California Public Utilities Commission

Energy Division's Evaluation of Demand Response Auction Mechanism

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Executive Summary

In D.14-12-024, the California Public Utilities Commission ("Commission," or "CPUC") authorized investor-owned utilities (IOUs) to conduct pilot Demand Response Auction Mechanism (DRAM) auctions in 2015 and 2016 for procuring demand response (DR) capacity aggregated by third-party providers, also referred to as demand response providers (DRPs),[1] to be delivered in 2016 and 2017. In D.16-06-029, the Commission authorized an additional pilot auction in 2017 for deliveries in 2018 and 2019.[2] D.17-10-017 authorized a fourth auction, which was recently concluded, for additional deliveries in 2019.[3]

In late 2016 in D.16-09-056, the Commission directed Energy Division Staff ("Staff") to "conduct an independent analysis of the 2015 and 2016 DRAM pilot auctions and the subsequent deliveries" and "present its findings and recommendations on whether to proceed from a pilot to permanent implementation of the mechanism to the Commission through a resolution"[4] by June 1, 2018. An Assigned Commissioner's Amended Scoping Memo, dated May 22, 2018, in proceeding (A.) 17-01-012 et al., acknowledged that Energy Division needed more time to complete the evaluation of the DRAM pilots, noting that "the preliminary results of the evaluation indicate a set of issues that are too complex to be addressed in the informal resolution process." The Scoping Memo thus expanded the scope of A.17-01-012 to include "the issue of the next steps for the [DRAM] Pilot."

This report discusses the study effort conducted by Staff to assess the performance of the DRAM pilots against the six specified success criteria adopted by the Commission.

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[1] Demand Response Provider refers to a CPUC Demand Response Provider defined in Electric Rule 24 (PG&E, SCE) and 32 (SDG&E) (together, Rule 24/32):
"An entity which is responsible for performing any or all of the functions associated with either a CAISO DRP and/or an Aggregator. DRPs must register with the CPUC and CAISO DRPs must also register with the CAISO. Unless otherwise specifically stated, all references to "DRP" herein shall refer to this definition."

[2] The Commission approved the IOU's DRAM I auction design, protocols and standard pro forma contract, bid evaluation criteria and non-binding cost estimates in July 2015, in Resolution E-4728. The IOUs' power purchase agreements from the DRAM I auction were approved by Staff disposition in early Spring 2016 (SCE AL3340-E; PG&E AL 4772-E; SDG&E AL 2843-E). The Commission approved the IOUs' DRAM II pilot design in January 2016 in Resolution E-4754. In September 2016, San Diego Gas and Electric's (SDG&E) and Pacific Gas & Electric's (PG&E) initial procurement for DRAM II were approved by Commission Resolutions E-4802 and E-4803, and Southern California Edison's (SCE's) DRAM II procurement was approved by staff disposition. Staff disposition approved the additional DRAM II procurement for SDG&E and PG&E in Fall 2016 (SDG&E AL 3004-E; PG&E AL 4946-E). Resolution E-4817 approved the IOUs' DRAM III pilot design and protocols in early January 2017.

[3] D.17-10-017 directed the IOUs to conduct an additional DRAM auction in 2018 for deliveries in 2019 ("DRAM IV"), in accordance with the procurement budget, guidelines, and all other parameters it adopted.

[4] D.16-09-056, p. 66.

The study focused primarily on results from DRAM I (2015 contracts for delivery in 2016) and DRAM II (2016 contracts for delivery in 2017), although analysis of some issues did consider data from DRAM III procurement conducted in 2017 (for delivery in 2018 and 2019).

Summary of Findings

Criterion 1, as adopted in D. 16-09-056, asks if the DRAM pilots engaged "new, viable third-party providers," or DRPs. Auction results indicated that the pilots were successful in engaging new DRPs: 16 out of ***[REDACTED]*** total companies bidding in DRAM I – III had never participated in an IOU DR program before the auctions. However, whether or not these companies could be considered truly "viable" was not clear. Ten companies that had not previously participated in IOU DR programs in California won DRAM contracts in DRAM I – III; seven companies new to DR won contracts in DRAM I − II alone. But of the seven new sellers across DRAM I – II, just three companies fulfilled the full terms of their contracts in the delivery years 2016 and 2017; the others either terminated or reassigned contracts one or more times. Furthermore, the DRAM pilots saw a consolidation of market leaders such that the top three companies controlled up to 95% of the total contract value and capacity megawatts (MW) of the DRAM pilots by the end of the third auction. While each of the DRAM pilot years saw ***[REDACTED]*** most contract value, the effect of contract reassignments and terminations intensified market concentration (in fact, all reassignments were acquired by one leading company). As discussed later in this report, the analysis suggested that the challenges associated with navigating the IOU and CAISO systems and processes ("integration challenges") could be a major driver of the underperformance of many DRPs, particularly for residential providers.

