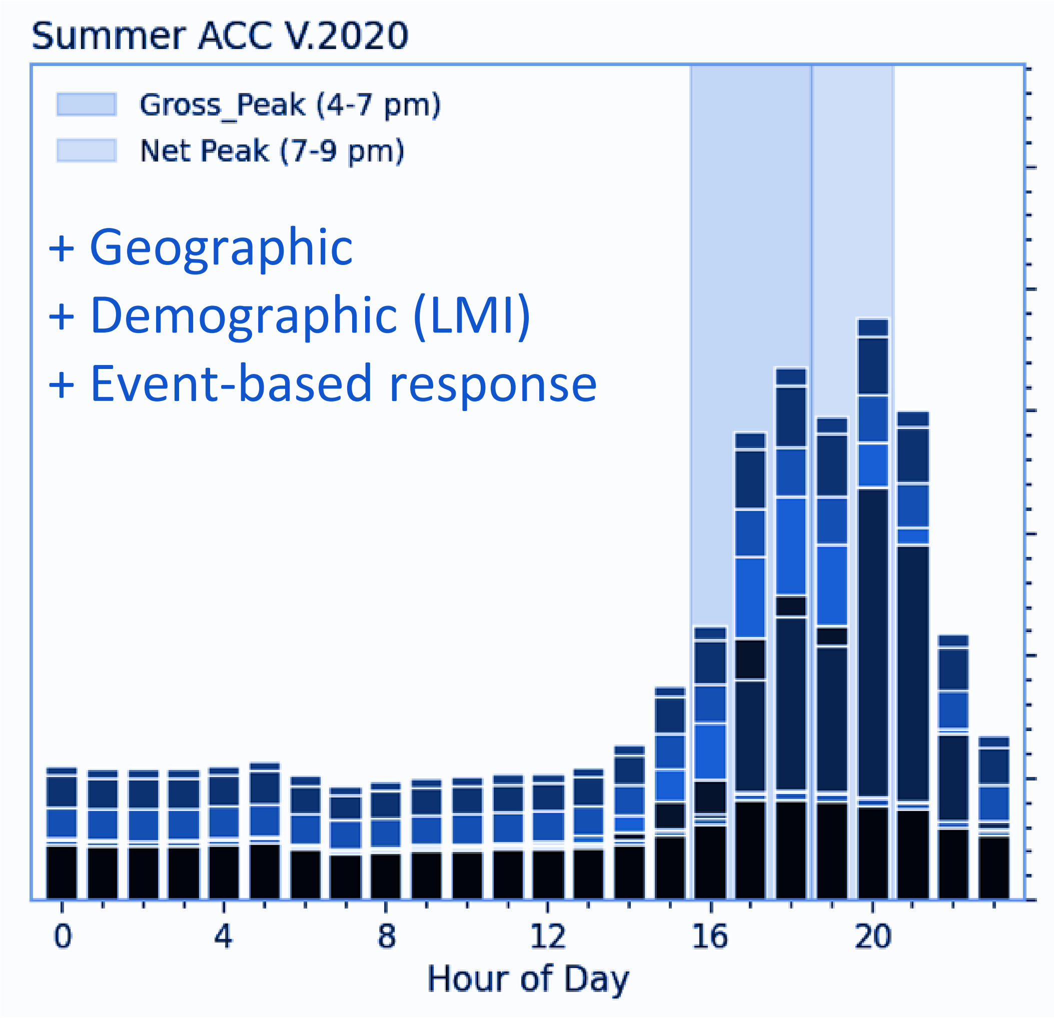
Energy Savings
Peak Reduction
Carbon Reduction

