Demand Response Auction Mechanism (DRAM) Evaluation Workshop

July 7, 2022

9:00 a.m. – 2:00 p.m.

Hosted by the Energy Division of the California Public Utilities Commission

California Public
Utilities Commission

Host & Presenters

- **Host: Energy Division**
  - Eleanor Adachi

- **Presenters: Nexant Team***
  - Aimee Savage
  - Candice Potter
  - George Jiang
  - Jeremy Smith
  - Josh Schellenberg
  - Kallie Wells

 * Nexant (now Resource Innovations) in partnership with Gridwell Consulting

This workshop is being recorded.

Agenda

Note that times are approximate. There will be a brief pause for questions after each section/criterion.

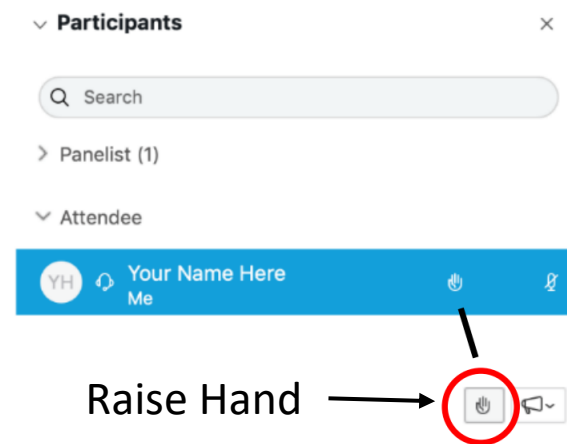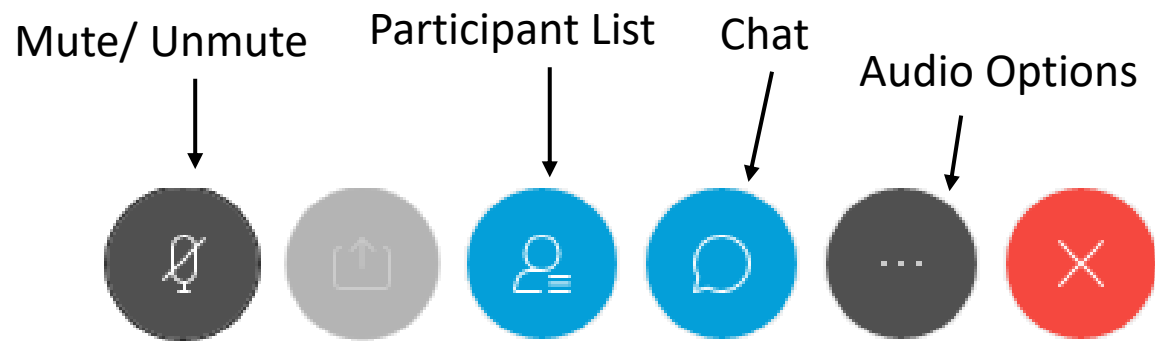| #	Topic	Time
1	**Introduction and Logistics**	9:00 AM – 9:15 AM
2	**DRAM Evaluation Report Presentation** (Background, Criteria 1-3)	9:15 AM – 10:30 AM
3	Stretch Break	10:30 AM – 10:35 AM
4	**DRAM Evaluation Report Presentation** (Criteria 4-6)	10:35 AM – 12:00 PM
5	Lunch Break	12:00 PM – 12:30 PM
6	**DRAM Evaluation Report Presentation** (Revenue Quality Meter Data, Results & Recommendations)	12:30 PM – 1:30 PM
7	**Closing Q&A**	1:30 PM – 2:00 PM

Logistics

• Workshop is being recorded

• Presentation & recording will be uploaded onto DR Workshops website at a later time

• Safety
  • Note surroundings and emergency exits
  • Ergonomic check
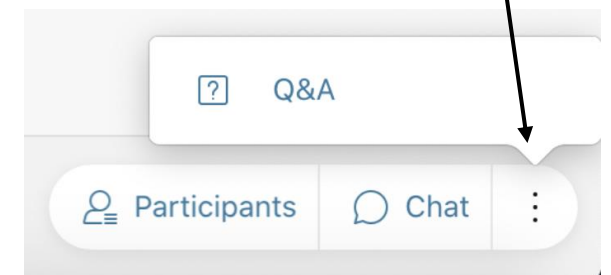 • In case of emergency, call 9-1-1
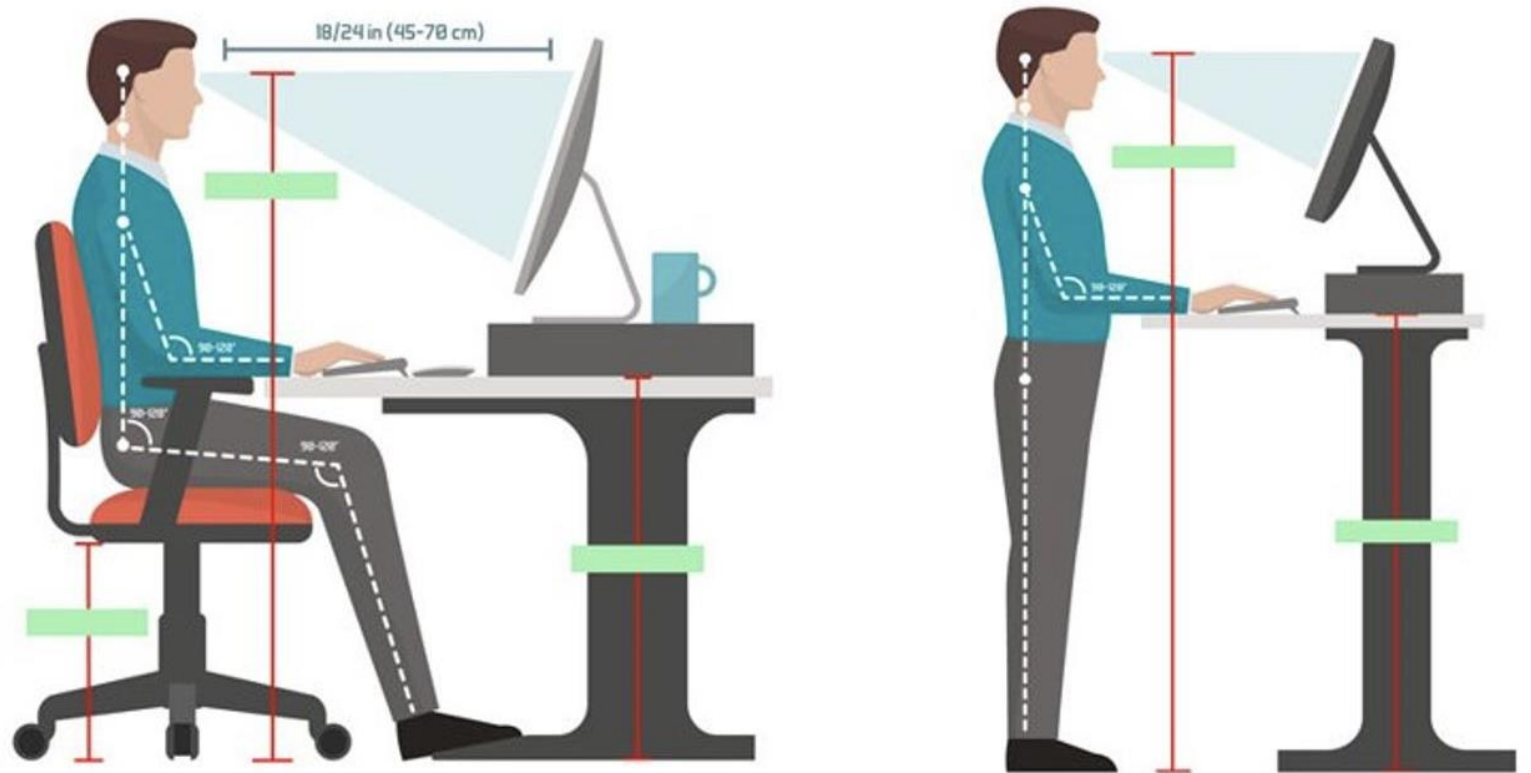
Logistics

- All attendees have been muted
- If using the chat, make sure it is sent to "everyone"
- To ask questions, please "raise your hand" and host will unmute you so you can ask your question. If you would rather type, use the "Q&A" function (send to "all panelists")
- Q&A questions will be read aloud by staff; attendees may be unmuted to respond to the answer. (Reminder: Mute back!)

Mute/ Unmute

Participant List

Chat

Audio Options

Participants

Q Search

> Panelist (1)

∨ Attendee

YH Your Name Here
Me

Raise Hand

"Q&A": on bottom right of screen, click the 3 dots

? Q&A

Participants   Chat

Ground Rules

- Please hold your questions until the Q&A slide after each section

- Keep comments friendly and respectful

- Please use Q&A feature only for questions or technical issues

- Do NOT start or respond to sidebar conversations in the Chat

- Refrain from discussing any other proceedings in case Commissioners are present to avoid inadvertent ex-partes

Demand Response Auction Market (DRAM) Evaluation

Delivery Years 2018 – 2021

Prepared by Nexant (now Resource Innovations)

in partnership with Gridwell Consulting

July 7, 2022

NexanT
Now a part of Resource Innovations

Introduction

- In Decision 16-09-056 (**Sep. 2016**), the California Public Utilities Commission (CPUC) reviewed the consideration of transitioning the Demand Response Auction Mechanism (DRAM) from pilot status to a fully operational mechanism

- The Commission adopted a set of six criteria to determine the success of DRAM

  a) Were new, viable third-party providers engaged?

  b) Were new customers engaged?

  c) Were bid prices competitive?

  d) Were offer prices competitive in the wholesale markets?

  e) Did demand response providers aggregate the capacity they contracted, or replace it with demand response from another source in a timely manner?

  f) Were resources reliable when dispatched, i.e., did customers perform appropriately?

Introduction

- In **Jan. 2019**, the final version of the Energy Division's DRAM Evaluation report was released

  - Focused on contracts from 2015 and 2016 (for delivery in 2016 and 2017, respectively) while also considering data from contracts in 2017 for delivery in 2018 and 2019

  - Found that DRAM had been successful in engaging new third-party demand response providers (DRPs) and new customers and that the capacity price offers for resource adequacy were generally competitive

  - Also found that bid prices for DRAM resources in the energy wholesale market were generally not competitive as well as inconclusive evidence of their performance and reliability

- Based on the findings of the 2019 report, the CPUC approved a continuation of DRAM for four years in Decision 19-07-009 in **Jul. 2019**

  - Recommended a limited continuation of DRAM to allow for demonstrated improvements in performance and reliability

  - Also approved an evaluation for delivery years 2018 through 2021 and solicitations for 2019 through 2021

Introduction

- The report released **Jun. 24, 2022** presents the results of this evaluation across the six adopted criteria for the success of DRAM, conducted by the Nexant Team
  - Composed of Nexant (now Resource Innovations) and Gridwell Consulting
- August Capacity and Annual DRAM Procurement Budget, DRAM I-VI

	DRAM I	DRAM II	DRAM III-A	DRAM III-B	DRAM IV	DRAM V	DRAM VI
Delivery Year	2016	2017	2018	2019	2019	2020*	2021
Capacity Procured (August MW)	40.5	124.6	181.9	205.0	166.6	215.8	206.1
Annual Procurement Budget (Millions USD)	$9.0	$13.5	$13.5	$13.5	$13.5	$12.8	$14.0

* 2020 DRAM had a 7-month delivery period.

Evaluation Objectives

- Building upon the 2019 DRAM Evaluation, the Nexant Team developed an evaluation research plan to continue the assessment of the mechanism

- Evaluation Research Questions by Criterion:

Metric	Research Questions
Criterion 1: Did DRAM Engage New, Viable DRPs?	- How many new DRPs were engaged each year? - Did the diversity of providers increase? - How many contracts were terminated and/or reassigned each year? - What were the underlying challenges in engaging new, viable DRPs and increasing market concentration?
Criterion 2: Did DRAM Engage New Customers?	- What was the customer profile for each DRAM year? - How did demographics of participants change between each successive DRAM auction? - For each customer segment in DRAM III–V, how many participants were new customers or existing DRAM customers?
Criterion 3: Were Auction Bid Prices Competitive?	- Were DRAM auction bids less than the long run avoided cost of generation (LRAC)? - Were bids dispersed in a narrow range? - How did bids compare to other appropriate benchmarks (e.g., IOU program capacity payments, CAISO's capacity procurement mechanism soft offer cap, the CAISO's DMM estimated cost for a new gas-fired peaker)?

Evaluation Objectives

- **Evaluation Research Questions by Criterion, continued:**

Metric	Research Questions
Criterion 4: Were Offer Prices Competitive in Wholesale Markets?	- What was the dispersion of DRAM energy and ancillary service offer prices in the day-ahead (DA) and real-time (RT) markets relative to (1) other DR resources and (2) other resource types? - Did DRAM resources update bids between the DA and RT markets? - How effective were DRAM resources in getting scheduled in the DA and RT markets? - During the CAISO's 120 highest net load hours how effective were the DRAM resources in getting scheduled in the DA and RT markets?
Criterion 5: Did DRPs Meet Their Contractual Obligations?	- What was the alignment of resources based on ratio of Supply Plan capacity (DRP-reported qualifying capacity) and contract capacity? - What was the alignment of resources based on ratio of invoiced demonstrated capacity and contract capacity? - What was the alignment of resources based on the ratio of bids into the DA market and Must-Offer Obligation (MOO)? - How well did DRPs meet the minimum dispatch requirement for 2021 DRAM contracts to deliver 30 MWh per 1 MW of average qualifying capacity (QC)?
Criterion 6: Were Resources Reliable When Dispatched?	- Did DRAM resources deliver energy in accordance with CAISO RT dispatch instructions? - Did DRAM resources awarded ancillary services in the DA market still have the ability to provide the capacity in RT?
Revenue Quality Meter Data (RQMD) Delivery	- Based on the RQMD Working Group report, should penalties be imposed for delayed customer and meter data that the Utilities provide to DRPs so that they may participate in the CAISO wholesale market?

Demand Response Auction Market (DRAM) Evaluation
Criterion 1: Did DRAM Engage New, Viable DRPs?

Presenting: Jeremy Smith

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Introduction

- Criterion 1 seeks to evaluate whether DRAM engaged new and viable DRPs to participate in demand response and evaluates the trend in market concentration over the DRAM waves.

- The previous CPUC DRAM evaluation analyzed the participation of DRPs, market concentration, and their viability in terms of contract terminations and reassignments in 2016 DRAM (I)-2019 DRAM (III-B). "New" was defined as a DRP that had never previously participated as an aggregator in IOU programs. "Viability" was defined as a DRP that completed the full terms of their contracts and delivered the capacity for which they were awarded.

- This evaluation expands upon that analysis for 2019 DRAM (IV) through 2021 DRAM (VI). Due to all DRPs having previously served as an aggregator for IOU programs by 2020 DRAM, the definition of "new" was modified for this evaluation to be a DRP that has never previously sold in DRAM. The team sought further understanding of challenges to viability and market concentration by interviewing DRPs.

Methodology

- **New:** Collected and analyzed bid and contract information, identifying DRPs that have not previously participated in DRAM.

- **Viability:** Reviewed contract terminations and reassignments for all DRAM waves.

- **Market Concentration:** Analyzed capacity and contract value share of each DRP overall, by market sector, and by IOU service territory. Calculated Herfindahl-Hirschman Index (HHI) to determine competitiveness of each market.

- **Barriers:** Conducted in-depth interviews with DRPs involved in DRAM to further understand the process and challenges of engaging new, viable third-party providers. Discussed bidding process, integration challenges with IOU and CAISO systems, Commission rules, steps to ensure DRP viability, and the future of the program.
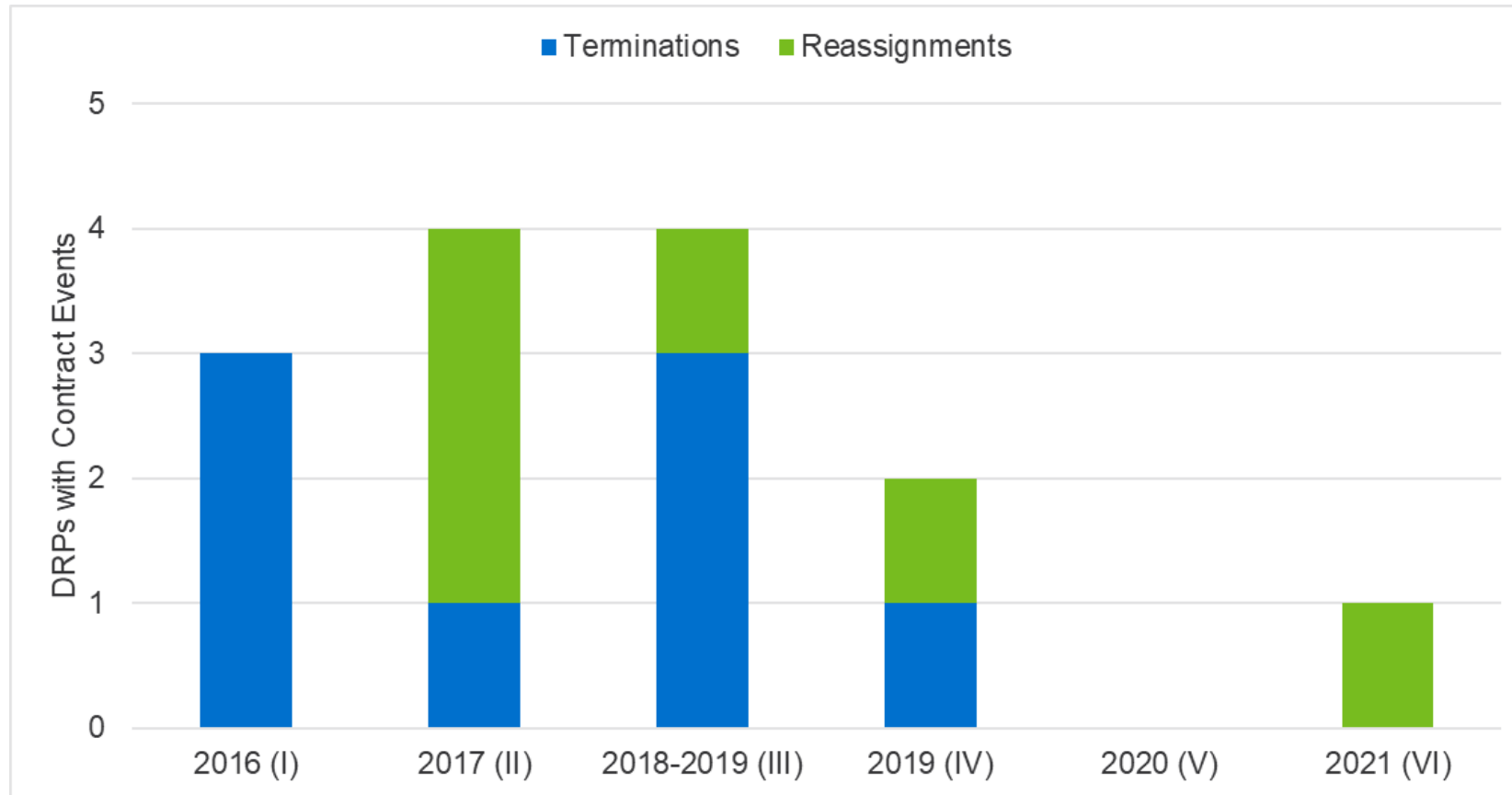
Participation of New Demand Response Providers