Criterion 2 asks whether new customers were engaged in demand response through the DRAM. On this point, the DRAM pilots were highly successful. Over 52,000 customers were enrolled in DRAM in the 2017 delivery year, 98% of which were residential customers. In addition, between about 74−95% of all customers participating in DRAM in 2016 − 2017 had never participated in an IOU DR program in California previously. Further, the DRAM pilots engaged residents of multi-family (MF) buildings and lower-income customers enrolled in the California Alternate Rates for Energy (CARE) Program. Participation by customers that benefitted from Energy Savings Assistance (ESA) direct install energy efficiency measures was somewhat lower; more customers that had used mainstream IOU energy efficiency program measures participated than did ESA participants, but both groups participated at higher rates than did Net Energy Metering (NEM) customers. A separate analysis found that less than 4% of all DRAM customers were in the top 5% of their customer class in terms of energy usage.

Criterion 3 asks whether DRAM auction bid prices were competitive using two sub-criteria. First, were DRAM auction bids less than the long-term avoided cost of generation? Second, were bids "dispersed in a narrow range?" With respect to the first

metric, analysis of DRAM auction bids for DRAM I – III indicated that the DRP capacity price offers were generally competitive for PG&E and SCE, starting with DRAM II; however, the relative competitiveness results were mixed for SDG&E:

- For Pacific Gas & Electric Company (PG&E) and Southern California Edison (SCE), bids by DRPs were ***[REDACTED]*** higher than the long-term avoided cost of generation for 2016, but lower for 2017–2019.
- For San Diego Gas & Electric Company (SDG&E), the average cost of DR capacity procured through DRAM was ***[REDACTED]*** lower than the long-term avoided cost of generation in 2016, higher in both 2017 and 2018, but ***[REDACTED]*** below in 2019.

[REDACTED]

Criterion 4 asks whether DRAM bid prices were competitive in the California Independent System Operator (CAISO) wholesale energy market. Because the Commission provided no guidance on how to evaluate competitiveness, ED Staff utilized three proxy metrics to assess energy bid price competitiveness in CAISO's Day-Ahead Market (DAM). These metrics were referred to as 'scheduling rate,' 'bid price distribution,' and 'scheduling effectiveness.' The analysis of these metrics showed that:

- DRAM resources were far less active in the DAM than other resource types– with some exceptions, IOUs were generally better at scheduling DR resources in the DAM (and had more dispatch hours than DRAM);
- Average DRAM bid prices were far less competitive in the DAM than bid prices for other resource types;
- DRAM resources were scheduled far less frequently during the highest CAISO system peak load hours than other resource categories.

Staff concluded that DRAM bid prices were generally not competitive in the energy market. As discussed further in the report, the results could be considered unsurprising given the forgiving design and minimal dispatch requirements associated with the pilot.

Criterion 5 examines the DRPs' performance relative to their contract obligations and asks whether the DRPs successfully aggregated and provided their contracted capacity. (Note that Staff's overall finding is inconclusive for reasons described below.) DRPs had a mixed but improving record (with 2017 and 1H 2018 results substantially better than 2016) in aggregating resource capacity on Supply Plans and making this capacity available in the wholesale market via Demonstrated Capacity. Overall, the DRPs' aggregate Supply Plans achieved 65% of contracted capacity for the 2016 delivery year, 90% in 2017, and 97% in 1H 2018. Demonstrated Capacity quantities were roughly 58% of contracted capacity for 2016, 88% for 2017, and 86% for 1H 2018. As discussed later in this report, Staff's analysis suggested that challenges associated with registrations, customer data access, and customer enrollment may have significantly hampered underperforming DRPs across the DRAM pilot; although the 1H 2018 launch of the

"click-through authorization process"[5] (for accessing IOU systems to obtain customers' data during the process of enrolling customers in the DRPs' programs) may help to improve future performance by mitigating IOU integration challenges. Analysis of recent invoices for Demonstrated Capacity exposed an important gap in the design of the DRAM pilot– namely the lack of a Commission-approved methodology to estimate Qualifying Capacity (QC) on Supply Plans, which, in Staff's view, makes the earlier findings regarding capacity aggregation inconclusive at best.

Criterion 6 examines the performance of DRAM resources in the CAISO energy market and asks whether resources responded to dispatches by CAISO. The 'dispatch performance' metric was defined as a measure of the extent to which a market resource performed when dispatched in CAISO's Real-Time Market (RTM) relative to energy awarded in the Day-Ahead Market (DAM). The analysis of this metric over the pilot period showed mixed results. Some DRPs performed well and delivered reliable dispatch performance above 80% and in some cases exceeding 100%, with many appearing to perform better than IOU programs. Some other DRPs essentially failed to perform in terms of rarely capturing DAM awards and not delivering meaningful load reductions. In addition, a small sub-set of DRPs had begun actively bidding in the RTM; these DRPs exhibited strong performance in responding to the RTM dispatch signals.

The DRAM evaluation findings are summarized in Table 1 below.