Grid Value

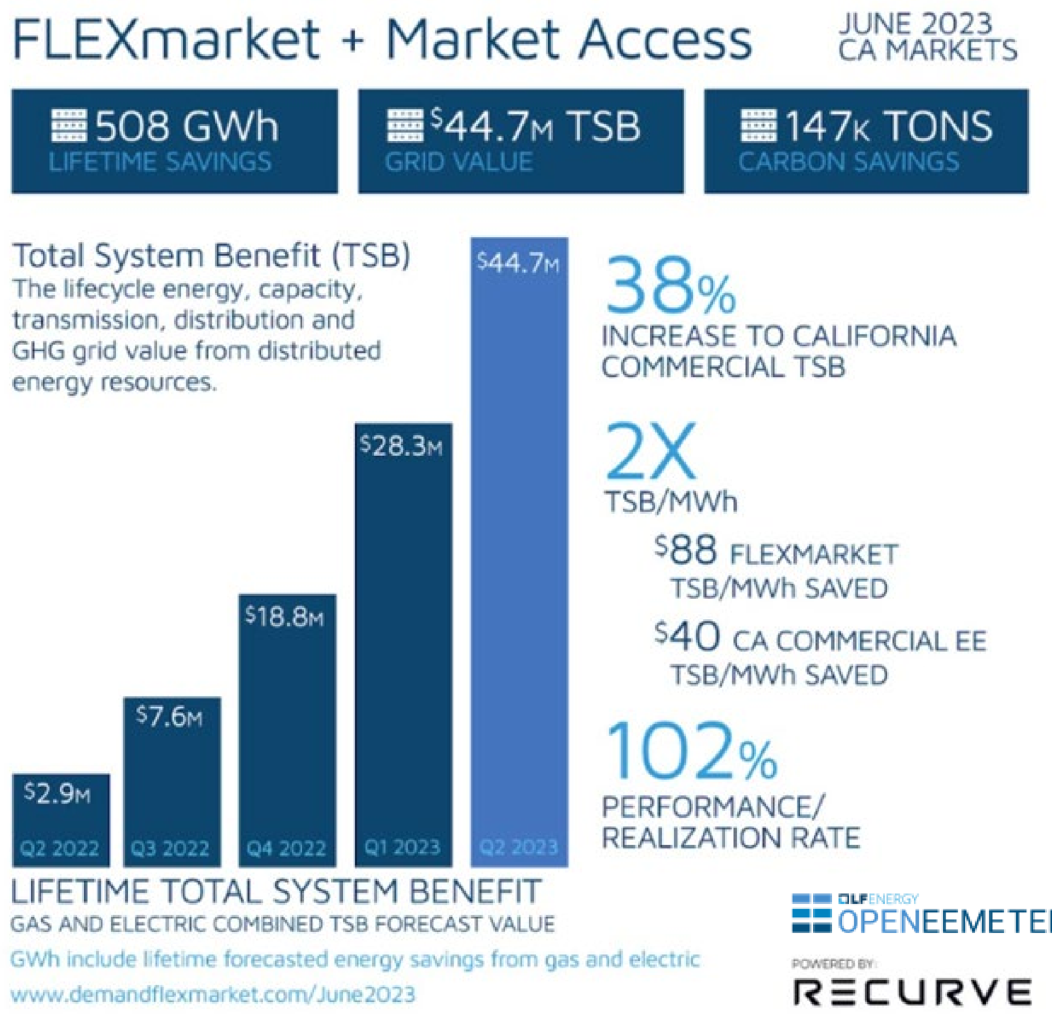
Metered Performance
Payment for Grid Value
Project Finance