- The number of DRPs participating is decreasing, both total and new
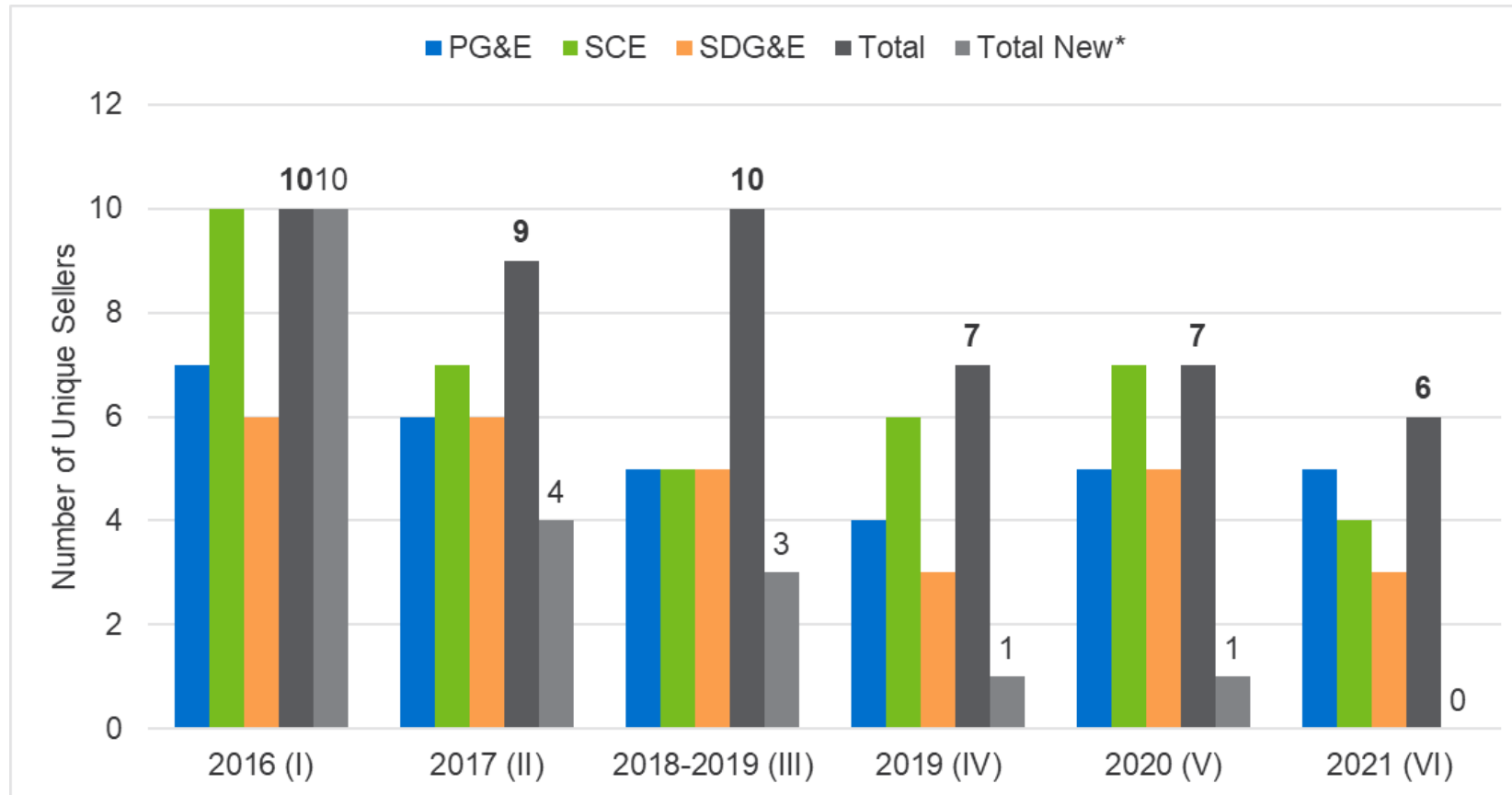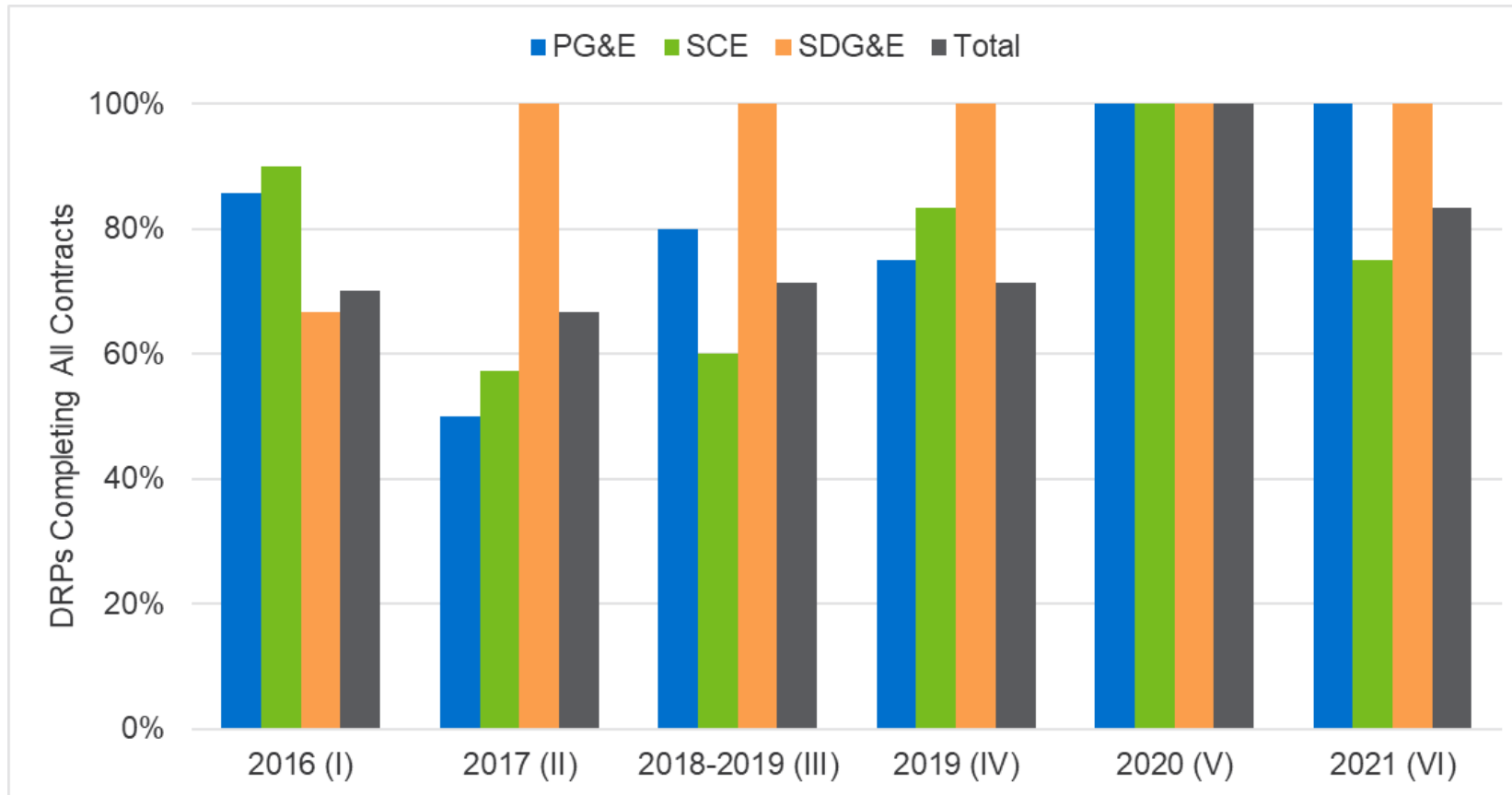
Demand Response Provider Viability

- The number of DRPs with contract terminations and reassignments has decreased

Demand Response Provider Viability

- The number of DRPs completing all contracts has increased
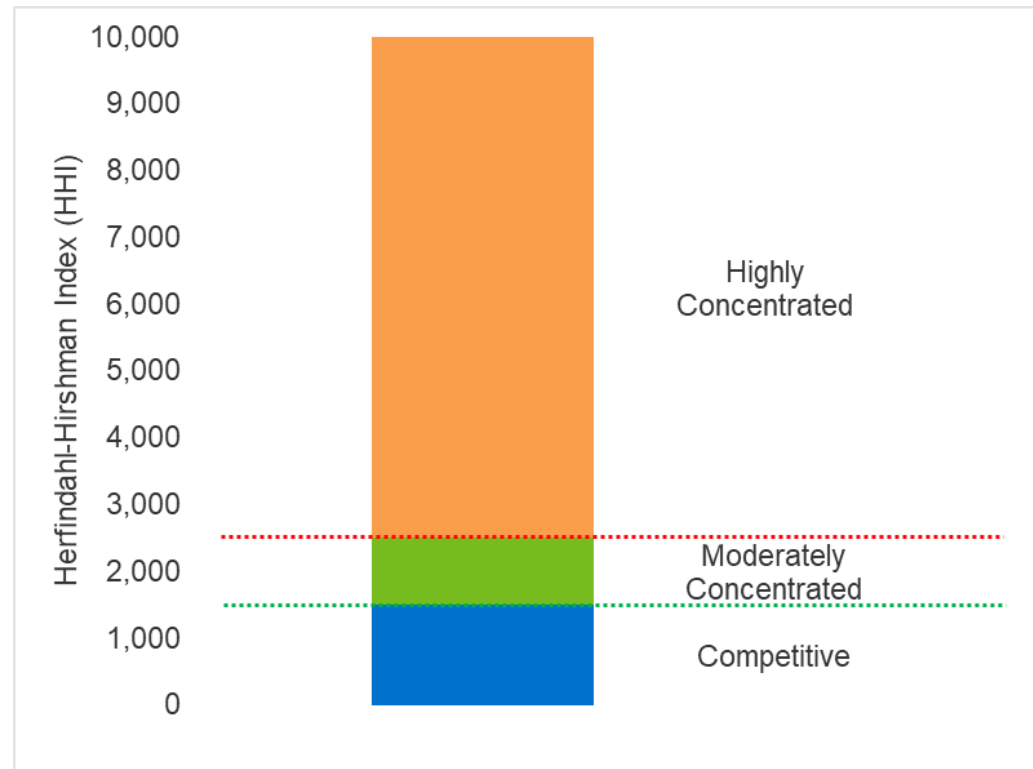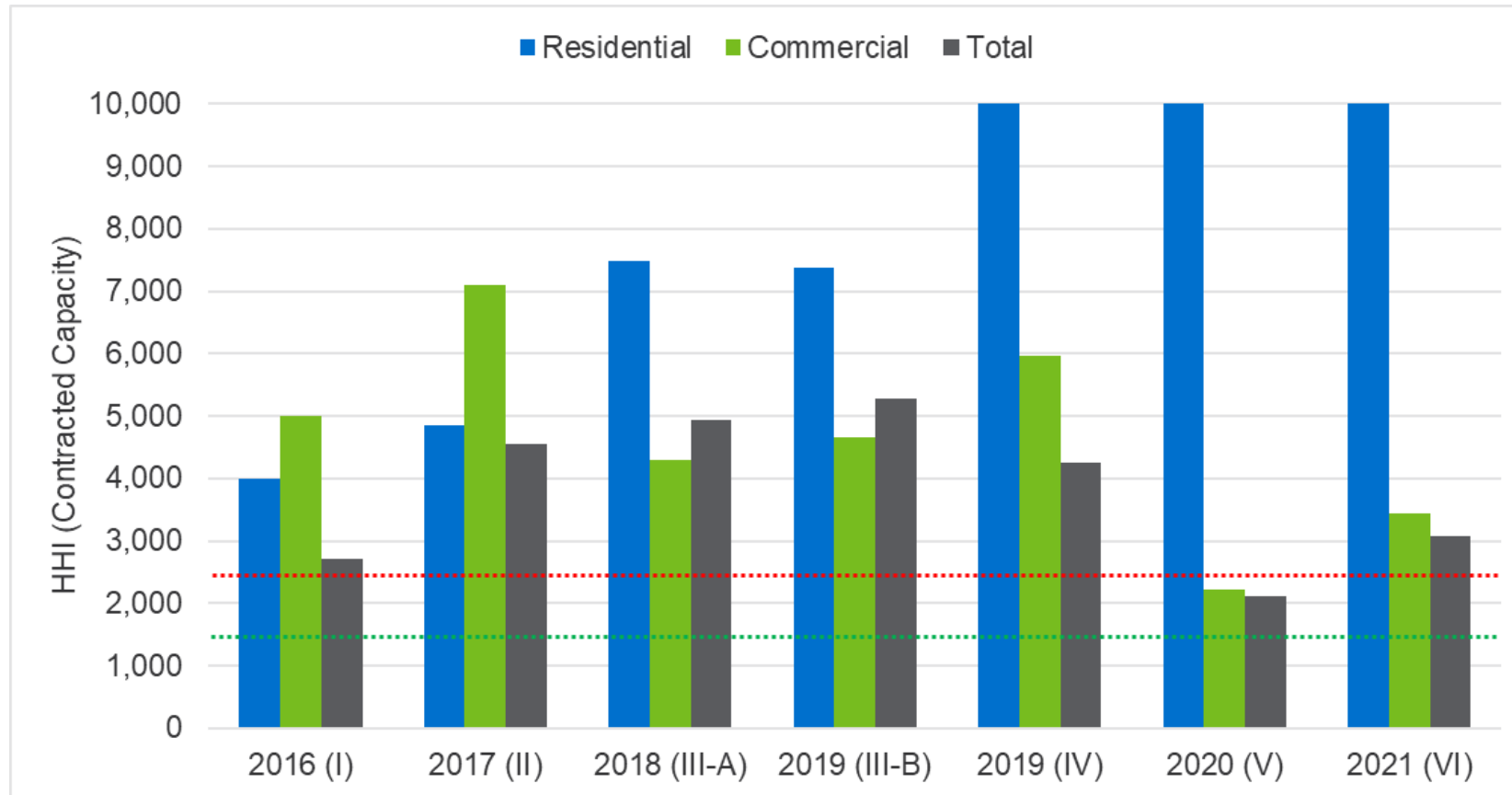
Market Concentration

- Herfindahl-Hirschman Index (HHI)

  - $HHI = (s_1 \times 100)^2 + (s_2 \times 100)^2 + (s_3 \times 100)^2 + \cdots + (s_n \times 100)^2$

Market Concentration

- HHI (Contract Capacity) by Market Segment

Market Concentration

- HHI (Contract Capacity) by IOU service territory
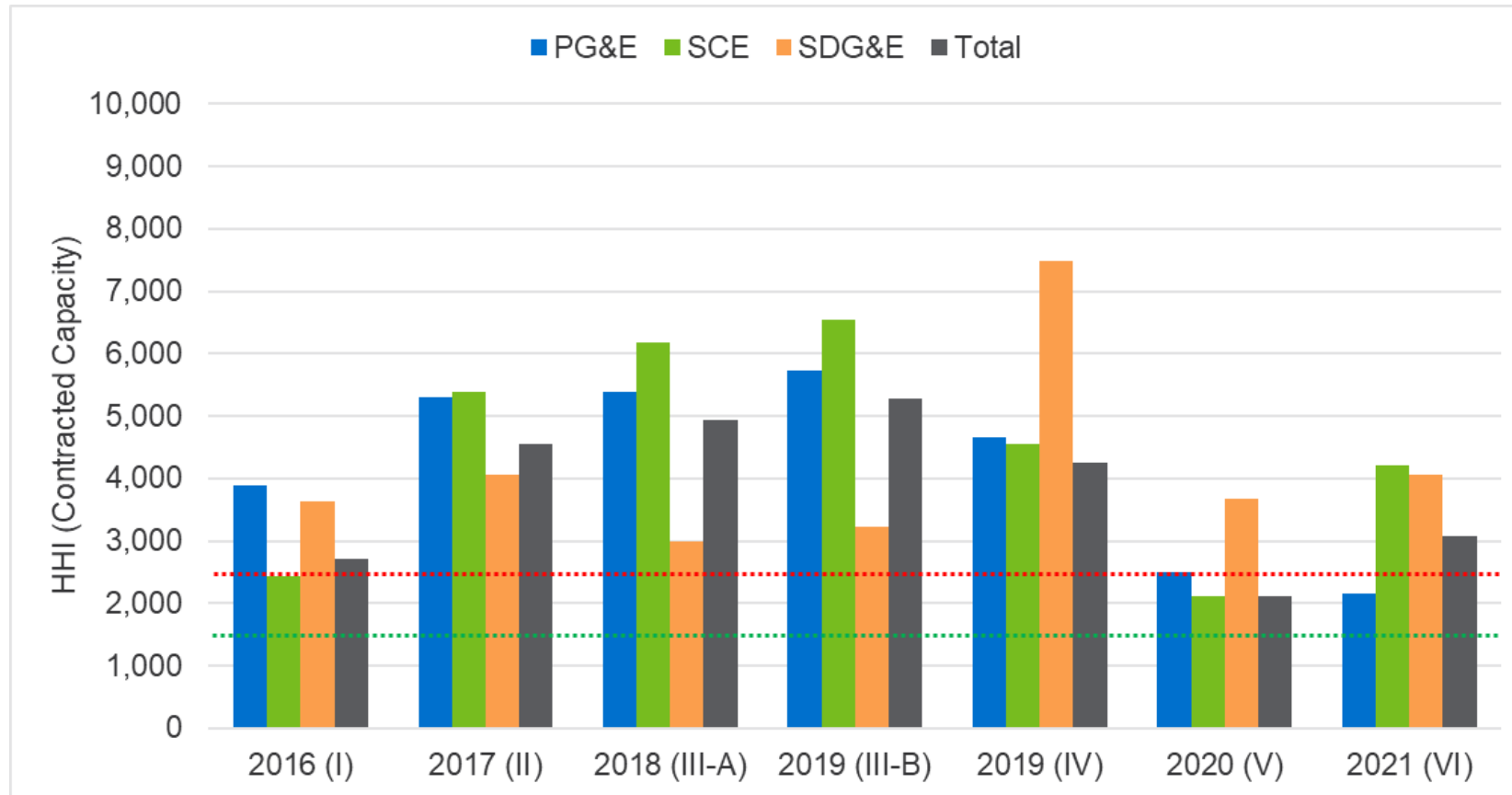
Challenges Faced by Providers – In-Depth Interviews

- Contacted 20 companies that participated in Bidders' Conference

- Contacted 2 bidders and completed 1 interview

- Contacted 9 sellers and completed 6 interviews

Participation Category	Number of Companies			
	Contacted	**Interviewed**	**Questionnaire**	**Total Complete**
No Bid	20	0	0	0
Bidders	2	1	0	1
Sellers	9	5	1	6
Total	**31**	**6**	**1**	**7**

Challenges Faced by Providers – Program Participation

- Most DRPs prefer CCA RA contracts due to longer contract terms and less administrative burden and testing requirements

- Primary barriers for DRAM participants:

  − Administrative burden has increased over time

  − Lack of timely and accurate meter data

  − Short-term contracts are riskier

Challenges Faced by Providers – Bidding Process

- All DRPs agreed the bidding process is straightforward*

- Most DRPs said bidding process lacks feedback on whether bid price or reliability is prioritized, leading to undervaluing capacity in hopes of winning

- Hurdles put in place to ensure viability have made DRAM less of an opportunity/test-bed for new DR technologies (BTM DERs)

- Challenge to provide accurate bids more than a year in advance of the delivery window

- Suggestions to improve bidding process:

  − More uniformity between IOU timelines, processes, and bidding templates

  − More transparency on what constitutes a viable bid and publicly available cost effectiveness models for DRAM, like EE and other DR programs

* No companies that elected not to bid or never won a contract were interviewed

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Challenges Faced by Providers – IOU Systems - Customer Enrollment

- Primary challenge is that inaccurate customer data (inaccurate dual-enrollment status or mislabeled account IDs) causes enrollment/eligibility delays

- Click-Thru Customer Information Service Request (CISR) forms have brought significant improvements

  − During the last evaluation, 88% of DRPs said customer fatigue with paper CISR forms was the primary barrier.

  − Still much better than processes in other states but giving agency to third-party when equipment is installed would prevent losing a customer (as reengaging can be challenging).