Table 1: DRAM Evaluation Summary

	Evaluation Criteria	Results
1	Did DRAM engage new, viable DRPs?	Yes, but some were not viable
2	Did DRAM engage new customers?	Yes
3	Were auction bid prices competitive?	Mostly yes
4	Were offer prices competitive in wholesale markets?	No, but not unexpected per current pilot design
5	Did DRPs aggregate contracted capacity in a timely manner?	Improving, but inconclusive (exposed key program design issue to fix)
6	Were resources reliable when dispatched?	Mixed; some DRAM DRPs delivered reliable performance, others did not

[5] Ordering Paragraph 1 of D.16-06-008 authorized IOUs to allow the use of the click-through authorization process, which provides a customer with "the means by which to verify and document the customer's consent to release its usage data to the third-party demand response provider." Ordering Paragraph 9 of D.16-06-008 ordered the IOUs to hold working group meetings to develop consensus proposals for the implementation of the click-through process. Resolution E-4868, adopted August 24, 2017, approved the utility implementation plans as modified and cost recovery for the click-through process.

1. Background

Following the 2008 Federal Energy Regulatory Commission (FERC) requirement that demand response (DR) be allowed to bid into the California Independent System Operator (CAISO) market,[6] the California Public Utilities Commission ("Commission," or "CPUC") began to collaborate with CAISO to broaden opportunities for DR in California.

In 2014 in D.14-03-026, the Commission committed to bifurcating its DR programs into two types: supply-side DR that would be bid into the CAISO markets and be economically dispatched by CAISO based on grid conditions, and load-modifying DR that involves customers modifying their load profiles on a regularly recurring basis in response to retail rates. The Commission directed investor-owned utilities (IOUs) to integrate all supply-side DR programs in IOU portfolios into the CAISO markets by January 1, 2018.[7]

In parallel, the CAISO developed and adopted parameters for Reliability Demand Response Resources (RDRR) and Proxy Demand Resources (PDR) market participation models over several years (2010–2015).

In D.12-11-025,[8] the Commission adopted policies and rules[9] that govern the bidding of third-party demand response into CAISO wholesale markets in 2012.

In 2014 in D.14-12-024, the Commission also adopted a settlement agreement developed by parties that defined the key parameters of a capacity auction mechanism through which the IOUs would procure DR capacity aggregated by third-party providers, also referred to as demand response providers (DRPs)[10] – with DR resource directly integrated into the CAISO markets. This auction initiative became the Demand Response Auction Mechanism (DRAM). The same decision also authorized the IOUs to conduct pilot DRAM auctions in 2015 and 2016 for procuring DR capacity aggregated by DRPs, to be delivered in 2016 and 2017. Through D.16-06-029 in 2016 and Resolution E-4817 in 2017, the Commission authorized an additional pilot auction in 2017 for

[6] Wholesale Competition in Regions with Organized Electric Markets, (Order 719), issued October 17, 2008 in RM 07-19 and AD07-7.
[7] Certain IOU extensions have been granted to this directive.
[8] Commission Decision 13-12-029 subsequently modified D.12-11-025.
[9] These rules are known as Electric Rule 24 (PG&E and SCE) and Rule 32 (SDG&E) (together, Rule 24/32).
[10] Demand Response Provider refers to a CPUC Demand Response Provider defined in Rule 24/32: "An entity which is responsible for performing any or all of the functions associated with either a CAISO DRP and/or an Aggregator. DRPs must register with the CPUC and CAISO." Unless otherwise specifically stated, all references to "DRP" herein shall refer to this definition.

deliveries in 2018 and 2019.[11] D.17-10-017 authorized a fourth auction, which is currently underway, for additional deliveries in 2019.[12]

In late 2016 in D.16-09-056, the Commission directed Energy Division Staff ("Staff") to "conduct an independent analysis of the 2015 and 2016 DRAM pilot auctions and the subsequent deliveries" and "present its findings and recommendations on whether to proceed from a pilot to permanent implementation of the mechanism to the Commission through a resolution"[13] by June 1, 2018. An Assigned Commissioner's Amended Scoping Memo, dated May 22, 2018, in proceeding (A.) 17-01-012 et al., acknowledged that Energy Division needed more time to complete the evaluation of the DRAM pilots, noting that "the preliminary results of the evaluation indicate a set of issues that are too complex to be addressed in the informal resolution process." The Scoping Memo thus expanded the scope of A.17-01-012 to include "the issue of the next steps for the [DRAM] Pilot."

This report discusses the study effort conducted by Staff to assess the performance of the DRAM pilots against the six specified success criteria adopted by the Commission. The study focused primarily on results from DRAM I (2015 contracts for delivery in 2016) and DRAM II (2016 contracts for delivery in 2017), although analysis of some issues did consider data from DRAM III procurement conducted in 2017 (for delivery in 2018 and 2019).