Performance Aligns Incentives

Price Anchored in Hourly Avoided Cost

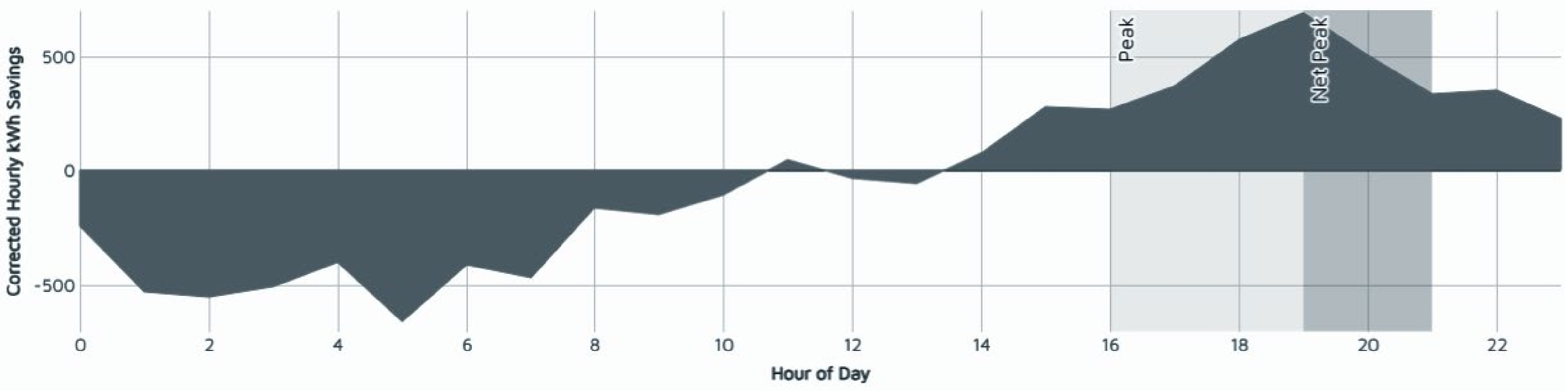


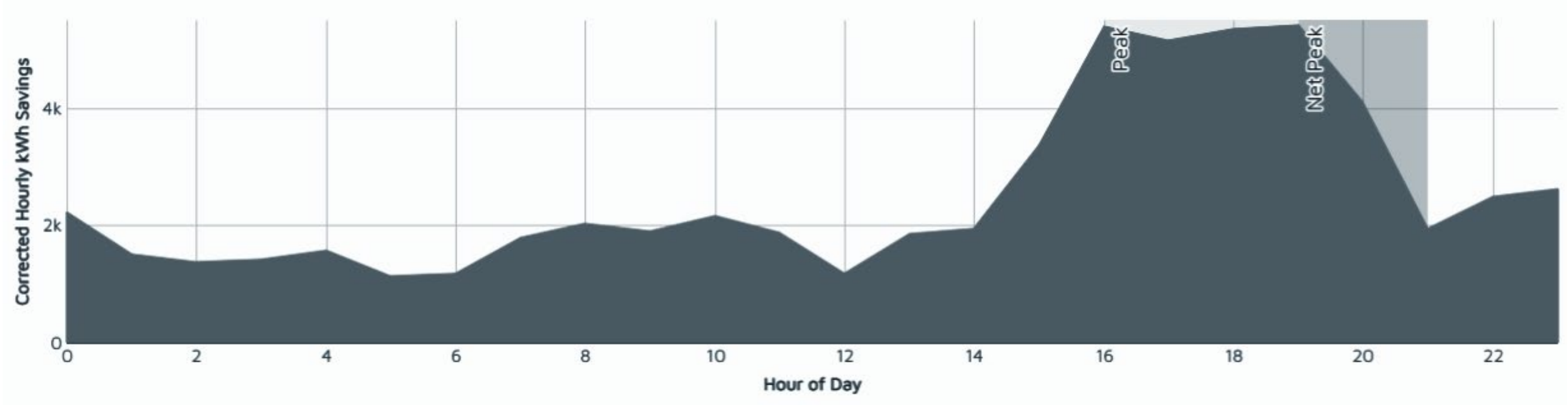
+ Geographic
+ Demographic (LMI)
+ Event-based response



Enable Range of Technology Agnostic Impacts

EV charging load shifts out of the evening peak





Smart thermostats reduce load across all hours, focusing on the peak

MCE Empowering Our Clean Energy Future
CONTRA COSTA | MARIN | NAPA | SOLANO

Adaptable to Multiple Procurement Models

Vertically Integrated Utilities

Generation & Transmission Providers

Wholesale Markets

Non-Wires / Pipes Alternatives

Wholesale Aggregation for member companies

Forward Capacity Markets

Aggregated Distributed Energy Resource (ADER)

Integrated Resource Plans & Resource Adequacy

All Source Procurements

Load Modifying Resource for Cooperatives & CCAs

Clean Energy Resource or Decarbonization Goals

Carbon Credit (Energy Attribution Credits)

FERC 2222 Enabled DSM

Strategies and Examples for Action

Develop or **publish value** for pricing avoided energy usage and decarbonization

- New York's Valuation of Distributed Energy Resources (VDER)
- California's Avoided Cost Calculator (ACC)
- Efficiency cost test values

Establish **measured outcomes as the default** and utilize standardized measurement and verification

- IRA-HOMES programs measured pathway with open-source M&V
- Kansas efficiency order setting metered results as default

Streamline program designs for **technology-agnostic solutions** valuing short and long term load management

- Market Access model
- Integrated Demand Side Management strategies
- Outcome-based performance incentives

Thank you!

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Thank you for joining today!

Upcoming:

- <u>In-Person:</u> **Integrated Distribution System Planning & Resilience Training, Jan 24-25, 2024** in Irvine, CA [*state agencies only*] www.naruc.org/about-naruc/event-calendar/western-dspr-training/

NASEO

National Association of State Energy Officials

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www.naruc.org/cpi-1/energy-distribution/der-integration-compensation/