- Suggestions to improve:

  − Automatic alert to DRPs when a customer's information changes that would make them ineligible

Challenges Faced by Providers – IOU Systems - Meter Data Management

- Most companies interviewed reported recurring problems obtaining timely and accurate meter data and said this was the most or second-most significant barrier to participation

- SCE was identified as the IOU with the most regular issues, which were most challenging during a billing system overhaul

- Delays and inaccurate data sometimes led to delayed payments or penalties after the 52-business day CAISO settlement deadline

- For certain loads (EV charging, battery storage, sub-metered loads), the Meter Generator Output (MGO) protocol would improve accuracy over metered data

Challenges Faced by Providers – IOU Systems - Customer Registration

- Delays caused by customers enrolled in utility programs/on tariff that makes them ineligible to participate in DRAM

- Additional delays caused by CAISO systems requiring IOU confirmation of DRP customer registrations

- Lack of central depository to track issues like the validation lists with utility programs

- Each time registration is resubmitted there is a 10-day waiting period

- Suggestions to improve

  - Smoother/automatic process to unenroll customers from utility programs/tariffs to avoid customers having to contact utility directly

Challenges Faced by Providers – CAISO Systems

- **Registration issues**
  - Not a defined timeline between starting to enroll a customer and them being market ready
  - Eligibility delays due to dual-enrollment in utility programs

- **Market rules**
  - Discrepancy between number of hours required to bid versus perform
  - Testing requirement for six months means seasonal loads (agricultural pumping or space cooling) are not representative during cooler months
  - Market rule complexity is a barrier to entry

- **Settlement processes**
  - Timeline does not account for delays in RQMD
  - 10-of-10 baseline not most accurate – option to choose other CAISO-approved baselines
  - 20% adjustment cap challenge for weather-dependent loads – could be removed

Challenges Faced by Providers – Other Barriers

- **Commission Rules and Processes**

  - 30 MWh per MW Qualifying Capacity minimum requirement

  - Timeline for quarterly reports reasonable, but does not account for delays in RQMD

- **Steps to Ensure DRP Viability**

  - Challenging to balance goals of new and viable, but viability should be valued over cheapest resource

- **Expectations about DRAM Future**

  - Overall DRPs have a positive view of the program and hope to see it continue and expand

  - Perpetual pilot

  - Capacity Bidding Program (CBP) just as good an opportunity as DRAM with elect option (PG&E), longer timelines, no scheduling coordinator, less administrative burden

Challenges Faced by Providers – Other Barriers

- Steady decrease in capacity prices and increase in number of hours required to dispatch makes DRAM less of an advantage over IOU programs

- Longer nomination timeframe doesn't allow for accurate forecasting/planning

- Requirement to test resources for 6 of 12 months

- Not being able to move customers from one resource to another

- Lack of process standardization across IOUs

- CCAs are more collaborative than IOUs

- Net exports are not counted towards DR performance

Discussion

- Two new DRPs were engaged in the 2019 (IV)-2021 (VI) DRAM waves

- Viability has improved overall, with less contract events and a higher percentage of DRPs completing all contract terms

- Significant market concentration since the start of the pilot, particularly in residential market (one seller). Top three DRPs held 74% of all contracted capacity in 2020 and 87% in 2021

- Primary challenges

  - Timely and accurate metered data

  - Administrative burden

  - Short-term contracts

Questions?

Photo by Camylla Battani

Demand Response Auction Market (DRAM) Evaluation

Criterion 2: Were New Customers Engaged?

Presenting: Jeremy Smith

Introduction

- Criterion 2 assesses whether DRAM engaged new customers that had never participated in an IOU DR program.

- In the initial evaluation of 2016 (I) and 2017 (II) DRAM by the Energy Division, this criterion was graded as pass/fail, with the threshold for a "pass" being the verification of at least one new customer participating in DRAM.

- The evaluation of 2018 (III-A) through 2020 (V) DRAM follows the same approach with one small change. Due to unavailable customer participation data before 2018, a "new" customer is one that had not yet participated based on 2018 enrollment data. Further, 2021 DRAM is not included because customer data was not available at the time of this evaluation.

Methodology

- IOUs provided characteristic data of their customer population, including DRAM participants. This data was analyzed to determine participation trends among customers of various groups, including:

  - Residential vs. non-residential

  - CARE vs. Non-CARE (California Alternative Rates for Energy or low-income)

  - NEM vs. Non-NEM (Net-energy metering or solar)

- New characteristics analyzed for this evaluation include electric vehicle (EV) and battery storage owners

- Participation trends were calculated as a fraction of all DRAM customers

- Compared DRAM participation among each group to that of the overall IOU population

- Analyzed high- and low-energy users (top 5% and bottom 5% of their class)
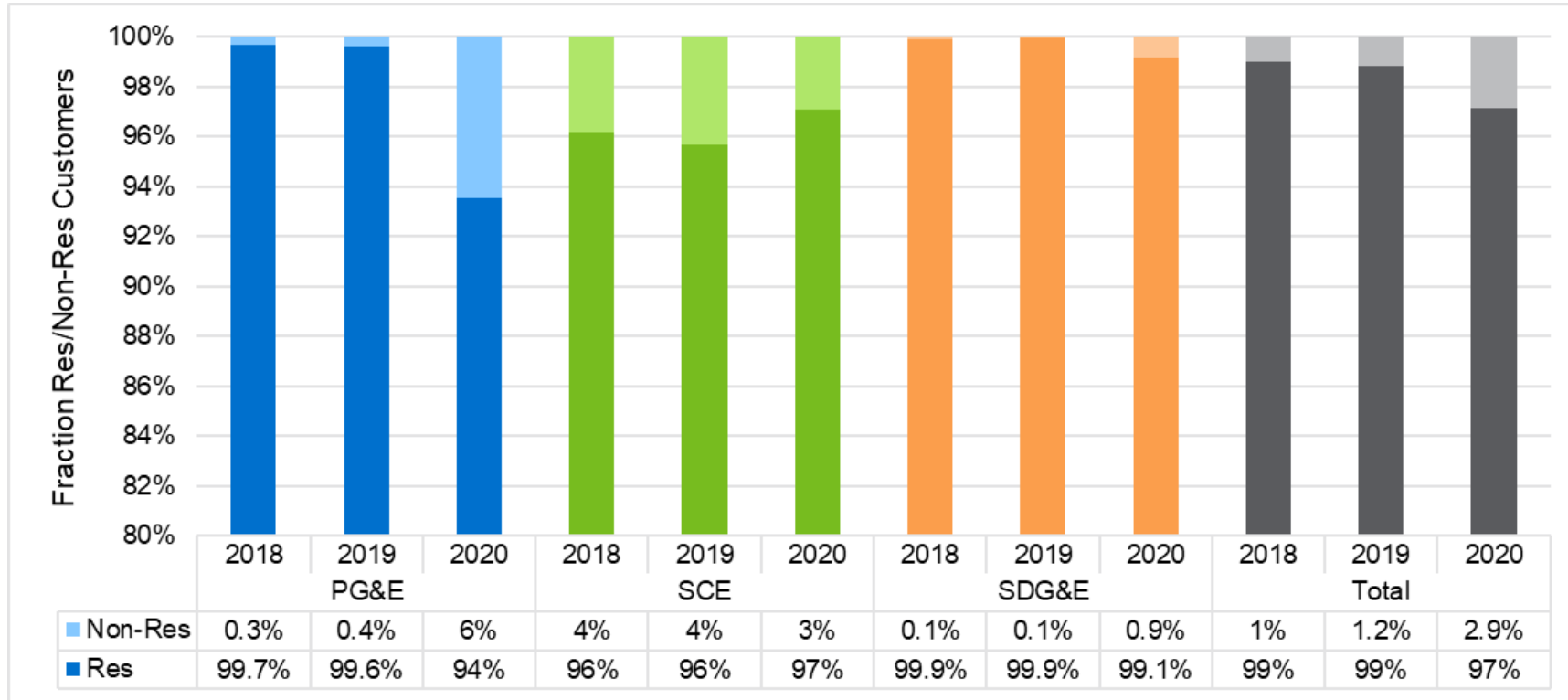
Overall DRAM Customer Characteristics

- DRAM enrollment peaked in 2019

  − Decrease in overall enrollment is from a shift to non-res DRAM contracts in 2020

- CARE enrollment steadily increased from 30% of customers in 2017 to 35% of customers in 2020

- EV and NEM participation steadily increased with adoption of the technologies

| Customers	2016 DRAM (I)	2017 DRAM (II)	2018 DRAM (III-A)	2019 DRAM (III-B+IV)	2020 DRAM (V)
DRAM Customers	12,513	52,260	104,945	149,976	70,484
New DRAM Customers	N/A	N/A	N/A	41%	26%
Residential	98%	98%	99%	99%	97%
Non-Residential	2%	2%	1%	1%	3%
CARE Rate	32%	30%	31%	33%	35%
NEM Rate	7%	5%	10%	12%	13%
EE Participant	14%	11%	10%	10%	5%
EV Rate	N/A	N/A	2%	3%	3%
Battery Storage	N/A	N/A	0.5%	0.6%	0.9%

Ratio of Residential vs. Non-residential Customers

- Higher fraction of non-residential customers in 2020 (due to decrease in PG&E residential)

	2018	2019	2020	2018	2019	2020	2018	2019	2020	2018	2019	2020
		PG&E			SCE			SDG&E			Total	
Non-Res	0.3%	0.4%	6%	4%	4%	3%	0.1%	0.1%	0.9%	1%	1.2%	2.9%
Res	99.7%	99.6%	94%	96%	96%	97%	99.9%	99.9%	99.1%	99%	99%	97%

Customers on CARE Rate in DRAM

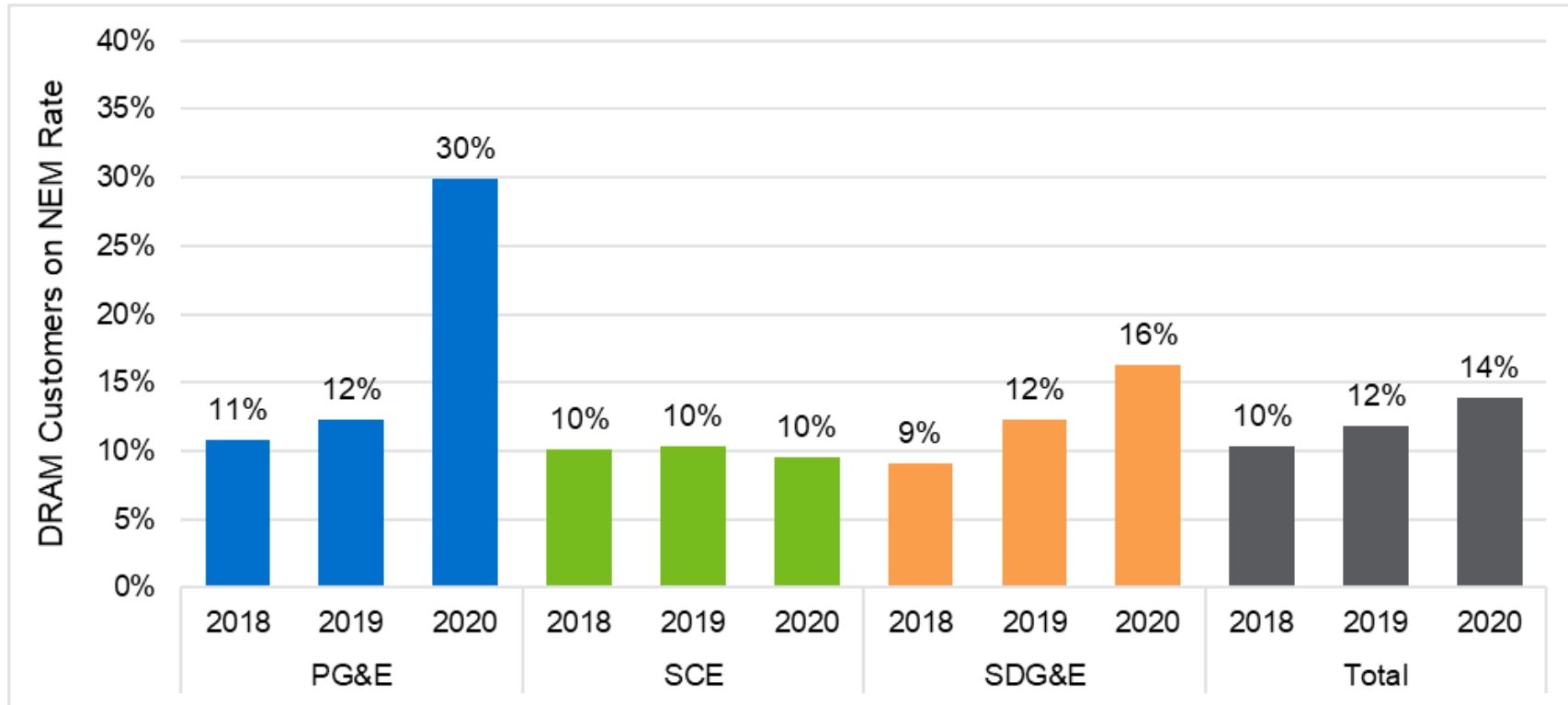- Participation among CARE customers has been consistent except for 2020 PG&E
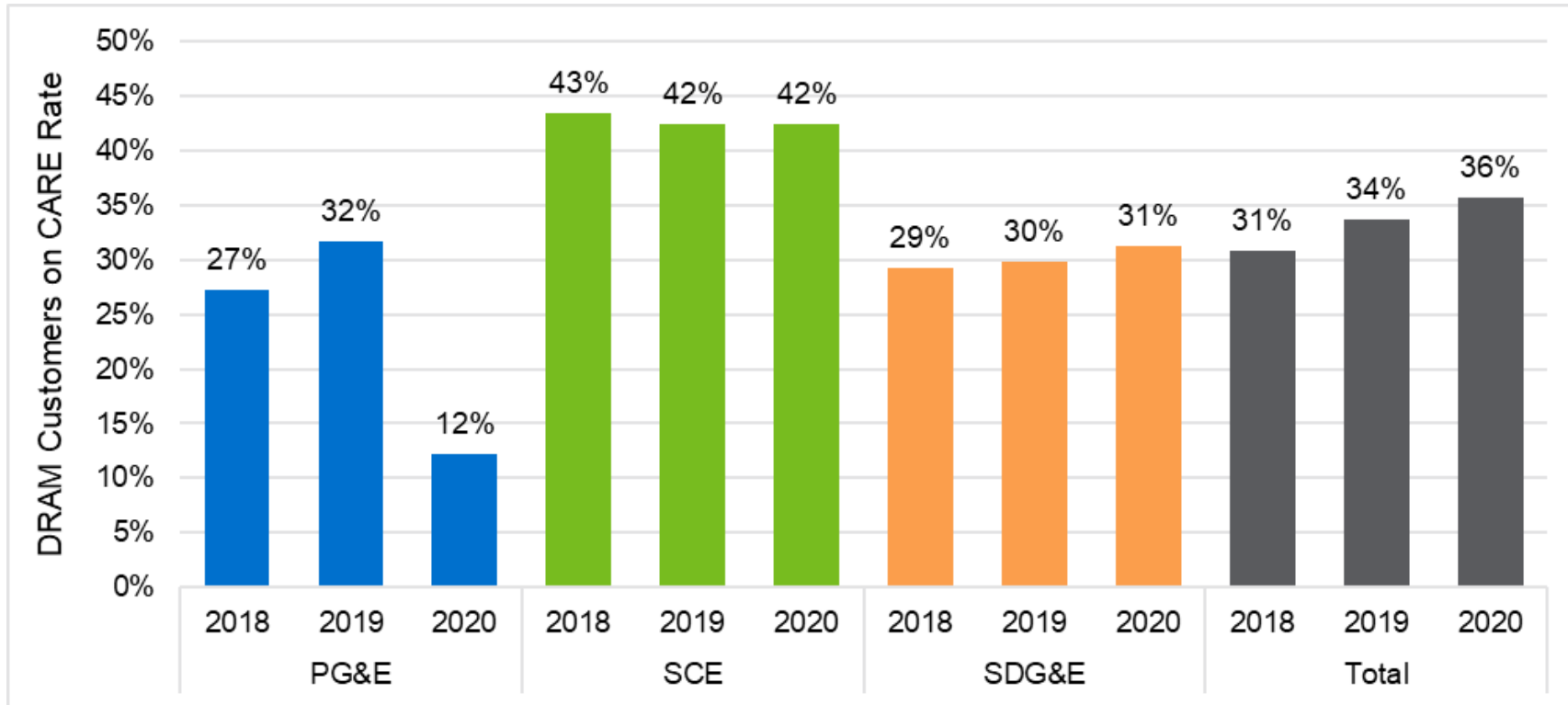
Customers on CARE Rate (DRAM Compared to Population)

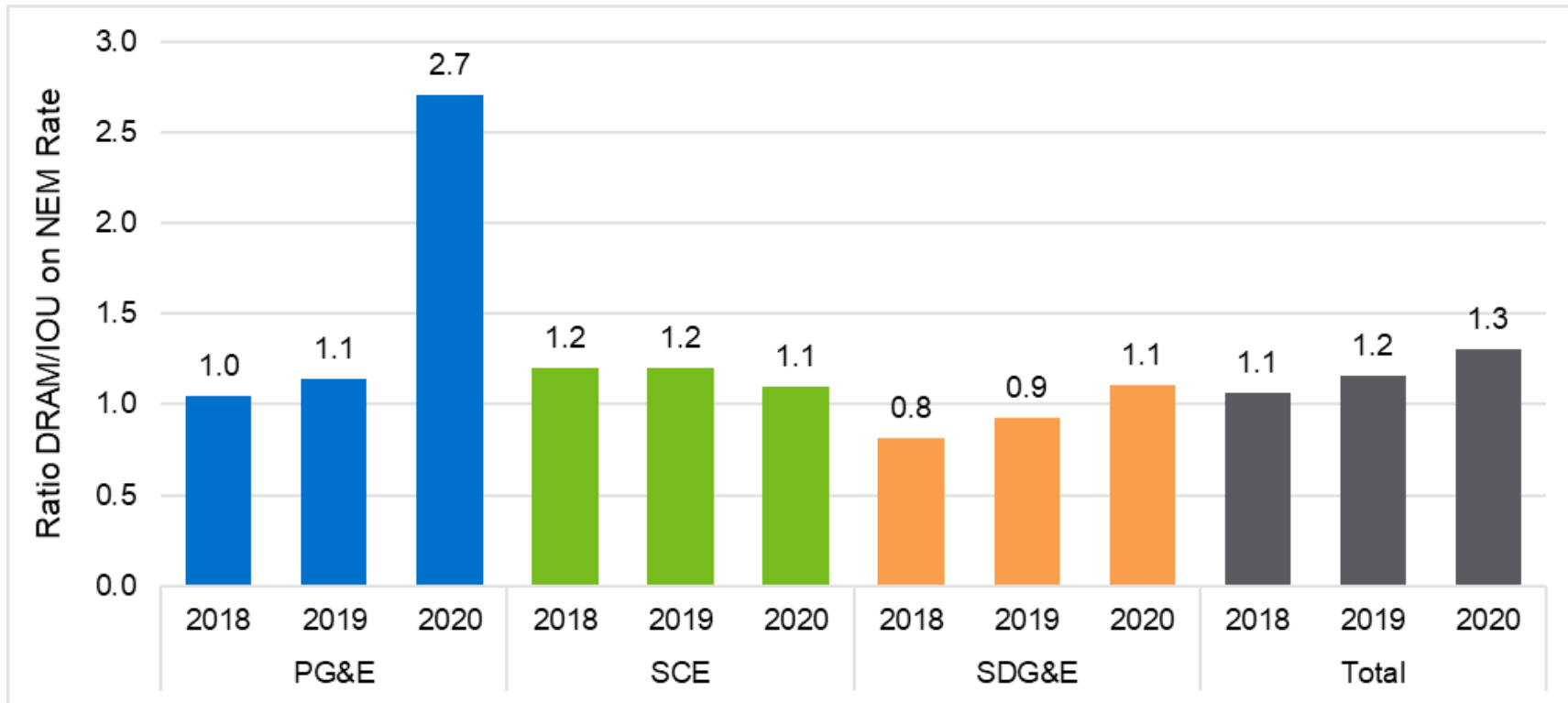- Higher participation in DRAM compared to the IOU population

Customers on NEM Rate in DRAM (Residential Only)