Table 2: Total Capacity and Procurement Budget, DRAM I–III Pilots

	2016	2017	2018	2019	Total
Capacity Procured (August MW)	40.5	124.6	181.9	205.0	551.9
Procurement Budget (Millions)	$ 9.0	$ 13.5	$ 13.5	$ 27.0	63.0

[11] The Commission approved the IOUs' DRAM I auction design, protocols, and standard pro forma contract, bid evaluation criteria, and non-binding cost estimates in July 2015 in Resolution E-4728. The IOUs' power purchase agreements from the DRAM I auction were approved by Staff disposition in early Spring 2016 (SCE AL3340-E; PG&E AL 4772-E; SDG&E AL 2843-E). The Commission approved the IOUs' DRAM II pilot design in January 2016 in Resolution E-4754. In September 2016, San Diego Gas and Electric's (SDG&E) and Pacific Gas & Electric's (PG&E) initial procurement for DRAM II were approved by Commission Resolutions E-4802 and E-4803, and Southern California Edison's (SCE) DRAM II procurement was approved by Staff disposition. Staff disposition approved the additional DRAM II procurement for SDG&E and PG&E in Fall 2016 (SDG&E AL 3004-E; PG&E AL 4946-E). Resolution E-4817 approved the IOUs' DRAM III pilot design and protocols in early January 2017.

[12] D.17-10-017 directed the IOUs to conduct an additional DRAM auction in 2018 for deliveries in 2019 ("DRAM IV"), in accordance with the procurement budget, guidelines, and all other parameters it adopted.

[13] D.16-09-056, p. 66.

2. DRAM Evaluation and Success Criteria

2.1 Evaluation Objectives

In D.16-09-056, the Commission adopted the following six criteria for assessing the success of the DRAM pilots:[14]

1. Did DRAM engage new, viable, third-party providers?
2. Did DRAM engage new customers?
3. Were auction bid prices competitive?
4. Were offer prices competitive in the wholesale markets?
5. Did demand response providers aggregate the capacity they contracted, or replace it with demand response from another source in a timely manner?
6. Were resources reliable when dispatched, i.e., did customers perform appropriately?

The following four objectives of this study were adopted in the Energy Division's "Research Plan for the Demand Response Auction Mechanism (DRAM) I, II, & III Pilots (2015–2017)" ("Research Plan"),[15] completed in Spring 2017:

- Assess the DRAM pilots based on the Commission's adopted criteria for determining its success;
- Explore additional questions based on input from parties to R.13-09-011;
- Provide data and factual analysis as the basis of findings and to guide recommendations, and;
- Undertake a balanced analysis based on input from the range of market, utility, and regulatory actors.

The Energy Division's Research Plan further elaborated upon the Commission-adopted success criteria and presented a list of metrics and sub-metrics for study, which are described in detail in Appendix A.

The Research Plan also identified questions, suggested by parties in comments on the draft Research Plan, that Staff could explore if time and resources permitted. These questions are listed below and many are discussed throughout this report:

[14] D.16-09-056, "Decision Adopting Guidance for Future Demand Response Portfolios and Modifying Decision 14-12-024," adopted on September 29, 2016, p. 66.
[15] Research Plan for the Demand Response Auction Mechanism (DRAM) I, II, & III Pilots (2015-2017); California Public Utilities Commission, Energy Division, April, 2017, p. 2. http://www.cpuc.ca.gov/General.aspx?id=7032

1. How would the DRAM pilot have performed against the DRAM program requirements adopted in D.16-09-056? If substantially different, can Staff provide recommendations to support a possible future DRAM program's success?
2. Did the agreements between DRAM aggregators and customers impose any financial risk of loss?
3. Was the DRAM pilot procurement mechanism – the RFO and the selection process – successful or should it be modified? If we consider DRAM pilots as testing two approaches – i.e., (a) a solicitation and auction mechanism; and, (b), whether third-party supply side DR performs in the wholesale market – were both parts successful?[16]
4. Did DRAM resources meet the obligations specified in contracts?
5. Did IOU and CAISO processes work to enable the participation expected by third-parties and their customers?
6. Did the DRAM pilot perform substantially differently across IOUs?
7. Did DRAM produce the most competitive supply-side DR available (as compared to other concurrent approaches)?
8. Did the DRAM pilot suggest there are more developed markets in certain territories or across certain customer types? Did Demand Response Providers (DRPs) experience more difficulty registering resources in some service territories as opposed to others?
9. What were the reasons for and impacts of contract reassignments on market concentration?
10. Were DRAM resources bid into the wholesale market viable, reliable, visible, and verifiable; did they provide load at the right time, for the right duration, when called upon?
11. Is there a correlation between auction bid prices and performance in the CAISO energy market?
12. How are NEM customers participating in DRAM relative to non-NEM customers?
13. Can DRPs provide cost-competitive and reliable capacity that meets the needs of an evolving grid?
14. Did DRAM pilot benefits exceed the costs, and can a DRAM program help achieve the state's climate goals?

[16] SDG&E suggests that the following metrics reflect these two components of the DRAM pilot: (a) 1.1-1.9; 3; and, (b) 1.10- 1.12; 2, 4, 5, and 6.

15. Can the Commission create a "public metric" on the price or cost of accepted DRAM bids to allow some comparison between average DRAM RA costs as compared to other RA prices?[17]

Finally, the Research Plan highlighted the following three questions related to policy developments at the Commission involving Disadvantaged Communities (DACs):

1. What proportion of DRAM customers participating in the pilot are geographically located within Local Capacity Areas?[18] Did any DRAM bidders qualify as and perform as required for Local Capacity Resource Adequacy resources?
2. Does the geographic location of customers participating in DRAM pilots overlap with the location of disadvantaged communities (DACs), and to what extent?
3. Did DRAM bidders attempt to qualify as Flexible Capacity Resource Adequacy resources? And if so, were they successful? Did DRAM bidders provide any other flexible products to the CAISO and/or ancillary services?

2.2 Relative Weighting of Success Criteria

When developing the DRAM Research Plan, Staff weighted the criteria according to its assessment of the role and importance of the criteria in determining the overall success of the DRAM pilots. Staff envisioned this approach as allowing for a more objective assessment of the success of the DRAM pilots against each criterion individually and as a whole. The weighting approach used in the Research Plan is presented in Appendix A. Staff decided to focus on the single most important metric for each criterion for the purpose of determining if the DRAM pilot was "successful."[19]

The Research Plan outlined three approaches to scoring the DRAM pilots against the adopted criteria. First, a "pass / fail" threshold was assigned to criteria for which identifying a minimum standard of performance seemed reasonable. Second, a "continuous" approach to scoring was utilized for those criteria for which the data uncertainty was felt to be high at the time the Research Plan was being developed and setting a "pass / fail" threshold appeared arbitrary. Third, these two approaches were combined into a "semi-continuous" score for cases in which the performance appeared to vary unpredictably but for which setting a minimum performance standard seemed appropriate.

[17] TURN suggested a possible metric could be the weighted average summer capacity price across all utilities.

[18] A Local Capacity Area is a CAISO-identified transmission constrained "load pocket" subject to a minimum required level of capacity, which are adopted annually in the CPUC's Local Capacity Requirements through the Resource Adequacy proceeding.

[19] The Research Plan termed the six overarching questions for evaluating DRAM's success (adopted by the Commission in D.16-09-056) as "criteria" and all qualifying questions as "metrics" and "sub-metrics."

Criteria 1 – 3 as adopted in the Research Plan were designated to be pass / fail; criterion 4 was deemed to be continuous; and, criteria 5 – 6 were listed as semi-continuous.

Table 3: Weighting of DRAM Criteria and Scoring Metrics

#	Description	Criterion Weight	Metric Type	Pass Threshold / Continuous Scoring Approach	Research Plan Metrics Comprising Criterion Score	Additional Research Plan Metrics Informing Analysis
1	Did DRAM engage new, viable, third-party providers?	0.05	Pass / fail	1 new third-party provider bidding / winning	1.1	1.2 – 1.12
2	Did DRAM engage new customers?	0.10	Pass / fail	1 new customer participated in DRAM	2.1	2.2 – 2.6; 2.A.1 – 2.A.3
3	Were DRAM auction bid prices competitive?	0.20	Pass / fail	DRAM short-listed bid prices meet definition of competitive	3.1	3.2 – 3.4
4	Were DRAM offer prices competitive in the wholesale markets?	0.20	Continuous	DRAM MWh are bid and scheduled in CAISO's Day-Ahead Market at: + / - 15% of IOU supply-side DR - Good + / - 30% of IOU supply-side DR - Acceptable + / - 45% of IOU supply-side DR - Needs Work	4.1	4.2 – 4.4
5	Did DRPs aggregate the capacity they contracted in a timely manner?	0.20	Semi-Continuous	80 – 100% - Good; score = continuous 60 – 80% - Acceptable; score = continuous Below 60% - Non-performing (fail); score = 0	5.1	5.2 – 5.8
6	Were DRAM resources reliable when dispatched?	0.25	Semi-Continuous	80 – 100% - Good; score = continuous 60 – 80% - Acceptable; score = continuous Below 60% - Non-performing (fail); score = 0	6.1	6.2 – 6.4
		1				

The Research Plan also adopted a scoring approach for assessing the overall performance of the DRAM pilots against the adopted success criteria (see Table 4 below): a total weighted score of 80–100% was deemed as "substantially successful," a total score of 60–80% was regarded as "needs improvement," and a total score below 60% was considered as "back to the drawing board."