- Participation among NEM customers has been increasing by ~2% per year

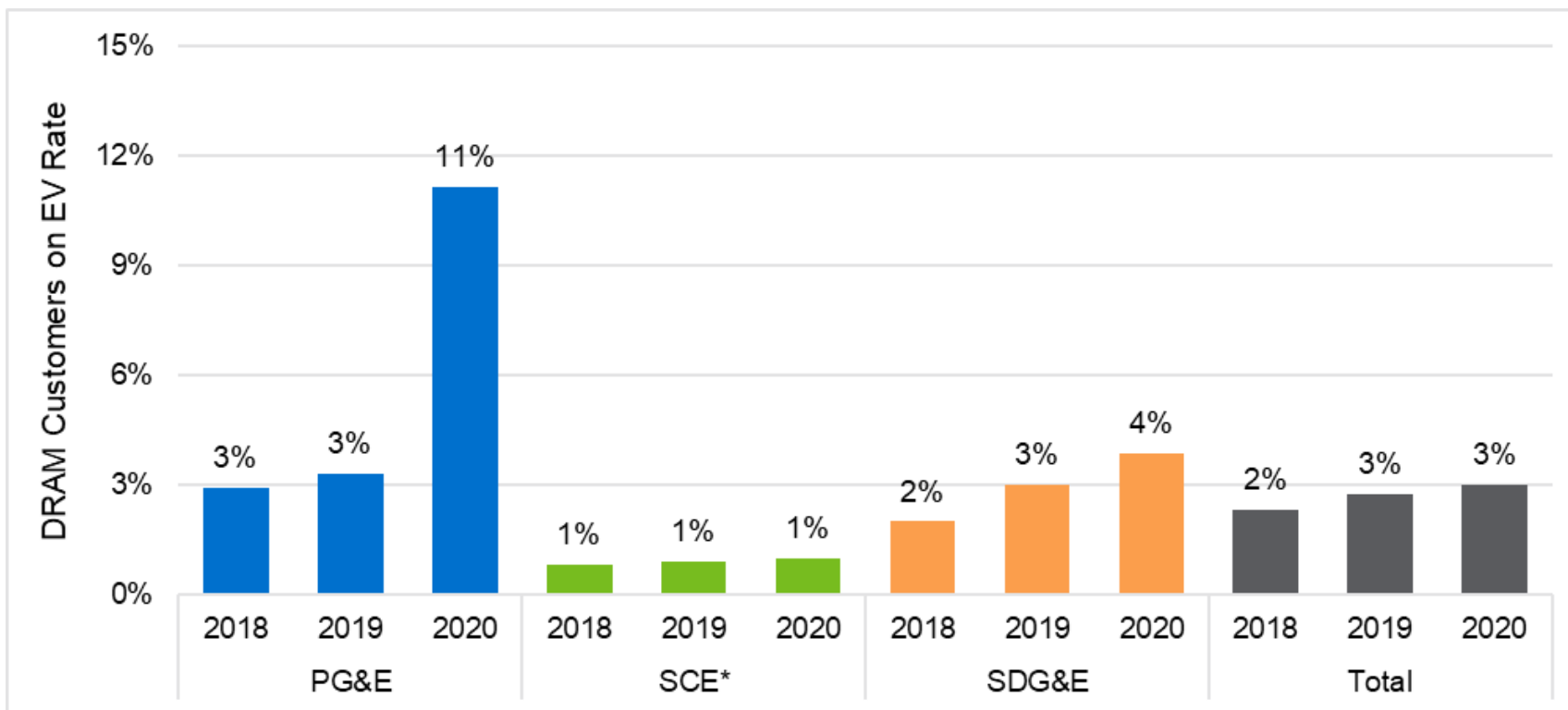# Customers on NEM Rate (Residential Only, DRAM Compared to Population)

- Higher participation in DRAM compared to the IOU population; increasing

Customers on EV Rate in DRAM (Residential Only)

- Participation among EV customers has been increasing

Customers on EV Rate (Residential Only, DRAM Compared to Population)

- Higher participation in DRAM compared to the IOU population; increasing

Customers with Battery Storage in DRAM (All Customers)

- Participation among customers with battery storage is slowly increasing

Customers with Battery Storage (All Customers, DRAM Compared to Population)

- Higher participation in DRAM compared to the IOU population; increasing to 3x by 2020
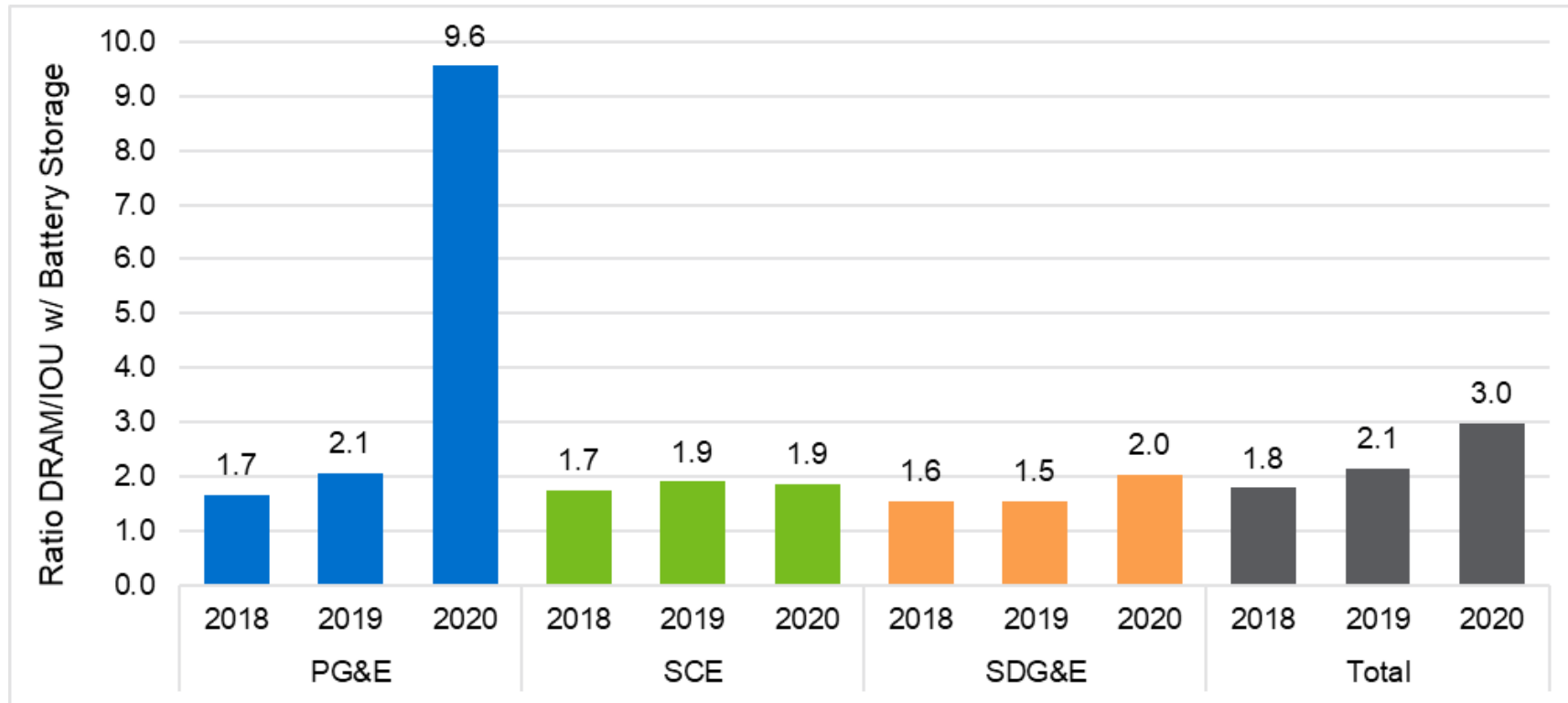
High Energy Users in DRAM
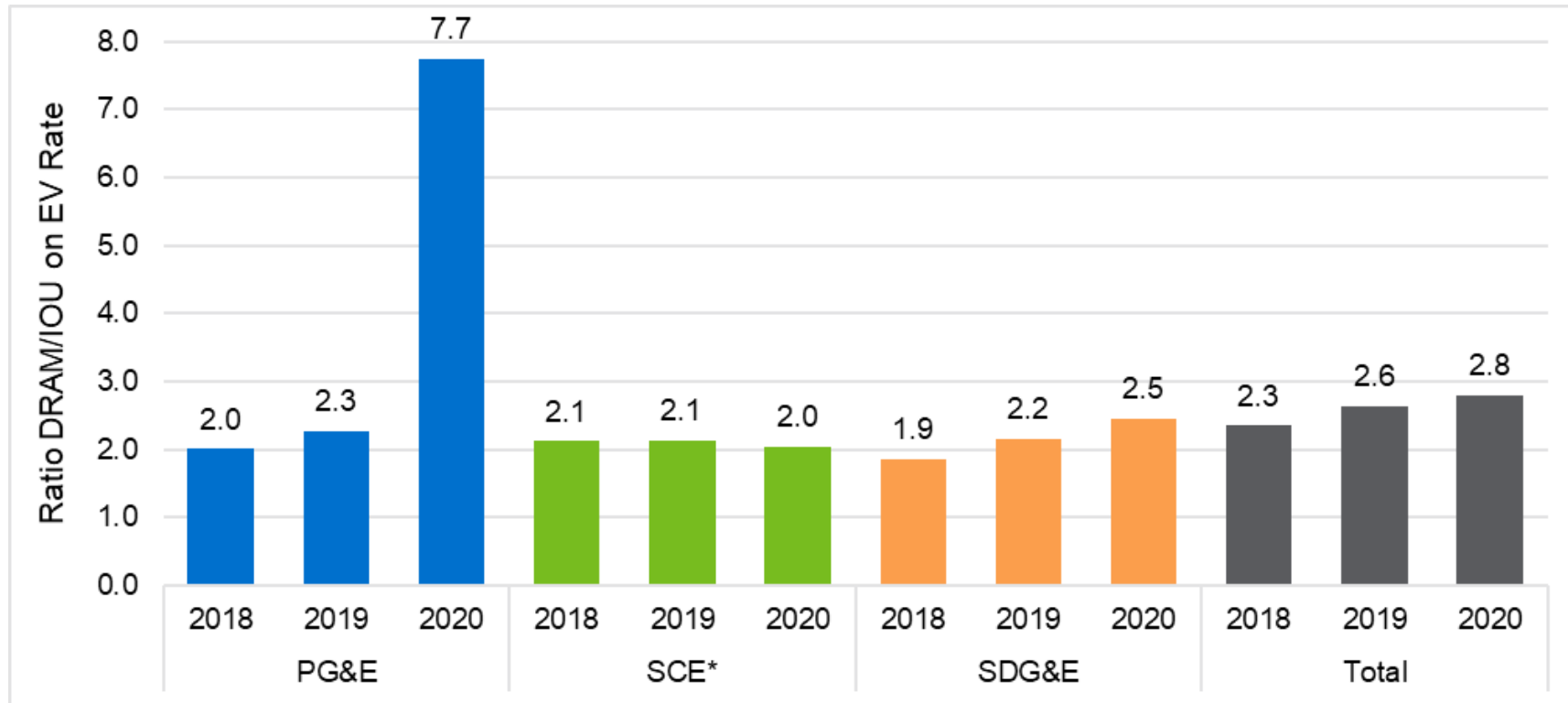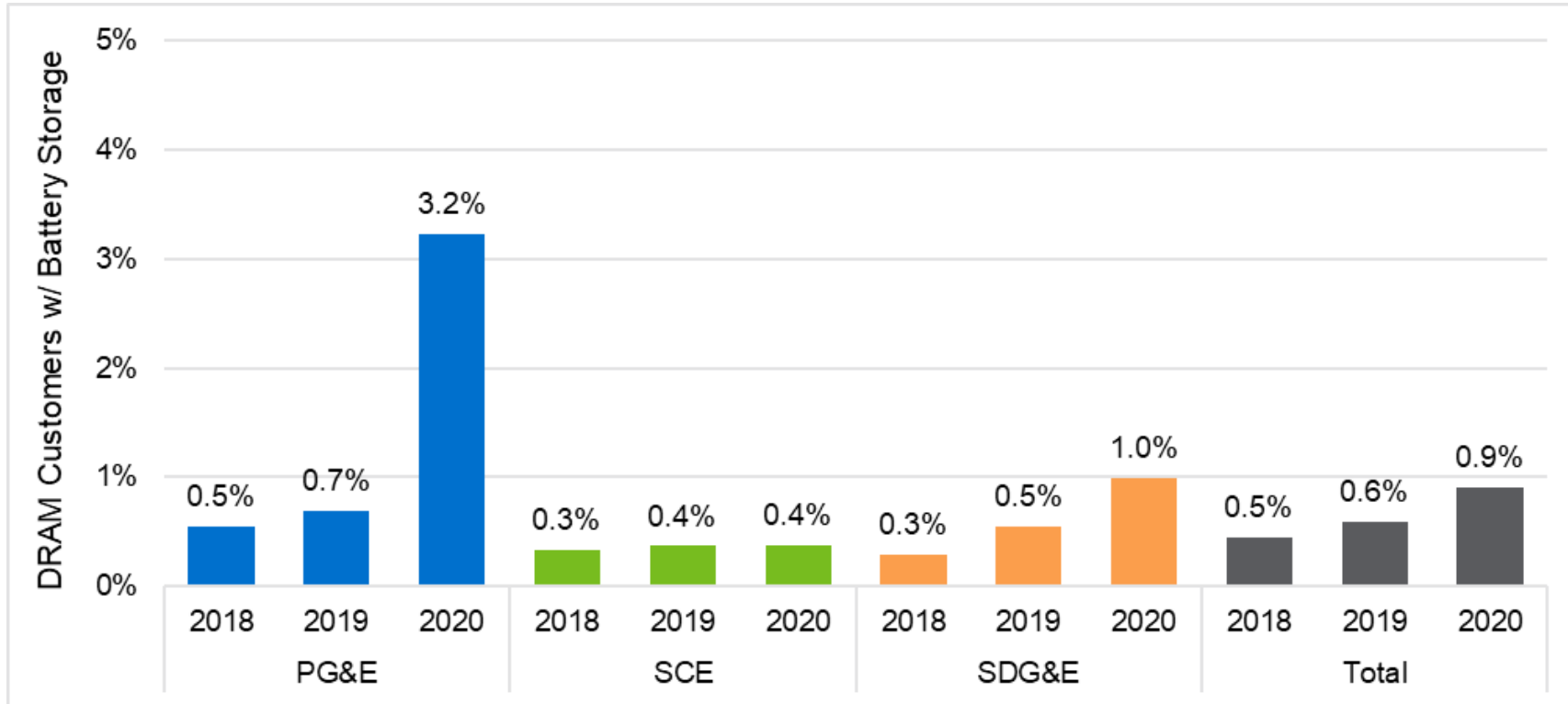
- The proportion of high energy users in DRAM has increased in PG&E and SCE territories

- 10% of PG&E DRAM customers were in the top 5% of their class in 2020

- 8% of SCE DRAM customers were in the top 5% of their customer class in 2020

- No trend in proportion of low energy users in DRAM (~8% in PG&E and SCE 2018-2020)
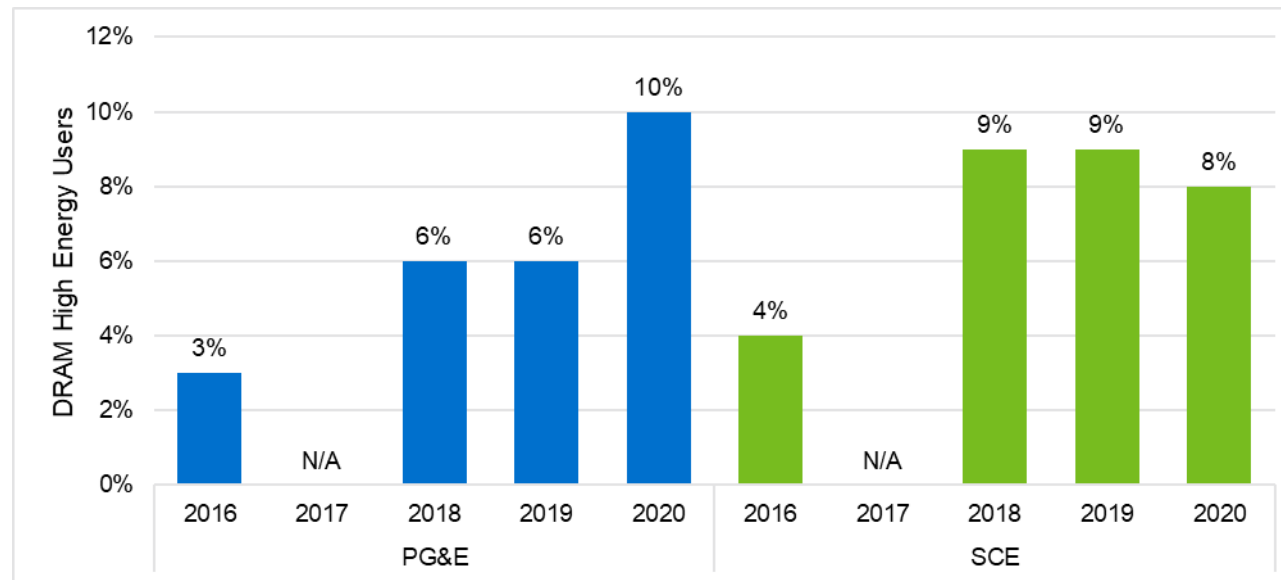
Discussion

- DRAM continues to engage thousands of new, primarily residential customers in DR

- Participation peaked in 2019 at 150,000 customers

- DRAM regularly enrolls low-income customers at higher ratio than IOU population

- Proportion of DRAM customers with solar, EVs, and battery storage increasing

- Customers in the top 5% of electricity usage doubled since 2016

Questions?

Photo by Jon Tyson

Demand Response Auction Market (DRAM) Evaluation
Criterion 3: Were Auction Bid Prices Competitive?

Presenting: Candice Potter

Introduction

- The IOU DRAM solicitations are the focus of Criterion 3 – whether or not the bids received in DRAM auctions are competitive.

- Nearly all of the information pertaining to DRP DRAM bids is confidential. Consequently, Criterion 3 findings are mostly also confidential.

- The first DRAM evaluation also included this research question and covered 2016 DRAM through 2019 DRAM (III) and considered two assessment areas:

  − Are DRAM bids, on average, lower than the long-run avoided cost (LRAC) of generation?

  − Are DRAM bids narrowly dispersed?

- The first evaluation found DRAM bids at PG&E and SCE to be "largely competitive with the LRAC".

- The first evaluation's finding on bid dispersion is confidential.

- This evaluation revisits the same research questions for the 2019 DRAM (IV) through 2021 DRAM auctions.

Methodology

The Criterion 3 assessment included the following activities:

- Summaries of the 2019 (IV) through 2021 DRAM IOU auctions

  - Are the numbers of bids, bidders, and sellers increasing or decreasing?

- Comparisons to various generation capacity cost benchmarks

  - How do average bid and awarded bid prices compare to other benchmarks of generation capacity costs?

- Comparisons to IOU DR program benchmarks

  - How do average bid and awarded bid prices compare to customer capacity payments of IOU DR programs?

- Dispersal of bids

  - What are the trends, if any, in dispersal of the set of all auction bids and the set of winning bids?

Auction Summaries

Delivery Year	2019 DRAM (IV)	2020 DRAM	2021 DRAM
Auction Open Date	1/25/2018	10/11/2019	5/22/2020
Seller Selection Notification Date	3/23/2018	12/12/2019	7/9/2020
Contract Performance Period	1/2019-12/2019	6/2020-12/2020	1/2021-12/2021

- Review of IOU RFO process (announcement, webinar, bid submission, nonconforming bid cure, bid evaluation, bid selection, bid notification, purchase agreement filing)

- Reported on the number of bidding DRPs and selling DRPs

- Reported on the total number of bids, number of shortlisted bids, and the number of winning bids

Numbers of Auction Sellers and Bids

- The number of DRP sellers has increased at PG&E.

- The number of DRP sellers shows a net decrease between 2019 (DRAM IV) and 2021, but with an intermediate increase in 2020 at SCE; at SDG&E the same observation holds except there is no net change in the number of sellers between 2019 (IV) and 2021.

- The number of bids received shows a net decrease between 2019 (DRAM IV) and 2021, but with an intermediate increase in 2020 at PG&E and SCE.

Number of DRAM Sellers
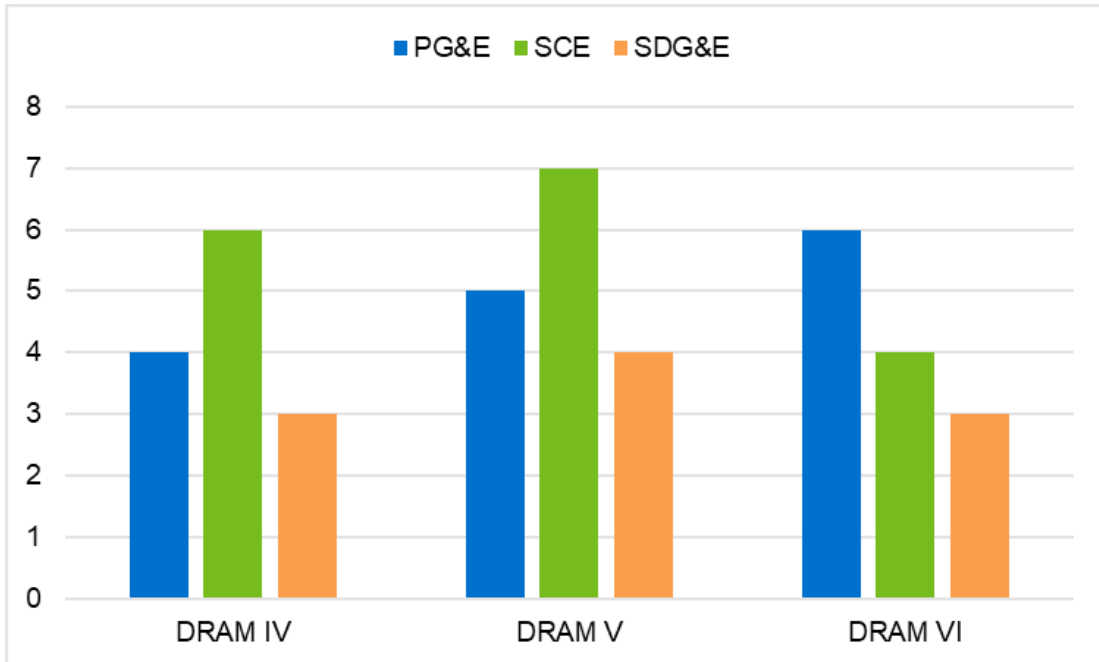
Number of DRAM Bids Received

53
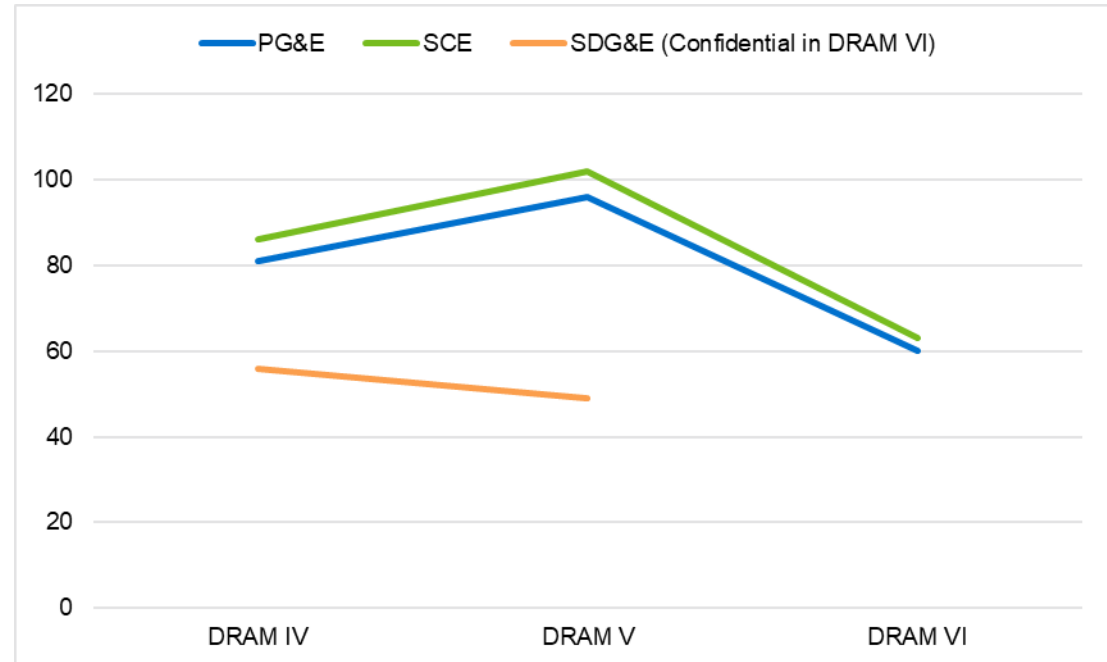
External Benchmarking

- Average DRAM awarded bid prices were compared to other generation price benchmarks to assess external competitiveness, but direct IOU-specific comparisons to these benchmarks are confidential.

  - Short-run capacity costs – both public and confidential IOU-specific

  - CAISO CPM and RAAIM

  - CAISO DMM estimate of new gas-fired capacity

  - Long-run avoided cost (LRAC) of generation

  - Customer capacity payments of IOU DR programs

- **Averaged across the three IOUs**:

  - Neither average DRAM bids nor awarded DRAM bids have consistently increased or decreased in value across the 2019 (DRAM IV) to 2021 period.

  - There is also no consistent trend with respect to competitiveness with LRAC over this period. However,

  - DRAM contracts are more competitive with LRAC at the end of the evaluation period than the beginning.

  - The average awarded DRAM contract price is lower than the LRAC in all three auctions during this period.

Dispersal of Bids

- Bid dispersal was evaluated for August bids received in the 2019 (DRAM IV) through 2021 auctions.

    - We assessed bid dispersal for the set of all bids received and

    - We assessed bid dispersal for the set of bids between the 25% and 75% percentile bids (i.e., excluding the very lowest and highest bids received).

    - The interquartile range (IQR) is a metric of bid dispersal that is not sensitive to the value of the very highest and lowest bids received.

- **Averaged across the three IOUs**:

    - IQR is decreasing over time.

    - 2020 DRAM IQR is 8% lower than that of 2019 DRAM (IV), and 2021 DRAM IQR is 21% lower than that of 2020 DRAM.

Summary

- The Criterion 3 points of assessment of DRAM RFO bid competitiveness were made using confidential data. The public-facing conclusions were mostly positive or neutral:

Public positive and neutral indicators of bid competitiveness

Statewide average bid prices:

- Neither average DRAM bids received nor awarded DRAM bids have consistently increased or decreased in value across the 2019 (DRAM IV) to 2021 period.

Statewide average bid competitiveness with LRAC:

- No consistent trend with respect to average DRAM bid or awarded bid's competitiveness with LRAC over this period, but

- DRAM contracts are more competitive with LRAC at the end of the evaluation period than the beginning, and

- The average awarded DRAM contract price is lower than the LRAC in all three auctions during this period.

Statewide average bid dispersal:

- IQR is decreasing over time; 2020 DRAM IQR is 8% lower than that of 2019 DRAM (IV), and 2021 DRAM IQR is 21% lower than that of 2020 DRAM.

Public potentially negative indicators of bid competitiveness

Number of sellers and number of bids received:

- Net decreases in the number of selling DRPs at SCE across the period 2019 (DRAM IV) through 2021.

- Net decreases in the number of bids received at PG&E and SCE across the period 2019 (DRAM IV) through 2021. SDG&E's number of bids received for 2021 is confidential.

Questions?

Photo by Elissa Garcia

57

Stretch Break :)

Please be back at 10:35 a.m.

Demand Response Auction Market (DRAM) Evaluation

Criterion 4: Were Offer Prices Competitive in the Wholesale Markets?

Presenting: Kallie Wells

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Introduction

- Criterion 4 aims to assess whether DRAM bid prices were competitive in the California Independent System Operator (CAISO) wholesale energy market

- There is a lack of a clear guidance as to what constitutes a competitive offer from DRAM resources, so this criterion for the overall evaluation is challenging

  - DRAM resources are made up of underlying customers that have unique costs and operating limitations that don't fit "cleanly" into a formula

- The Nexant Team evaluated the competitiveness of DRAM resources by analyzing the distribution of bid prices, scheduling rates, and scheduling effectiveness

  - Comparisons are made across time periods and to other resource types

Methodology – Bid Price Distribution and Comparison

- The bid price distribution and comparison analysis seeks to evaluate the overall distribution of energy offers by DRAM resources into the CAISO's markets at various price points

  - Evaluates and compares average bid prices across years, resource types, and DRPs using MW-weighted average bid prices

  - Conducted for day-ahead and real-time markets separately

  - Only observations with at least one bid curve step were included in metrics based on MW-weighted average bid price

- For distribution analysis, each MW is first categorized by corresponding offer price before categorizing it into bid price bin

- Excludes Reliability Demand Response Resources (RDRR) since they are required to be at least 95% of CAISO energy bid cap

Methodology – Scheduling Rate and Scheduling Effectiveness

- Scheduling rate evaluates how effective DRPs were in getting the DRAM resource's energy scheduled in the CAISO market

  - Determined by taking the ratio of scheduled energy to MWs offered into the market based on CAISO data

  - Evaluated across differing time periods (all hours, AAHs, Q3 AAHs)

- Scheduling effectiveness evaluates how effective DRPs were in getting the DRAM resources energy scheduled into the CAISO market during the top 120 net load hours of each year

  - Same calculation as scheduling rate just evaluating over the hours during which the CAISO system is at the highest need for resources such as DRAM

MW-Weighted Average Bid Prices: Day-ahead and Real-time Markets

- MW-weighted average bid prices are higher than that of other resource types included in the analysis

- 2021 day-ahead and real-time prices seem to be more aligned than in the past

- See a slight change in bidding by DRPs but the change in bidding is masked by average prices

- Data quality issue may be impacting results

Legend: Day-ahead (blue) — Real-time (green)

Y-axis: MW Weighted Average Bid Price ($/MWh)

Year	Day-ahead	Real-time
2018	$758	$981
2019	$818	$998
2020	$849	$567
2021	$778	$824
Overall	$808	$868
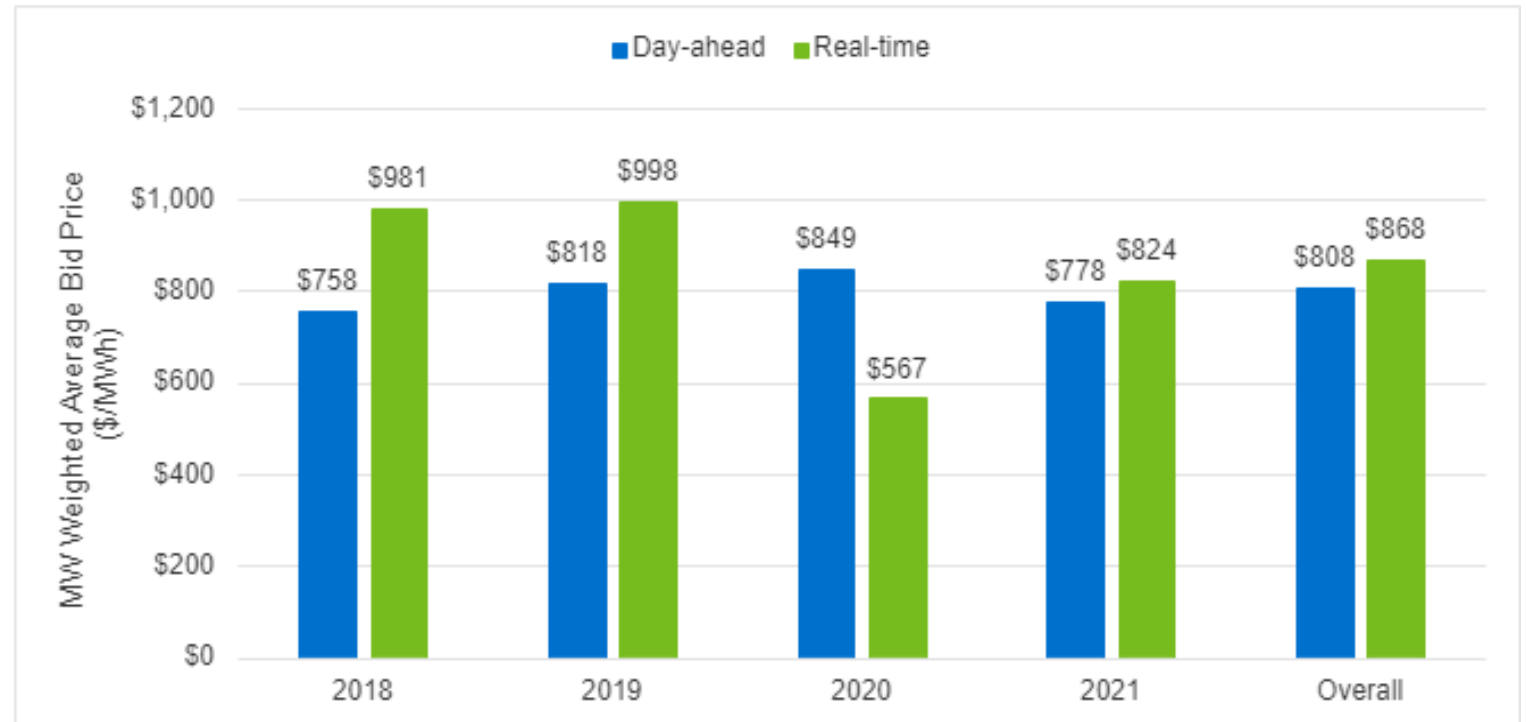
Bid Price Distribution: DRAM Day-ahead MWs by Bid Price Category

Percentage of DRAM Day-ahead bid in MWs by price category
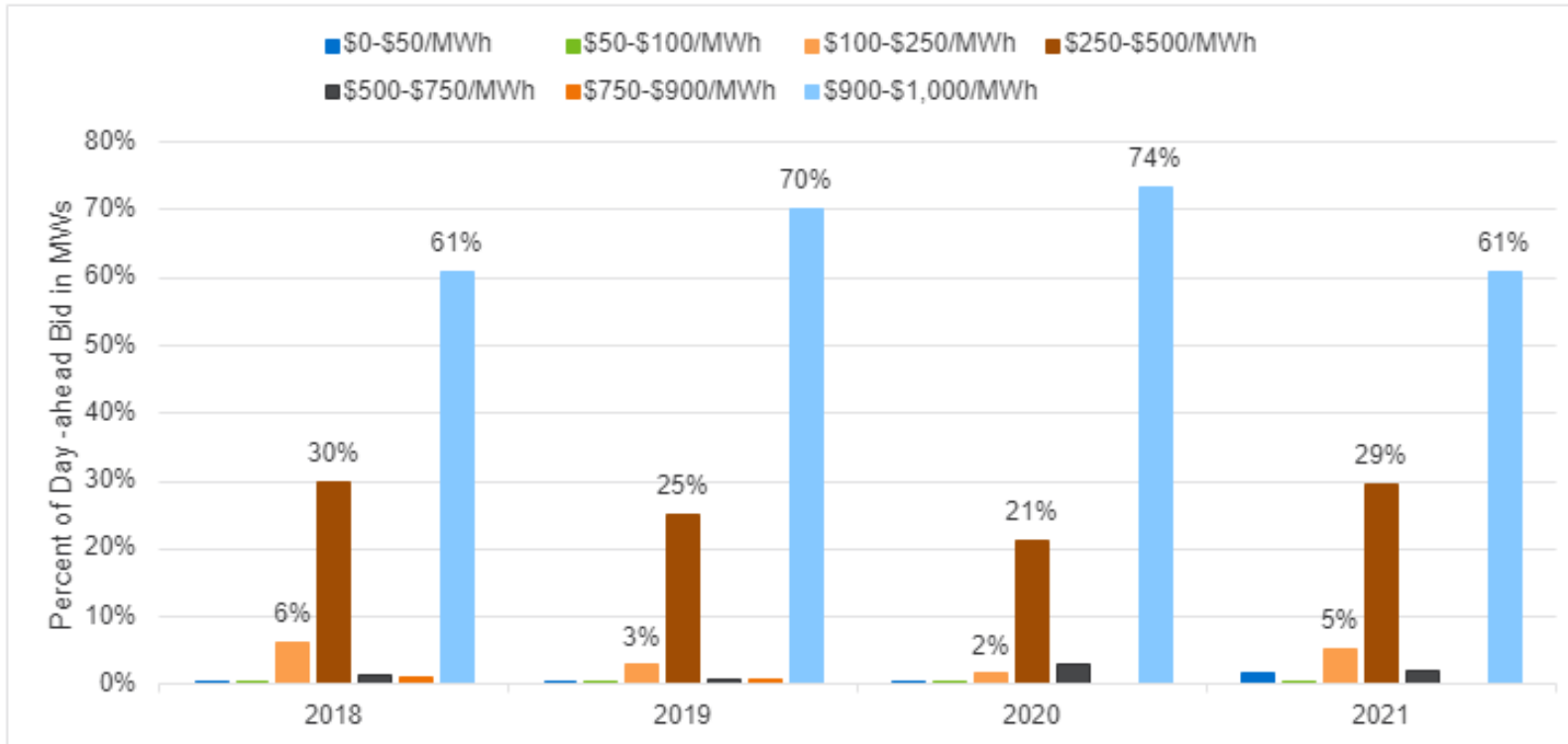
- Slight change in bidding over time can be observed

- Seeing an increased percentages of MWs being offered in a lower prices in more recent years

- Minimum dispatch requirement may be a contributing factor

Bid Price Distribution: DRAM Real-time MWs by Bid Price Category

Percentage of DRAM real-time bid in MWs by price category
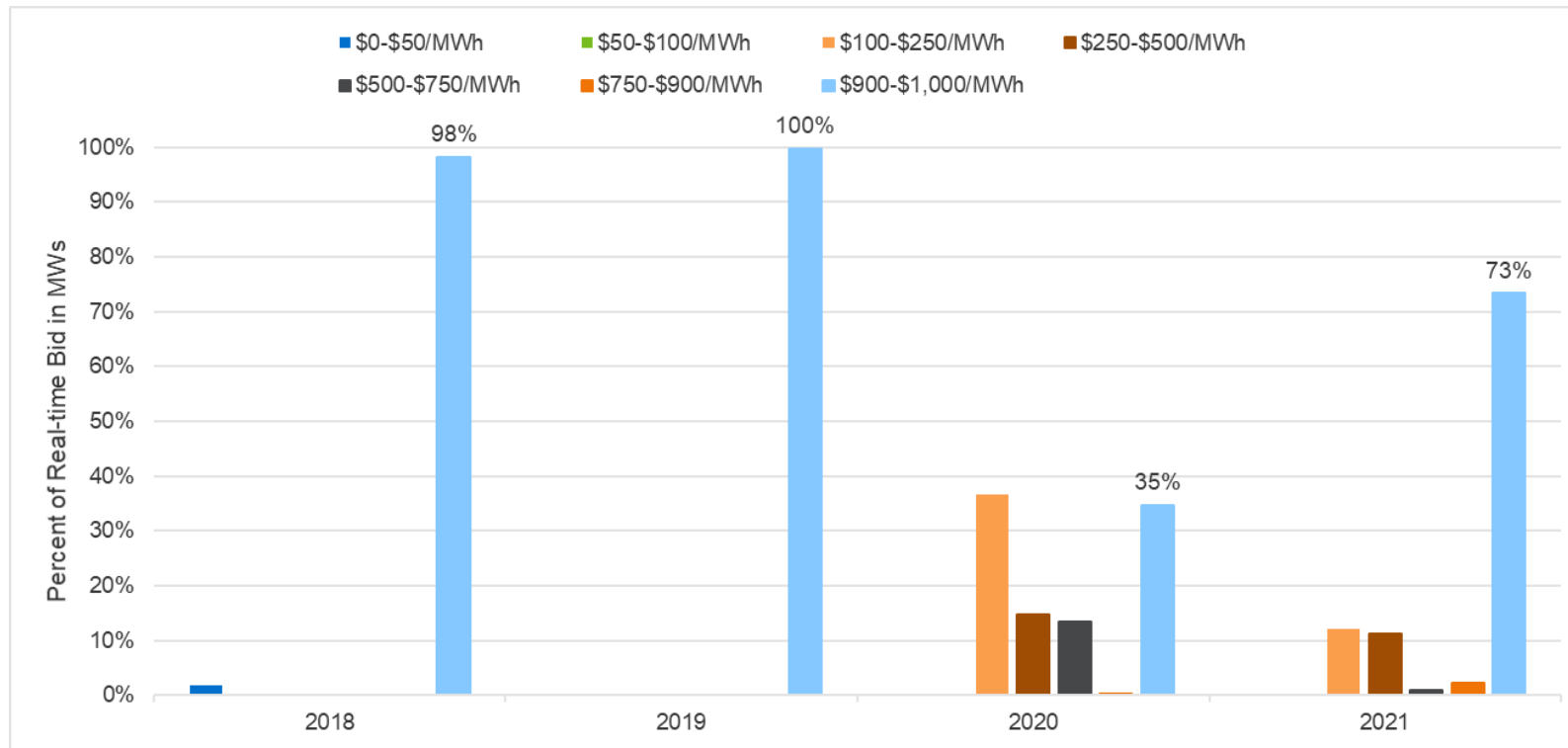
- Same trend can be seen in real-time as day-ahead with more pronounced real-time MWs offered in at lower prices