Table 4: Interpretation of the Total Weighted Score

Total Weighted Score (across the six success criteria)	**Finding**
80 – 100%	Substantially successful
60 – 80%	Needs improvement
Less than 60%	Back to the drawing board

As discussed throughout this report, the actual performance of the DRAM pilots against the adopted success criteria was found to be more nuanced than anticipated by the Research Plan. Results differed across IOU service territories and across DRPs and pilot

years. Results also differed based on how Staff handled related variables such as the inclusion or exclusion of DRPs in certain analyses depending on various factors (such as the use of “screen scraping” or contract termination or re-assignment). As a result of these many nuances, Staff opted not to attribute a quantitative score to the DRAM pilot evaluation.

3. Methods

The DRAM evaluation study largely followed the activities and schedule presented in the Research Plan described in the last section.

Commission Staff utilized the following sources of data in conducting the analysis:

- CAISO data provided through the CPUC–CAISO annual subpoena process;
- Parallel bidding and performance data provided by scheduling coordinators (SCs) for most DRPs;
- multiple data requests to DRPs;
- interviews and correspondence with fourteen DRPs;
- an online survey sent to sixty companies participating in one or more DRAM bidders' conference;
- a follow-up online survey sent to DRP winners of DRAM III and IV contracts and several SCs;
- two large data requests to IOUs, as well as a large number of additional requests and clarifications.

Staff thanks all of the individuals responding to Staff requests for their responsiveness and patience.

Staff identified numerous sources of potential data quality issues over the course of the study:

Firstly, during the quality control phase of the study, it was found that Staff had incomplete lists of CAISO resource IDs for use in its analysis of performance data. This required an extensive collaborative effort with the IOUs, DRPs, and SCs to remedy this situation.

Secondly, subsequent quality review revealed wide differences in results from Staff's analysis of performance data and the performance level perceived by select DRPs and SCs. Such discrepancies in results raised significant concerns and necessitated numerous additional discussions by Staff with select DRPs and SCs, as well as CAISO, to sort through the potential issues and identify potential sources of error.

4. DRAM Procurement Overview

This section provides a high-level review of DRAM procurement results. The remainder of this report focuses exclusively on the DRAM evaluation results.

4.1 IOU DRAM Procurement Summary

Between DRAM I – IV (contract delivery years 2016 – 2019), the IOUs procured nearly 715 MW (August), yielding an average of nearly 179 MW (August) for each of the four years. IOUs procured the most DRAM capacity for delivery in 2019 (DRAM IIIB), with roughly 205 MW (August). The Commission authorized a total budget of $63 million for DRAM contracts over these four years, averaging roughly $16 million annually across the three IOUs.

Table 5: DRAM Procurement Overview (MW)

IOU	DRAM I 2016	DRAM II 2017	DRAM IIIA 2018	DRAM IIIB 2019	DRAM IV 2019	Cumulative 2016 –2019	Annual Average
SCE	20.32	56.20	88.50	99.20	73.34	264.22	66.06
PG&E	17.17	56.40	79.47	90.10	72.74	243.14	60.78
SDG&E	2.99	12.00	13.90	15.69	16.50	44.58	11.15
Total (MW)	40.48	124.60	181.87	204.99	162.58	714.52	178.63

Note: The year shown is the year of contract delivery.

Table 6: DRAM Budgets ($ Millions)

IOU	2016	2017	2018	2019	Cumulative Total	Annual Average
SCE	$ 4.0	$ 6.0	$ 6.0	$ 12.0	$ 28.0	$ 7.00
PG&E	$ 4.0	$ 6.0	$ 6.0	$ 12.0	$ 28.0	$ 7.00
SDG&E	$ 1.0	$ 1.5	$ 1.5	$ 3.0	$ 7.0	$ 1.75
Total	$ 9.0	$ 13.5	$ 13.5	$ 27.0	$ 63.0	$ 15.75

Over this period, the amount of capacity procured increased from 40.5 MW (August 2016) to 368 MW (August 2019, inclusive of DRAM III and IV). Further, the amount of capacity procured for the same annual budget ($13.5 million) increased 60% from roughly 125 MW (August) in 2017 to 205 MW (August) in 2019 for DRAM IIIB, although it then dropped in DRAM IV to roughly 163 MW (August) on account of the simple average August bid price cap.

4.2 Customer Profile

To support development of DRAM residential products, D.14-12-024 ordered a pilot design working group to "develop and recommend a proposal for a set-aside based on location, customer class or attribute, or end uses."[20] Subsequently, Resolution E-4728 ordered the IOUs to create a set-aside of 20% of their total MW procured under the DRAM each year for residential aggregations.[21] Although the IOUs have complied with the set-aside, the amount of residential MW (August) procured annually has nonetheless varied widely.