- Results may be impacted by data quality issues

Scheduling Rate: Day-ahead Market

- Increase in scheduling rate in recent years compared to 2019

- Higher scheduling rates as the time period evaluated narrows in on the hours with highest system need

- Lower 2019 schedule rate may also be impacted by the significantly higher amount of MWs being offered in by DRAM resources overall
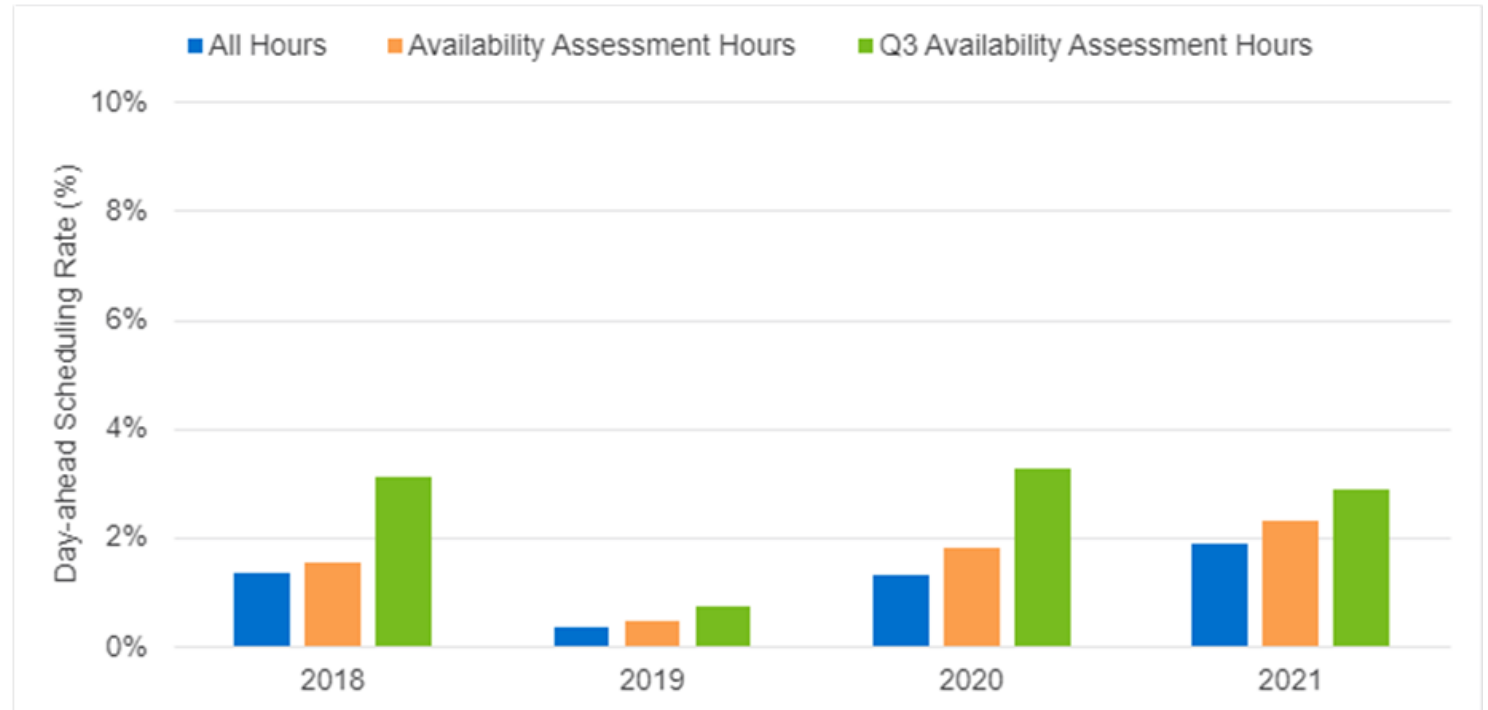
Scheduling Rate: Real-time Market

- Similar to day-ahead, see an increase in scheduling rates in recent years compared to 2019, especially during AAH and Q3 AAH periods

- More effective in getting scheduled in the real-time market compared to day-ahead, which is expected given price volatility in real-time

- Recall, analysis does not include resources without an economic bid curve in real-time
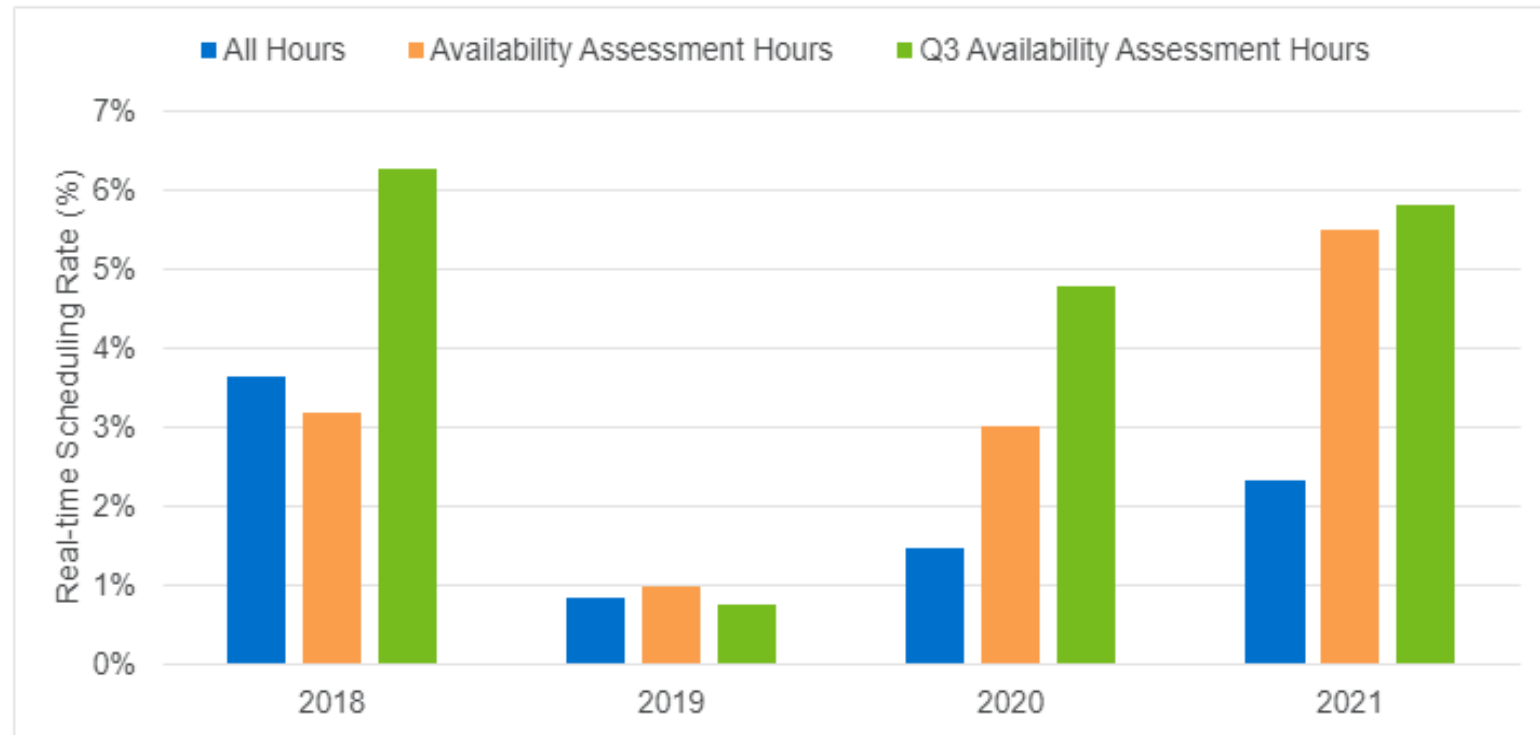
Scheduling Effectiveness: Day-ahead and Real-time Markets

Year	Scheduling Effectiveness		Scheduling Rate	
	Day-ahead	Real-time	Day-ahead	Real-time
2018	9%	9%	1%	4%
2019	2%	3%	0%	1%
2020	13%	22%	1%	1%
2021	7%	16%	2%	2%

- Scheduling effectiveness is higher than scheduling rate across all markets and years

- Increase in scheduling effectiveness, most notably the last two years

- Indicates DRPs are becoming more effective in getting DRAM resources scheduling during hours of highest system need of non-renewable resources

Discussion

- DRAM resources are offered in at prices higher than the other resource types, but there seems to be a slight change in bidding more megawatt hours at lower prices than in the past

  - Challenging to determine definitively if a result of actual change in bidding or data quality issues

  - Could be in response to change in contractual obligations

- DRAM resources are becoming more effective in getting their capacity scheduled in the day-ahead (DA) and real-time (RT) markets, especially during periods of highest system needs, but remain less active than IOU DR and other resource types.

  - DRPs that offer lower bids tend to have higher scheduling rates and scheduling effectiveness

  - Increased scheduling rates and effectiveness may also be driven by tighter supply conditions overall

- Solely evaluating the incremental energy offers does not provide comprehensive picture of bidding behavior

Questions?

Photo by Taylor Wilcox

Demand Response Auction Market (DRAM) Evaluation

Criterion 5: Did DRPs Meet Their Contractual Obligations?

Presenting: Aimee Savage, Kallie Wells

Introduction

- Criterion 5 seeks to evaluate if DRPs met their contractual obligations and were able to successfully provide their contracted capacity

- This evaluation assessed three types of contract compliance:

  - Contracted Capacity, Supply Plan Capacity, and Demonstrated Capacity Comparison

    - DRPs' contract compliance was measured by assessing the ability of the DRPs to align Supply Plan and Demonstrated Capacity values with Contracted Capacity

  - Must Offer Obligation (MOO) compliance by comparing total DA market bids to each DRP's MOO

  - How well the DRPs met the minimum energy requirement in the 2021 DRAM contracts

Contracted Capacity, Qualifying Capacity, and Demonstrated Capacity Comparison

- **Contracted Capacity** is defined as the amount of capacity a DRP has agreed to provide to the IOU for each day of the respective showing month within the contracted term

- **Qualifying Capacity** (QC) reflects the amount of total capacity a DRP has aggregated and showed on the monthly supply plan

  - It is indicative of a DRP's ability to enroll enough participants to provide the aggregated load reduction it promised in its contract with the IOU

- **Demonstrated Capacity** (DC) is the amount of qualifying capacity the DRP was capable of delivering in each delivery month

Demonstrated Capacity

- Demonstrated Capacity is indicated to the IOUs through invoicing at the end of each delivery month and can be based on one of three options with the below order:

  - **Dispatch**: The results of a DC Dispatch during the applicable Showing Month, equal to the maximum hourly load reduction calculated using the appropriate baseline method;

  - **Test**: The results of a DC Test in the event, equal to the maximum hourly load reduction during any hour of such DC Test calculated using the appropriate baseline method; or

  - **MOO**: The average amount of capacity for each resource that the DRP bid into the applicable CAISO Markets during the AAH hours in the Showing Month (in compliance with the CAISO MOO)

- The DRPs are required to demonstrate capacity based on an actual market dispatch or test and can only use their MOO for the purposes of DC invoicing if there has been no full dispatch or test of the resource in a given month

  - Beginning in 2020 the Commission required that DC invoices must be based on a market dispatch or a capacity test for at least 50% of the contracted months during the contract term

  - The Commission also added a new requirement effective 2021 for a minimum dispatch requirement in DRAM contracts

Methods: Contracted Capacity, QC, and DC Comparison

- The three IOUs provided contract and invoice data to the Nexant Team via templates developed by Energy Division
  - Contract capacities for each DRAM contract from 2018 to 2021
  - Month-ahead supply plans (the basis for QC)
  - Complete DC invoice data through December 2021, split by capacity test, MOO, and market dispatch
- DRP-level results are presented for the entire year, for the third quarter, and for the month of August of each year evaluated
- Contracted, qualifying, and demonstrated capacity totals by resource were summed to the DRP total during the relevant time period, allowing for an analysis of the alignment of the DRPs' qualifying and demonstrated capacity compared to its aggregate contracted capacity
- In 2018 and 2019 DRAM some DRPs' contracts were terminated and as a result, these contracts were not included in the analysis

Contracted Capacity, QC, and DC Comparison: All DRPs, Annual

- The figure to the right compares the annual contracted capacity, QC, and the three types of DC (capacity test, MOO, and market dispatch) from 2018 to 2021
  - The blue bar represents the aggregate contracted capacity (MW) and the green bar represents aggregate QC (MW)
  - The stacked orange bar represents invoiced demonstrated capacities, which can either be from a market dispatch, a capacity test, or the resource's MOO
  - When the total demonstrated capacity is less than the qualifying capacity (the stacked orange bar is lower than the green bar), it indicates a deficiency in demonstrated capacity
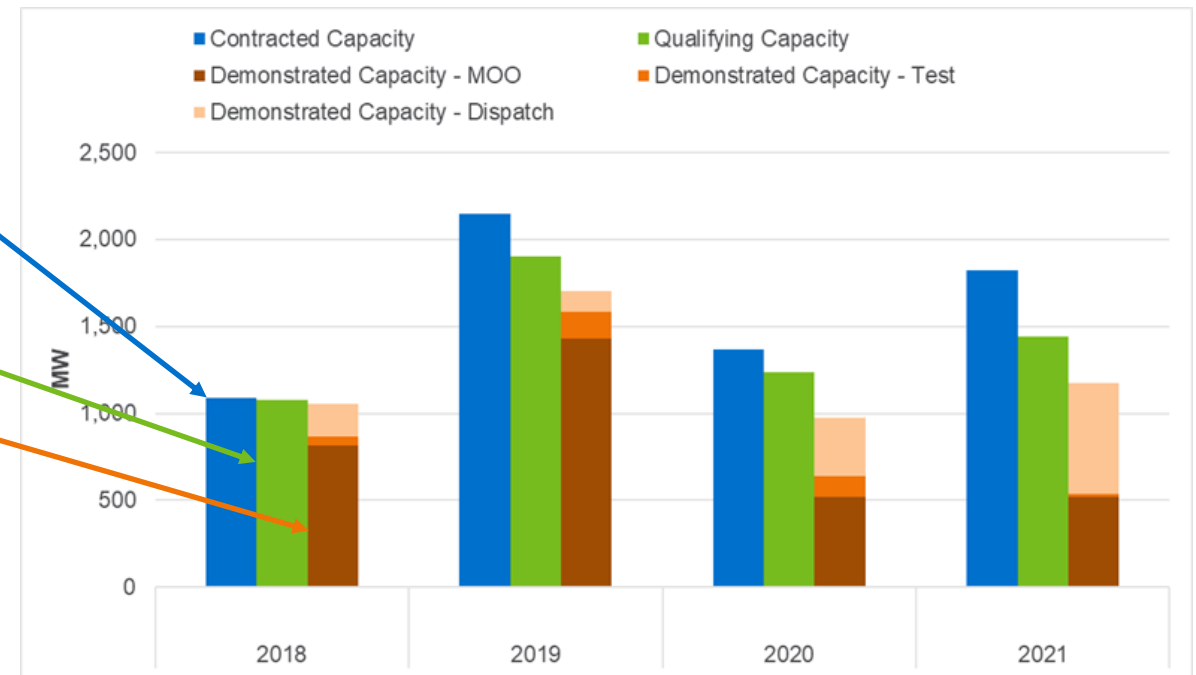
Contracted Capacity, QC, and DC Comparison: All DRPs, Annual

- In 2018, the demonstrated capacity of the DRPs was in close alignment with both the contracted and qualifying capacity

- DRP performance was slightly lower from 2019 to 2021

- When looking at demonstrated capacity for the entire year, most of the invoiced capacity is based on MOO

- The data shows a lower number of MOO based DC invoices in 2020 and 2021 compared to prior years

  - As a result of new DC invoice requirements, the number of MOO based DC invoices decreased in 2020 and 2021 compared to prior years
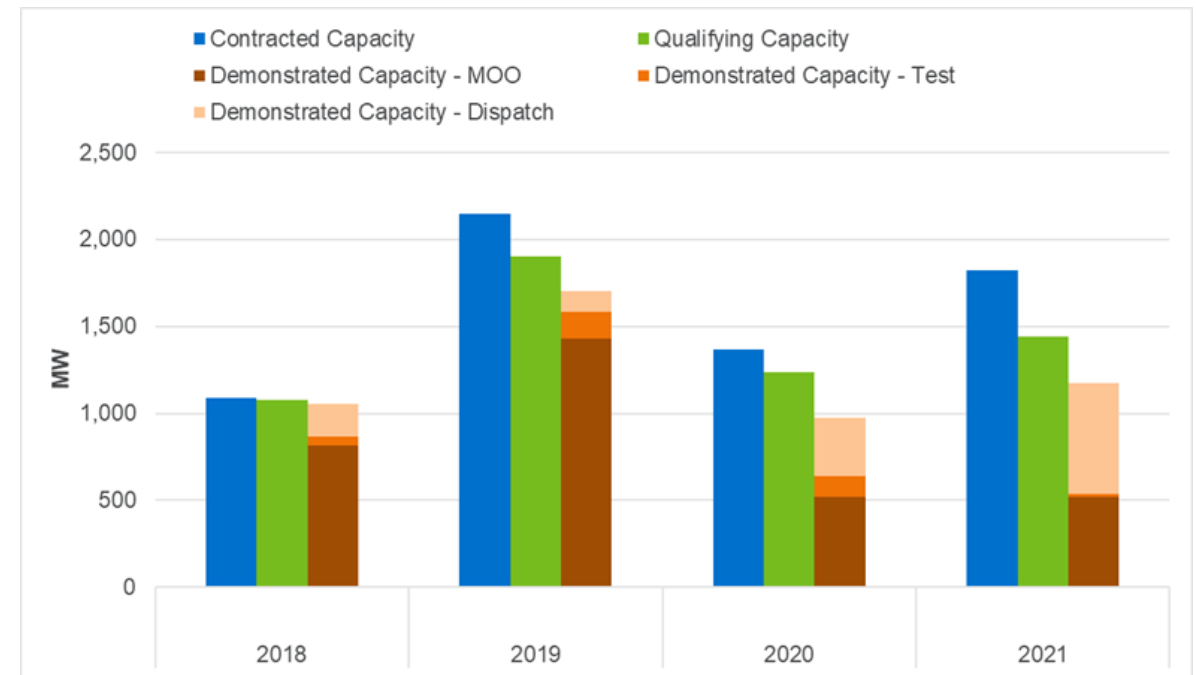
Contracted Capacity, QC, and DC Comparison: All DRPs, Q3

- Q3 is generally when the highest system needs occur
  - Q3 has a higher utilization of DRAM resources
- Again, DRP performance was slightly lower from 2019 to 2021
- In the Q3, more of the demonstrated capacity is provided by market dispatch (compared to other quarters)
  - All DRAM resources must be dispatched for a minimum of two hours in the month of August
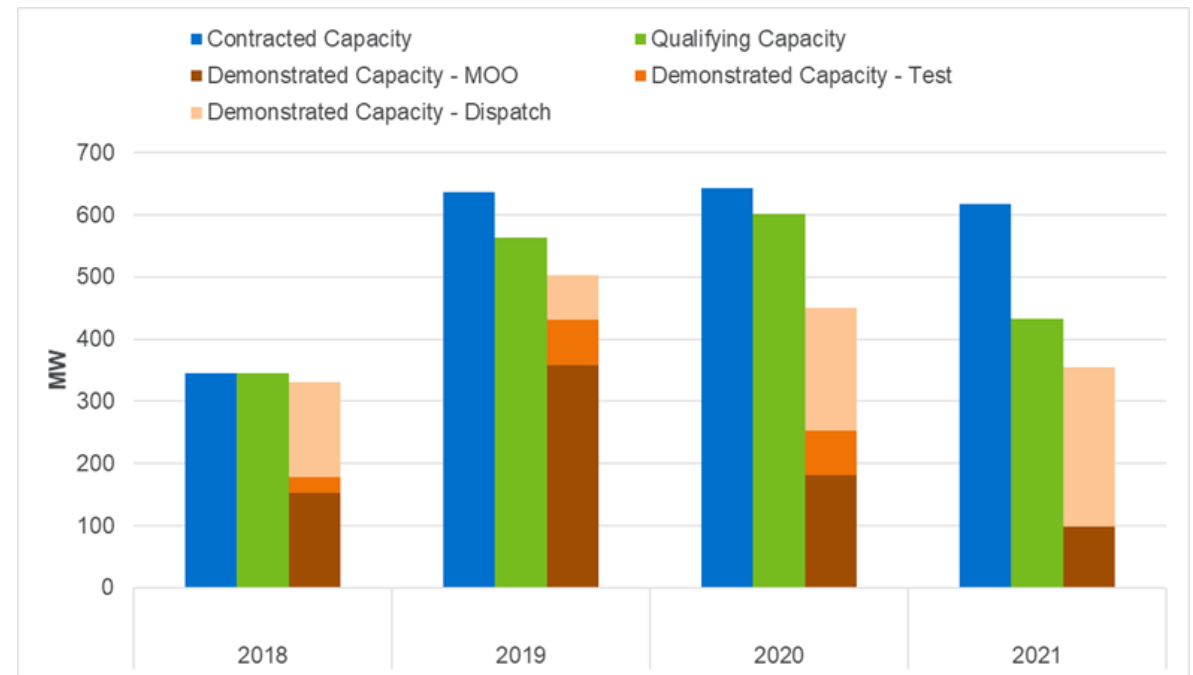
Contracted Capacity, QC, and DC Comparison: All DRPs, August

- Historically, August has been a system peaking month, particularly in 2020 when CAISO issued a Stage 3 Emergency for the first time in nearly twenty years

  - August is also the month in which DRPs are required to submit all their DC invoices based on actual market dispatch

- General DRP performance trends follow a similar pattern in the month of August as the annual and Q3 levels

  - DRPs' alignment between the August contracted capacity and demonstrated capacity is highest in 2018 but falls in 2019, 2020, and 2021

Day-Ahead Bids and MOO Comparison

- Beginning with the 2020 DRAM, the DRPs were required to submit quarterly reports that indicated, among other information, the amount bid into the day-ahead (DA) market and the qualifying capacity per month

- This qualifying capacity was used to determine the must offer obligation (MOO), or the amount that each DRP is required to bid into the DA market each month

  - Therefore, the MOO compliance presented here is somewhat dependent on the accuracy of the reporting by each DRP

- Relative MOO compliance can be determined via a proportion of the total capacity bid into the DA market for a given DRP and month, and the total MOO for that same DRP and month

Day-Ahead Bids and MOO Comparison: All DRPs

- DRPs are generally compliant with MOO requirements and bid at least their qualifying capacity into the DA market

- In all but two of the quarters evaluated, DRPs bid over 100% of the required amount determined by their qualifying capacities.
  - DRPs bid exactly 100% of their required MOO capacity in the remaining two quarters

- Bidding more than the MOO during the hotter summer months is reasonable
  - There is more opportunity to win DR bids and thus earn more money from dispatching events

- Additionally, it is possible that DRPs overbid into the market to ensure ample opportunity to meet or exceed performance goals (and not necessarily for MOO compliance)

81
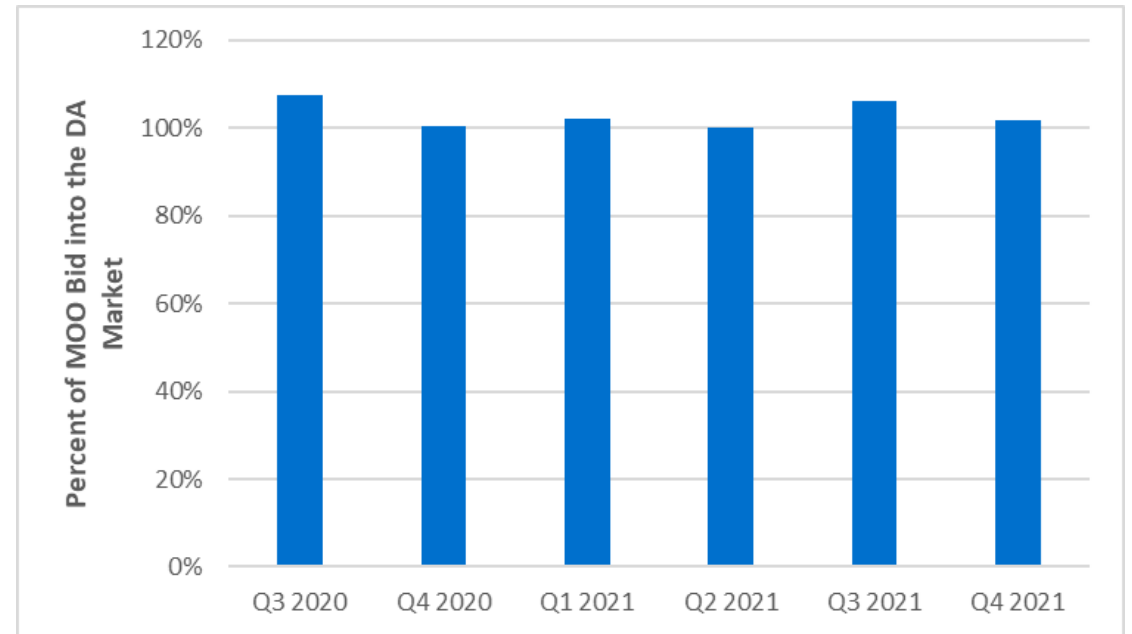
Minimum Dispatch Requirement

- Commission established a new requirement for DRAM contracts beginning in 2021 to deliver 30 MWh per 1 MW of average Qualifying Capacity (QC)

  - Average QC is defined as the average of the three highest QC months by DRAM contract based on the month ahead supply plans

- The requirement is only applicable to 2021 and, given data challenges, unable to conduct similar analysis for prior years for comparison purposes

- The Nexant Team was only able to evaluate contracts for which we had mappings of resource IDs to DRAM contracts

  - 16 DRAM contracts representing 170 MWs of Average QC

- Based on CAISO settlement data and DRAM contract data provided by DRPs and IOUs

Minimum Dispatch Requirement: Methodology

- Compared Minimum Dispatch Requirement of each DRAM contract to total delivered energy during Availability Assessment Hours (AAHs) of all CAISO resources IDs identified as within the DRAM contract

  - Delivered energy is based on metered data per CAISO settlement data

- Assessed compliance by evaluating:

  - Percentage of the delivered energy requirement that was met by DRAM contract, and

  - Percentage of DRAM contracts that met the requirement (i.e., met at least 100% of the requirement)

- Conducted a "what-if" scenario assuming 100% performance of all resources to see if performance impacted DRPs from meeting minimum dispatch requirement

  - Calculated delivered energy based on CAISO real-time dispatch

Minimum Dispatch Requirement Findings

- On an aggregate basis, 70% of the total delivered energy requirement was actually delivered based on metered data

- Compliance with the new requirement varied significantly across DRPs, ranging from delivering less than 20% of the requirement to well over 100%

- Based on the metered data, 31% of the DRAM contracts evaluated met the minimum dispatch requirement with just under half meeting at least 90% of the requirement

- Based on the CAISO dispatch data, 50% of the DRAM contracts evaluated would have met the minimum requirement, assuming 100% performance
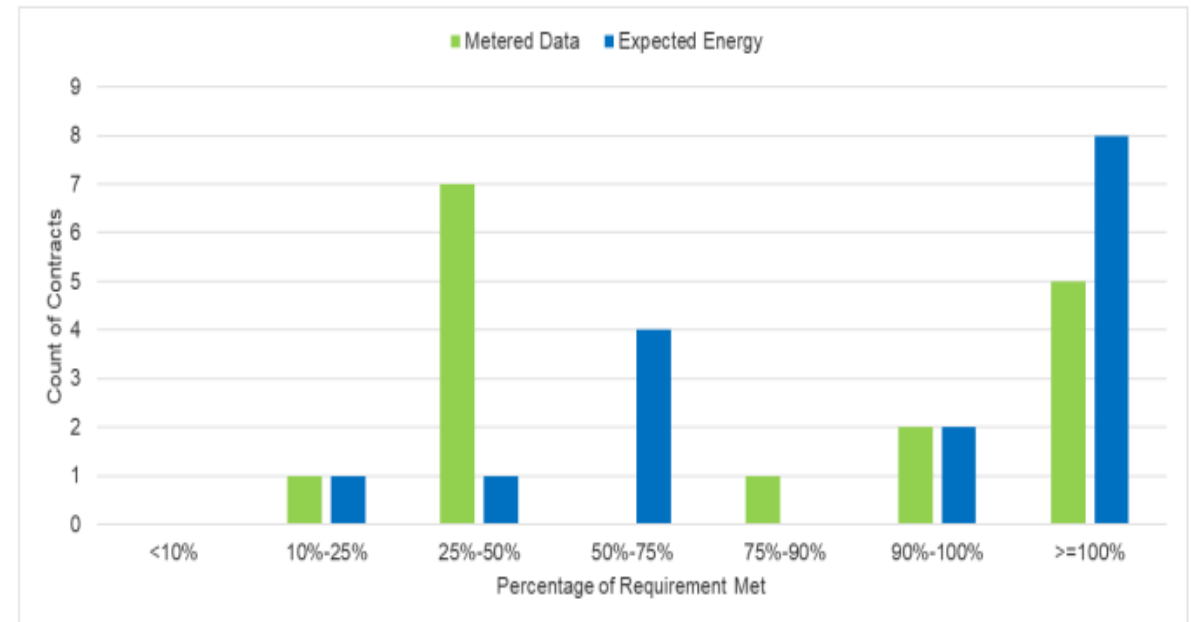
Discussion

- In 2018, DRPs were mostly able to demonstrate capacity in close alignment with the contracted capacity, but DRP compliance was slightly lower from 2019 to 2021

  - Demonstrated capacity alignment varied considerably across DRPs and the mix of demonstrated capacity types was not consistent across DRPs

  - In 2018, 2019, 2020, and 2021 the percentage of MOO-based DC invoices were 77%, 84%, 53%, and 44% respectively

- DRPs collectively bid at least 100% in every quarter of the evaluation cycle and bid over 100% in every quarter but Q4 2020

  - When examining results for each individual DRP, MOO compliance varies

- Compliance with the new Minimum Dispatch Requirement varied significantly by DRP but, based on analysis presented throughout the report, may have been a contributing factor to changes in bidding and scheduling rates.

Questions?

Photo by Rohit Farmer

Demand Response Auction Market (DRAM) Evaluation

Criterion 6: Were Resources Reliable When Dispatched?

Presenting: Aimee Savage, Kallie Wells

Nexant

Now a part of Resource Innovations

Introduction

- Criterion 6 assesses the reliability of DRAM resources when dispatched by the CAISO market

- The reliability of DRAM resources were evaluated using various approaches:
  - Assessed the performance of DRAM resources by comparing delivered energy using CAISO settlement metered data to CAISO dispatches both by real-time interval as well as by dispatch "event"
  - Assessed the accuracy of demonstrated capacity invoices, which are indicative of DRAM performance and are the basis of DRPs' capacity payments
    - The Nexant Team independently estimated delivered energy using IOU AMI data

- The Nexant Team faced significant data issues and challenges during this assessment, which likely impact the results

Methods: Nexant-Calculated vs. DRP/SC-Reported Delivered Energy Comparison

- The Nexant Team independently estimated delivered energy for DRAM dispatches in the RTM

- These values were then compared to the ones reported by DRPs and their SCs which are used for IOU and CAISO settlements and payments

- The Nexant Team and the DRPs used the same CAISO-approved PDR performance evaluation methodology to calculate delivered energy

- Due to constraints in time and resources, this comparison analysis was limited to Q3 and Q4 2020

Methods: Nexant-Calculated vs. DRP/SC-Reported Delivered Energy Comparison

- **Step 1**: Determine which event hours to include in the analysis

- **Step 2**: Identify which customers were dispatched for each event using DRP enrollment data

- **Step 3**: Map dispatched customers to their IOU-provided AMI data

- **Step 4**: Use CAISO-approved baseline methodologies to calculate adjusted baseline usage

  – Nexant used the applicable baseline methodology reported by the DRPs for each resource

    – Day Matching 10-in-10

    – Day Matching 5-in-10

    – Day Matching Combined

- **Step 5**: Calculate delivered energy for each resource and event hour by taking the difference between adjusted baseline and metered energy (provided by IOUs)

- **Step 6**: Compare Nexant-Calculated delivered energy by month and DRP to:

  – CAISO-reported dispatched energy

  – SC-reported delivered energy

  – DRP-reported delivered energy

Comparison of Dispatched and Delivered Energy: All DRPs

- There is considerable variability in the accuracy, performance, and magnitude of delivered energy by month

- All sources found that DRAM underperformed during July, August, September, and October

- DRP-reported delivered energy exceeds Nexant-calculated delivered energy most notably in July, November, and December

- In November and December, DRP-reported delivered energy is larger than CAISO-reported dispatched energy
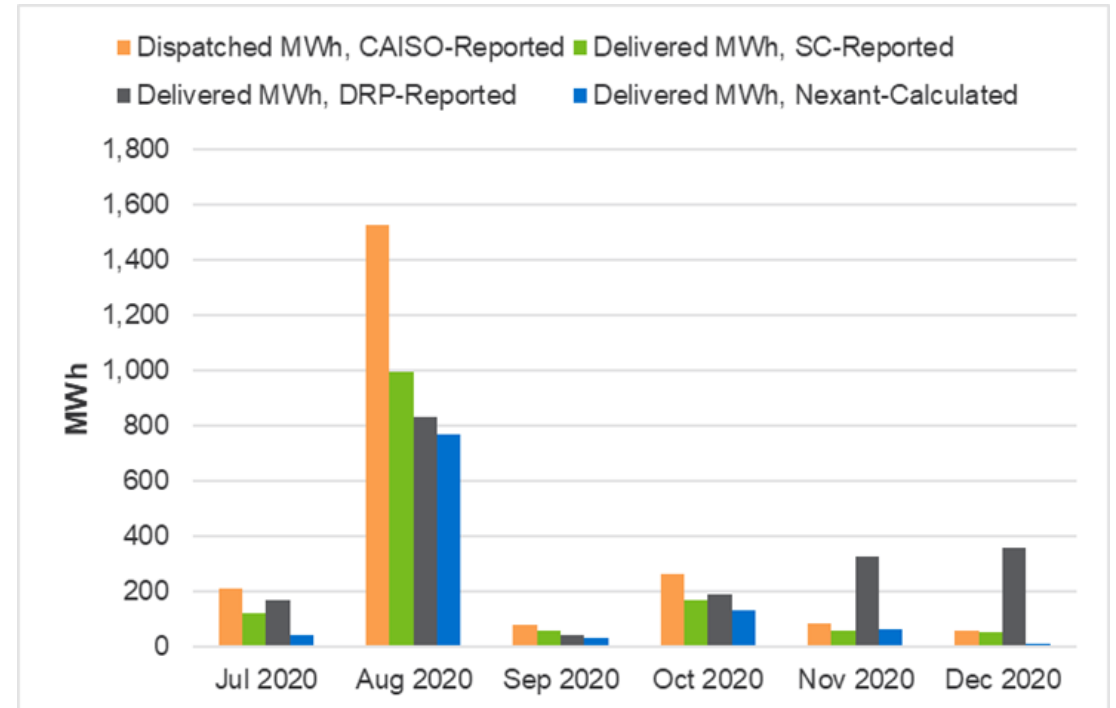
Delivered Energy as Percentage of Dispatched Energy: All DRPs

- SC-reported and Nexant-calculated delivered energy as a percent of CAISO-reported dispatched energy varied by month
  - SC-reported performance dispatched energy ranged from 57% in July to 93% in December
  - Nexant-calculated performance ranged from 20% in July to 76% in December
- DRP-reported performance ranged widely
  - DRP-reported performance is relatively stable around 75% in the months of July-October 2020, but spikes to 367% in November and 600% in December

92
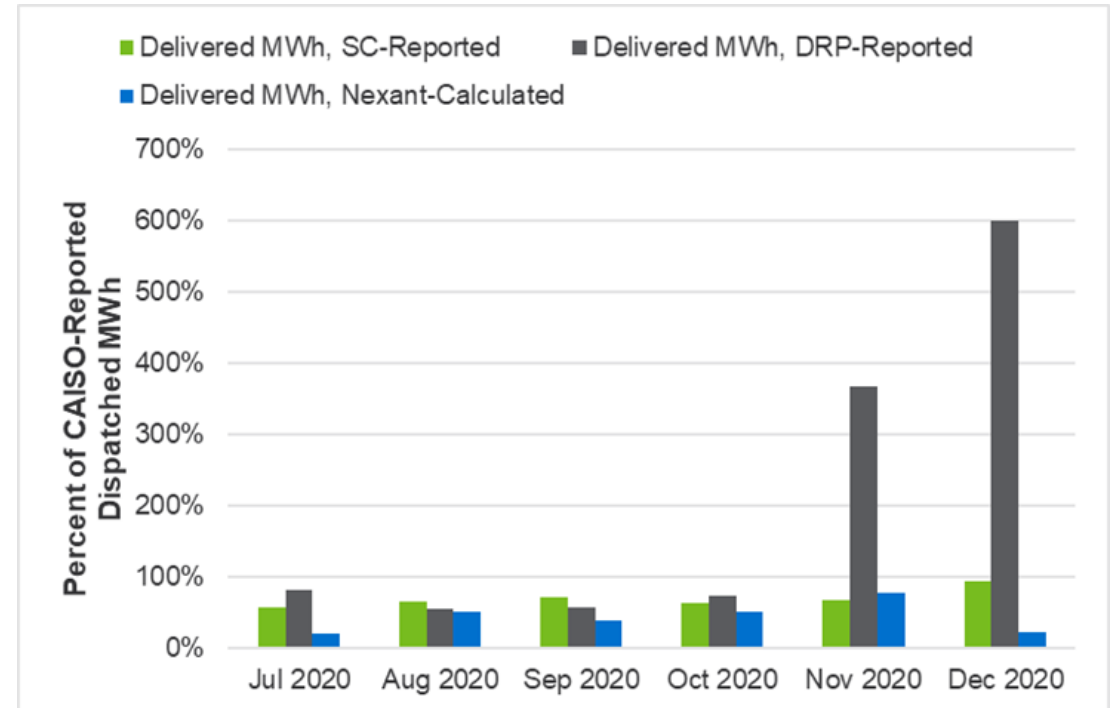
Methods: Performance Calculation Based on CAISO Settlement Data

- This section discusses the overall performance of DRAM resources, and thus DRPs, based on CAISO settlement and market award data

    - Compare CAISO metered data to the real-time market dispatches by resource ID as the real-time dispatch instruction represents the final schedule to which resources are supposed to generate/perform

- The evaluation was conducted by comparing DRAM resource's delivered energy to CAISO real-time dispatch instruction both by interval (Time-Based) and event (Event-Based)

- Time-Based methodology assesses performance by dividing the resource-specific metered values from the CAISO settlement data and dividing it by the CAISO real-time dispatch for that resource and 5-minute interval, expressing it as a performance percentage

- Event-Based methodology assesses performance by first summing up the metered data for that resource event and dividing it by the summation of the CAISO 5-minute real-time dispatch for the same intervals within the event horizon

Performance of DRAM Resources – Time Based

- **Performance of DRAM resources is improving year over year but there still remains quite a bit of variability among DRPs**

  - Only includes intervals for which metered data was available

  - Performance for each interval was capped at 100% such that over performance in one interval does not off-set underperformance in another

- **Dispatch level did not significantly impact performance, and again while improving year over year still varied by DRP**

Average performance by year

Year	Average Performance	Total CAISO Dispatch (MWhs)
2018	51%	834
2019	71%	3,553
2020	84%	4,314
2021	84%	5,911

Average performance by dispatch level and year

Dispatch Level	2018	2019	2020	2021
<=0.01 MW	75%	83%	96%	96%
0.01 MW - 1 MW	46%	66%	52%	82%
1 MW - 3 MW	62%	32%	70%	93%
>3 MW	88%	38%	86%	93%

Performance of DRAM Resources – Event Based

- An event is comprised of consecutive 5-minute intervals for which the DRAM resource received non-zero dispatch instructions from the CAISO