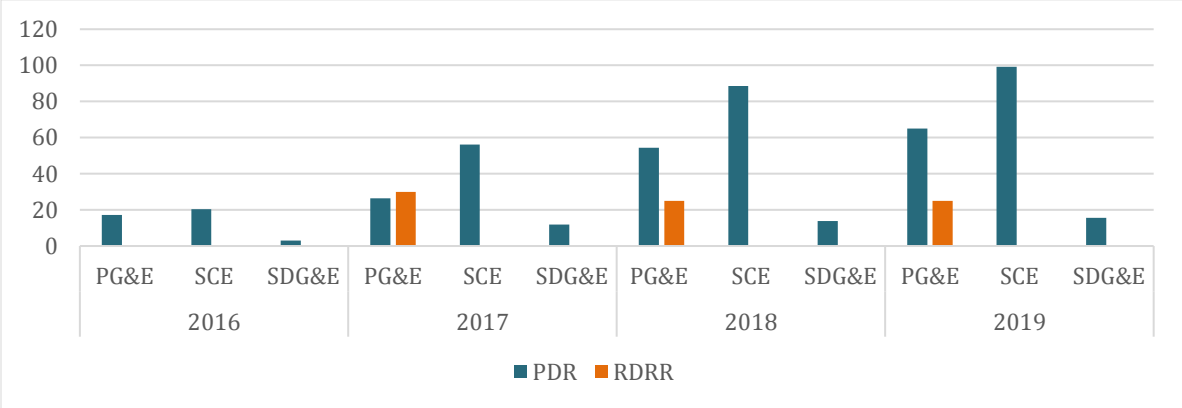
4.2.1 Procurement by Customer Class (CONFIDENTIAL)

[REDACTED]

4.3 Capacity Attributes

Of the cumulative 552 MW procured across four delivery years, 472 MW (August) was procured by IOUs for PDR products, or 86% of all contracted capacity. Only PG&E reported procurement of RDRR in the DRAM pilots (all of which was non-residential), selecting 80 MW (August) in total between 2017 and 2019 (see Figure 1 below). These differing results likely stemmed from SDG&E's smaller industrial base and the fact that SCE had already reached its 2% reliability cap in 2017.[22]

Figure 1: PDR and RDRR Procurement by IOU (August MW), 2016 – 2019



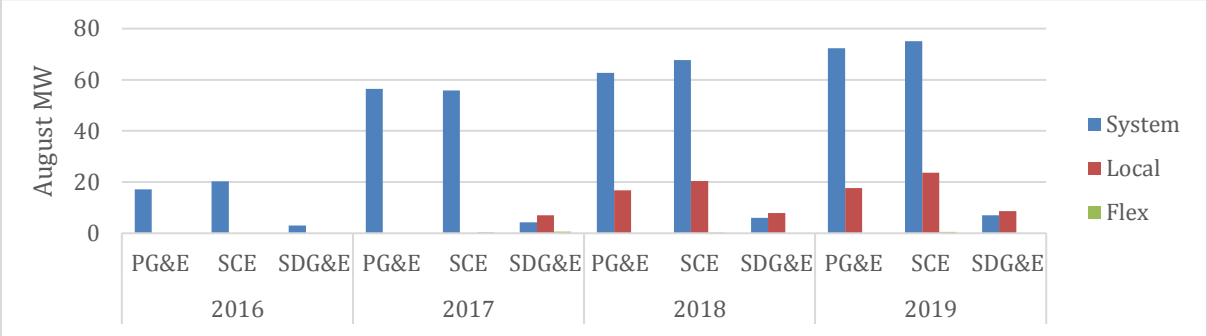
For the first DRAM pilot year, 2016, the Commission authorized the IOUs to procure only system Resource Adequacy (RA) capacity. For 2017 (DRAM II), the Commission

[20] D.14-12-024, Ordering Paragraph 5b, p. 86.
[21] Resolution E-4728, Ordering Paragraph 19, p. 39.
[22] D.10-06-034 adopted a reliability-based DR Settlement Agreement that capped reliability-based DR programs that count toward resource adequacy at 2% of the recorded all-time coincident CAISO system peak, starting in 2014.

authorized IOUs to procure local and flexible RA in addition to system RA. DRAM III further permitted sellers to offer a flexible capacity category 1 product, whereas DRAM IV authorized IOUs to procure all of these resource types while also "appropriately prioritiz[ing] bids for local resource adequacy."[23]

Over the four pilot years, the vast majority– about 81%– of the capacity procured by all three IOUs was system RA. Flexible RA comprised just 0.3% of total procurement over all four years, with local RA totaling just 18.5% (see Figure 2).

Figure 2: System, Local, and Flexible RA (MW) Procured by IOUs



4.3.1 Capacity Attributes – Continued (CONFIDENTIAL)

[REDACTED]

[23] D.17-10-017, Ordering Paragraph 10, p. 90.

5. Criterion 1: Were New, Viable, Third-Party Providers Engaged?

The results clearly showed that the DRAM pilots engaged new third-party providers (DRPs) in demand response delivery in California. However, whether or not some of these new providers could be considered "viable" was less clear. This section presents data and analysis related to criterion 1.