- Similar to the time-based assessment, performance by event is improving year over year but there does seem to be steep drop-off in almost every year evaluated
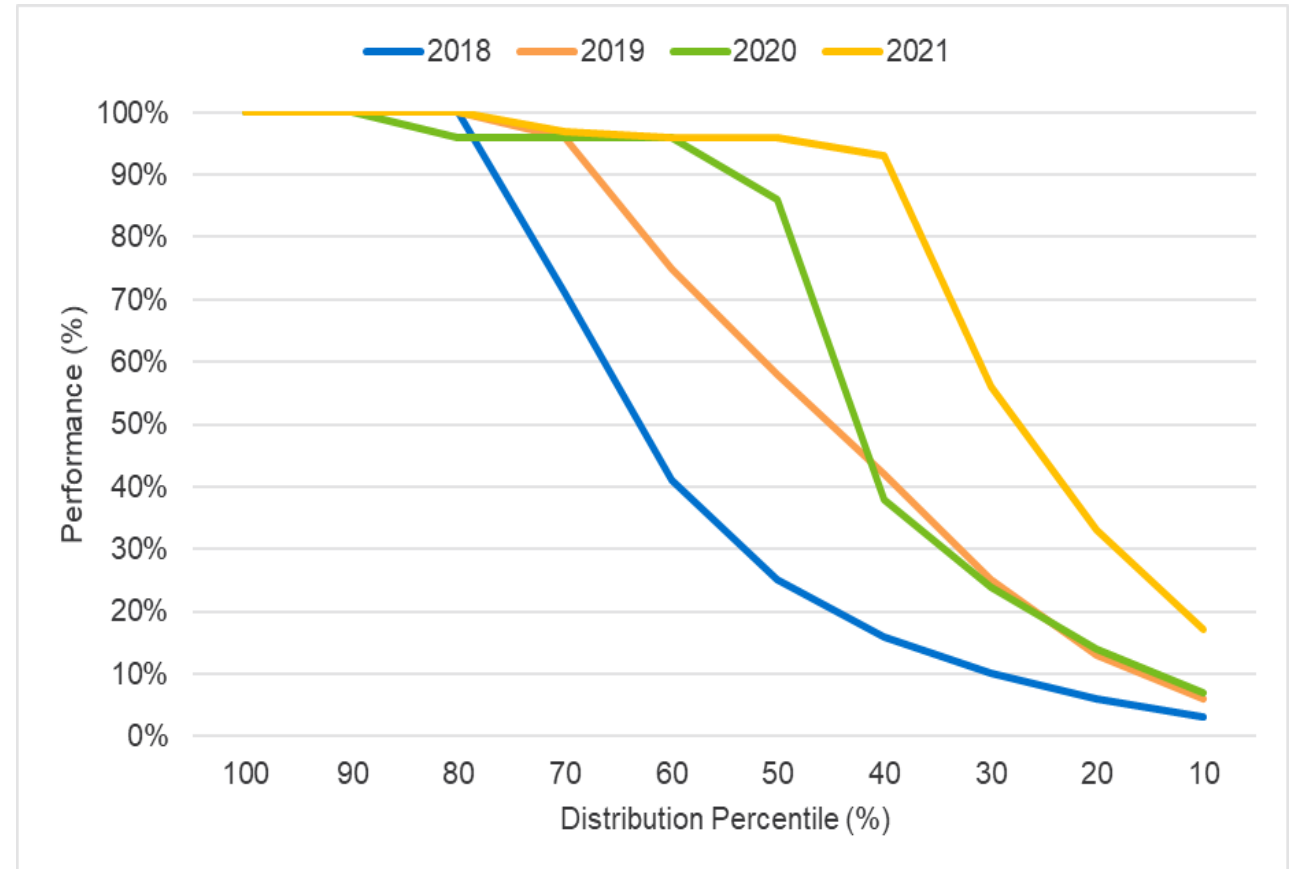
Discussion

- We observe that based on both approaches (time and event based) while DRAM performance appears to be improving year-over-year, there is still significant variation by DRPs and significant room to increase performance overall.

  - All resources are capable of performing to CAISO's expectation, but not always consistently

  - The size of dispatch appeared to have no impact on performance

- The performance level of DRAM resources may be impacted by a lack of incentive to consistently perform at or near expectation

  - CAISO settles the difference based on the real-time energy

  - DRAM resources are paid based on invoices provided to the contracting party, which only needs to show performance of one hour

- The accuracy and performance of DRAM resources varies greatly by DRP and over time

  - In most event hours, DRPs overreport their delivered energy

  - In addition, DRPs do not report the same delivered energy values in their quarterly reports as they do when the SC reports the delivered energy to CAISO for settlement

Data Issues: Summary

- Various data issues resulted in decreased confidence in the reported values from DRP, IOU, and CAISO sources

- Missing and problematic data on resources, customers, bidding, meter and settlement data narrowed the number of events the Nexant Team was able to analyze and decreased the accuracy of which the remaining were analyzed

- As such, the comparison of dispatched and delivered energy only included events where at least 95% of dispatched customers had sufficient data and no more than 100% of dispatched customers are present in the enrollment data

  − The Team estimated delivered energy for 71% of the event hours reported by the DRPs

  − The most common reason events were excluded was that less than 95% of customers dispatched were available for analysis

Data Issues: CAISO Data and Quarterly Reports

- CAISO Data: was used to compare values to CAISO-reported values

  - Many missing or incomplete values in metered energy

  - Exclusion of these hours could bias results down if they were incorrect

- Quarterly Report Data from DRPs: was used to identify events and DRP-reported values

  - Inconsistent data points, including market awards with no expected energy and vice versa, events without any customers dispatched, and events with missing baseline and metered energy values

  - Nexant excluded inconsistent data points, limiting ability to evaluate DRAM

  - Mismatch between DRP-reported event hours and CAISO-reported event hours

Data Issues: DRP Enrollment Data and IOU Customer Characteristics

- **DRP Enrollment Data: used to map customers to DRAM resources during events**
    - Customers enrolled in multiple resources at once had to be excluded
    - Missing some customers and entire resources
    - Sometimes missing unique identifiers to map customers to demographic or AMI data from IOUs
- **IOU Customer Characteristics: used to determine customer class**
    - Some customers assigned both residential and non-residential status were unable to be used
    - Some customers missing customer class
        - Able to be inferred based on resource or baseline method used
        - In the case of Combined baseline method, was unable to be inferred since this includes both customer classes

Data Issues: AMI Data from IOUs and Baseline Methods

- AMI Data from IOUs: used to map customers to their hourly usage

  - CAISO dictates that baseline analysis be conducted at the 5-minute interval, hourly AMI data was provided so Nexant calculated delivered energy at the hourly level

  - AMI data was largely unproblematic with only a handful of missing meter data for some customers

- Baseline Methods: were provided in the Quarterly Reports and used to recreate the DRP's baseline methodology

  - Baseline methodology used varies from resource to resource, so it was important Nexant knew which to utilize for each resource and event

  - This field was blank in quarterly reports sometimes and could be often be inferred by customer class

  - CAISO states that outages should be excluded from baseline days in a baseline analysis, Nexant did not receive required data to determine which days outages had occurred

Questions?

Photo by Emily Morter

Lunch **Break**

Until 12:30 p.m.

Introduction

- Revenue Quality Meter Data (RQMD) is critical for ensuring a functional monitoring and reporting process, so it is important to have a governance structure that results in timely data delivery.

- D.19-12-040 authorized a Working Group (WG) to discuss and develop a report investigating a series of questions regarding delayed customer and meter data that the Utilities provide to DRPs so that they may participate in the CAISO wholesale market.

Methodology

- Reviewed the Working Group (WG) report completed in May 2021.

- Based on the findings in the WG report, provided a recommendation as to whether to impose penalties to the IOUs for delayed, missing, or inaccurate RQMD.

Summary of Findings from Working Group Report – DRP Comments

▪ Five DRPs with contracts in 2020 submitted responses to a WG questionnaire regarding the frequency and impact of delayed RQMD from each IOU, including the financial and operational consequences.

IOU	% Accounts Not Receive RQMD by T+48B	DRP Comments
PG&E	1-5%	Data missing for longer than a week; solar export data double counted
SCE	1-5%+	20-30% of customer data were incorrect due to time shifts (more impactful than delays)
SDG&E	1-5%	Delays less common and less impactful than other IOUs

Summary of Findings from Working Group Report – DRP Comments

- Data delivery delays prevent calculation of customer performance, impacting revenues and delays payments to customers. This lowers program satisfaction.

- Data delays impose risk of CAISO penalties and impact creation of supply plans.

- Tracking down missing data and developing internal solutions to overcome data quality issues takes a significant amount of time.

- Four of five DRPs reported not losing capacity payments due to missing or delayed data, but some said they lost revenue from energy market.

- Some DRPs reported invoicing delays or forfeiture of a portion of payment due to missing or inaccurate (time shifts) data that lowered performance.

- Another concern is that missing or inaccurate data prevents DRPs from knowing if they have met the 30 MWh per MW minimum energy requirement, which could result in needing to dispatch additional hours to avoid penalties.

Summary of Findings from Working Group Report – IOU Comments

- All three IOUs submitted responses to a WG questionnaire regarding the processes and timelines for Validation, Editing, and Estimation (VEE) of raw data and the causes of missing or delayed RQMD.

	PG&E	SCE	SDG&E
Collect + Transfer to MDMS	Every 4 hours	Daily	Daily
Data Validation	3 times per day	Daily	Two batches twice daily
RQMD Available	After billing cycle (~30 days)	After billing cycle (27-33 days)	Daily
Top 4 Primary Causes of Delays			
Malfunctioning or non-communicating meters	✓	✓	✓
Meter configuration changes		✓	
Closed service accounts/data sharing authorizations	✓		✓
Account updates due to rate/program changes		✓	
Data validation procedures		✓	
Access issues			✓
IT system and application outages	✓		✓
Misunderstanding by third parties of pre- and post-RQMD status	✓		

Discussion

- DRPs said missing or inaccurate data is one of, if not the most significant challenge faced while participating in DRAM.

- Do not recommend retroactive penalties be imposed to the IOUs due to the lack of an existing framework and agreement for financial implications.

- Metrics should be established to define the success and failure of RQMD delivery that come with either financial earnings opportunities if met or penalties if not met.

  - Time to deliver RQMD

  - Accepted data formats, including which data elements are provided

  - Data accuracy

Discussion

- Recommend PG&E and SCE make RQMD available daily after validation rather than after the end of the customer billing cycle (as SDG&E does). This data should be available for DRAM in the same timeline as it is for IOU programs.

- When issues cannot be resolved between the DRP and IOU (for things within the IOU's control), quantifiable revenue losses or fines incurred by DRPs due to delayed or inaccurate RQMD should be reviewed in a hearing by a neutral arbiter.

- Timeline for revenue loss or penalties to DRPs should be adjusted based on data delivery date, not conclusion of program months.

Questions?

Photo by Hadija Saidi

Demand Response Auction Market (DRAM) Evaluation
Summary of Results and Recommendations

Presenting: George Jiang, Josh Schellenberg

Summary of Results

- ## Criterion 1: Did DRAM engage new, viable DRPs?

  - Yes, two of the nine DRPs that won contracts in 2019 DRAM (IV) to 2021 DRAM were new

  - Viability has improved, but integration challenges remain

    - Only one contract termination and two contract reassignments, compared to nine terminations and six reassignments in 2016 DRAM to 2019 DRAM (III-B)

    - Challenges identified include the unpredictability of the program, lack of timely/accurate metered data, need for greater flexibility, and administrative burden

  - The market is moderately to highly concentrated

    - Only one DRP won residential contracts in the evaluation period

    - The three largest DRPs accounted for 75% to 94% of the capacity in each cycle

Summary of Results

- Criterion 2: Did DRAM engage new customers?

  - Yes, but the proportion of new customers is decreasing in each cycle

    - Compared to 2018 enrollment, about 58% of all participants in 2019 (III-B+IV) were new to DRAM

    - In 2020, only 26% of enrolled customers had not participated in 2018 or 2019

  - DRAM continued to engage low-income customers, with 31 to 35% of all participants in 2018 to 2020 enrolled in a California Alternate Rates for Energy (CARE) rate

  - High energy use customers (highest 5% in customer class) comprised approximately 10% and 8% of participants in PG&E and SCE territories, respectively, compared to approximately 4% in 2016

Summary of Results

- Criterion 3: Were auction bid prices competitive?

  - Our public findings are mostly neutral and positive:

    - Neither average DRAM bids received nor awarded DRAM bids have consistently increased or decreased in value across the 2019 (DRAM IV) to 2021 period (statewide average).

    - No consistent trend with respect to average DRAM bid or awarded bid's competitiveness with LRAC over this period (statewide average), but

    - DRAM contracts are more competitive with LRAC at the end of the evaluation period than the beginning (statewide average), and

    - The average awarded DRAM contract price are lower than the LRAC in all three auctions during this period (statewide average).

    - IQR is decreasing over time; 2020 DRAM IQR is 8% lower than that of 2019 DRAM (IV), and 2021 DRAM IQR is 21% lower than that of 2020 DRAM (statewide average).

  - However, there are some potentially negative indicators of competitiveness:

    - Net decreases in the number of selling DRPs at SCE across 2019 (DRAM IV) - 2021.

    - Net decreases in the number of bids received at PG&E and SCE across 2019 (DRAM IV) - 2021.

Summary of Results

- Criterion 4: Were offer prices competitive in wholesale markets?

  - No, but they seem to have improved in recent years

    - DRAM resources tend to be offered at prices that far exceed that of both the net benefits test and other resource types

    - Appears to be a slight change in bidding more megawatt-hours at lower prices than in the past

    - DRAM resources are becoming more effective in getting capacity scheduled in the day-ahead (DA) and real-time (RT) markets, especially during periods of highest system needs, but remain less active than IOU DR and other resource types

    - DRPs that offer lower bids tend to have higher scheduling rates and scheduling effectiveness

  - Data quality issues make it challenging to determine if trends exist or will persist

Summary of Results

- Criterion 5: Did DRPs meet their contractual obligations?

  - Mixed:

    - Must-Offer Obligation (MOO) compliance is high; DRPs collectively bid at least 100% in every quarter of the evaluation cycle and bid over 100% in every quarter but Q4 2020

    - Alignment of Supply Plan Qualifying Capacity and Demonstrated Capacity with Contracted Capacity is declining year-over-year

      - DRP compliance decreased from 2019 to 2021, where demonstrated capacity alignment ranged from 79% in 2019 to 65% in 2021

    - Only 30% of contracts evaluated, representing 23% of the required energy, fulfilled their 2021 minimum dispatch requirement

Summary of Results

- ## Criterion 6: Were resources reliable when dispatched?

  - Mixed:

    - Overall, DRAM performance appears to be improving year-over-year, but with significant room to grow

    - There is significant variation by DRPs and by dispatch

      - While some DRPs tend to perform relatively well in a consistent manner, others seem to be performing well during some events and then underperforming for the remainder

  - There are significant inconsistencies when calculating performance from different datasets reported by the DRPs, by the Scheduling Coordinators for CAISO settlement purposes, and data calculated by the Nexant Team

  - A majority of data reported by the DRPs overestimate delivered energy when compared to the Nexant Team's analysis

Summary of Results

- **Revenue Quality Meter Data: Should penalties be imposed for delayed customer and meter data?**

    - Not retroactively, but specific metrics for success and failure of Revenue Quality Meter Data (RQMD) delivery and associated penalties should be established

    - Lack of an existing framework and agreement establishing a penalty structure

    - Metrics should be established to define the success or failure of delivery of RQMD that come with penalties or financial earnings depending on if they are met

    - Quantifiable revenue loss or fines incurred by the DRPs as a result of delayed or inaccurate RQMD should be reviewed and resolved by a neutral third party to determine culpability and potential penalties

    - Timeline for revenue loss or penalties to DRPs should be based on the date on which complete and accurate data is delivered, not conclusion of program months

Summary of Key Issues

- Widely varying performance, and consistent underperformance in some cases, have significantly lowered the overall effectiveness of DRAM

- Lack of availability during critical hours, such as the August 2020 heatwave, as studied in more detail by CAISO

- Given the above two issues, the additional system capacity (if any) that each DRP has delivered is highly uncertain and varies substantially

- Data errors and reporting inconsistencies, leading to over-compensation and a lack of confidence and transparency regarding overall DRAM performance

- Significant administrative burden for all parties involved

Recommendation 1: Performance Incentives

- **Align incentives of DRAM capacity contracts with demonstrated performance, including consistency and availability, and unique characteristics of DR**

  - Upfront incentive to support ramping up DR participation, but withhold a majority of the capacity payment each year to allow time for the DRP to demonstrate consistently high performance and availability during the peak season

  - Performance-based payment tied to an adjusted capacity metric that accounts for variation in performance and availability, especially during critical hours

  - Early contract termination and penalties if a given resource consistently underperforms

  - Eliminate capacity compensation based on bid amounts, such as the Must Offer Obligation

  - Incentivize aggregation of resource IDs to reduce statistical noise in baseline calculations, allowing for a more accurate assessment of a given DRP's ability to perform

  - Multi-year contract with annual performance-based payments and a ramp-up period to allow time for the resource to grow to full capacity (if the above recommendations are implemented)

Recommendation 2: Data Accuracy and Administrative Burden

- **Develop a centralized data repository and reporting system to increase data accuracy, prevent over-compensation and reduce administrative burden**

    - Create "single source of truth" for all DRAM data that will reduce administrative burden while addressing inaccuracies in data, reporting and invoicing

    - Help the CPUC and other parties continuously monitor, evaluate, and forecast DR performance to ensure further transparency and track available capacity

    - Sources of information include utility meter data, DRP enrollments mapped to utility accounts, contract-level and resource-level information, bids into the DA and RTM, and data relating to market dispatches and capacity tests (both raw data and subsequently modified datasets that support reporting)

Recommendation 3: Comparing DRAM to other DR Resources

- **Conduct a cost-effectiveness analysis of DRAM to compare to IOU DR programs and LRAC based on historical performance**

  - Full cost-effectiveness analysis using both DRAM program costs and benefits

  - Factor in the actual performance of DRAM resources to derate bids and compare those adjusted bids to LRAC

  - Enable stakeholders to assess the net benefits or costs of DRAM in direct comparison to the net benefits or costs of IOU DR programs, including third-party DR resources that the IOUs manage (such as the Capacity Bidding Program)

Recommendation 4: CAISO Market Availability

- **Further evaluate impact of minimum load costs, start-up times and market rules on resource availability and market dispatch**

  − Evaluation was unable to confirm what commitment costs were reflected in the market based on the data provided

  − More recent and frequent snapshots of the CAISO Masterfile data in order to confidently evaluate the portion of DRAM resources classified as long-start resources

  − Allows for a more comprehensive evaluation of the portion of DRAM resources exempt from the Resource Adequacy Availability Incentive Mechanism (RAAIM)

Recommendation 5: Performance Calculation Methodology

- **Assess and consider offering other choices in baseline methodology that better represent demand response performance for certain customers**

  - Assess the accuracy of other baseline methodologies and determine which customer types, technologies, or weather conditions would be better represented by alternative performance calculation approaches, including the use of control groups

  - Investigate the potential risks and benefits of allowing DRPs to use the Meter Generator Output (MGO) protocol for battery storage, electric vehicle chargers, or other sub-metered technologies rather than relying on traditional meter data to quantify performance

Recommendation 6: Revenue Quality Meter Data (RQMD)

- Consider establishing specific metrics regarding delivery timeline and data accuracy to define the success or failure of delivery of RQMD with either financial incentives for meeting the requirements or penalties if they are not met

  - Quantifiable revenue loss or fines incurred by the DRPs resulting from delayed or inaccurate RQMD should be reviewed in a hearing by a neutral arbiter to determine percent culpability and negligence

  - Data available immediately after validation rather than waiting until the end of the billing cycle

  - RQMD transfer process could also benefit from a centralized data repository to track and monitor data quality (see Recommendation 2), helping to reduce administrative burden for the IOUs and DRPs

Questions?

Photo by Ana Municio

Closing Q&A

Until 2:00 p.m.

California Public Utilities Commission

Thank you for attending today's DRAM Evaluation Workshop.

If you have feedback, please contact Eleanor Adachi (Eleanor.Adachi@cpuc.ca.gov).