#	Description	Criterion Weight	Criterion Type	Pass Threshold	Score
1	Did DRAM engage new, viable, third-party providers?	0.05	Pass / fail	1 new third-party provider bidding / winning	**Yes, but some were not viable**

5.1 Participation of New Demand Response Providers

Several new DRPs competed in the DRAM pilots. Nearly ***[REDACTED]*** of all bidders participating in the pilots over the three-year period had never participated in an IOU DR program in California previously. Of the ***[REDACTED]*** DRPs that bid into one or more of the three DRAM I – III auctions (2016 – 2019), sixteen had never participated in any IOU DR program previously. Fifteen companies won one or more auction contract(s) during the three years. Of these fifteen companies winning contracts, ten of them (or 67% of winning DRPs) had not previously participated in any IOU DR program in California. Table 7 summarizes these results across the three IOUs and the three auctions.

Table 7: Summary of DRPs New to DR in California (DRAM I – III)[24]

Type of DRP	Number	Percent
Unique Bidders	***[REDACTED]***	100%
Unique New Bidders	16	***[REDACTED]***
Unique Sellers	15	100%
Unique New Sellers	10	67%

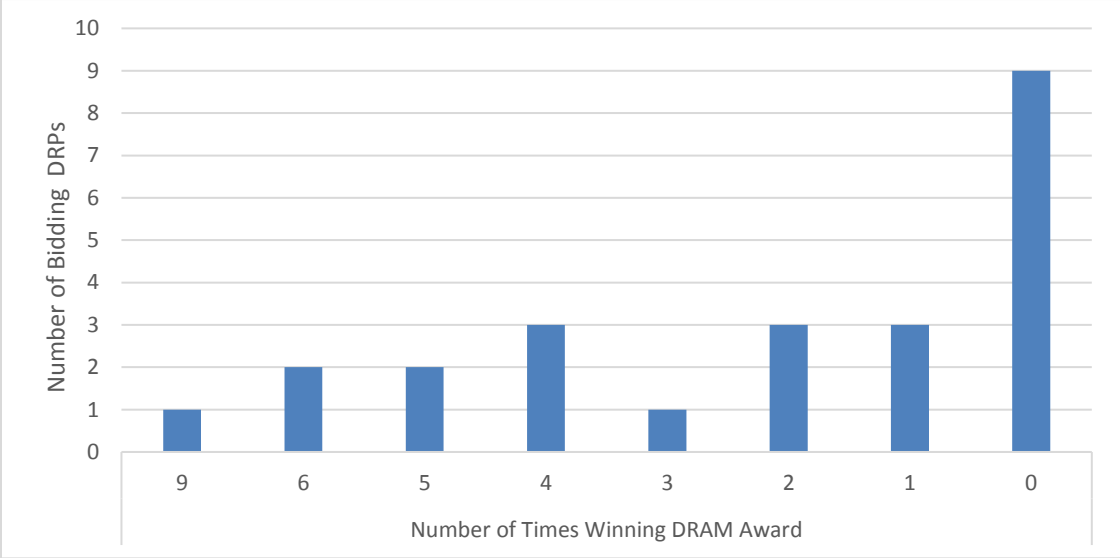
Note: A "seller" is a DRP that won a DRAM contract.

A number of these fifteen "seller" companies won more contracts than other DRPs. For instance, one DRP company won a contract award with each IOU in each of the three auctions – totaling nine awards. In contrast, about nine companies bid into the DRAM auctions at least once but never won a contract. Figure 3 shows the distribution of

[24] The "unique" designation is intended to eliminate overlap across the IOUs in the statewide total; a "seller" is a third-party bidder that wins a contract.

bidding DRPs winning different numbers of DRAM contracts. The vast majority of awards – 46 out of 55 total contract awards to individual DRPs over the three auctions, or 84% of total awards – went to companies that had never previously participated in an IOU DR program in California before 2016.

Figure 3: Frequency of DRP Auction Awards (DRAM I – III)



5.1.1 DRP Participation by IOU (CONFIDENTIAL)

[REDACTED]

5.1.2 DRP Participation - Discussion

It could be concluded that DRAM auctions over the pilot period attracted widespread bidding interest among companies new to the IOU DR programs in California. However, the level of new provider engagement was not consistent over the pilot period. In general, the percentage of new companies bidding into each auction declined with each successive auction for each of the three IOUs.

5.2 Viability of New DRPs

The DRAM pilots did experience contract terminations and reassignments, leading to some DRPs exiting DRAM. When factoring in contract terminations and reassignments, the number of seller (winning) DRPs and new sellers completing the full terms of their contracts declined significantly. The data indicated that in the initial two years of the DRAM pilot, just six out of the ***[REDACTED]*** unique bidding companies became sellers and completed the full terms of their contracts. Just three new sellers accomplished the

same across DRAM I – II (see Table 8), casting doubt on the actual viability of several newly-engaged providers.

Table 8: Impact of Contract Terminations/Reassignments (2016–2017 Only)

Participant Type	2016–2017 Only	Percent
Unique Bidders	*[REDACTED]*	
Unique New Bidders	13	*[REDACTED]*
Unique Sellers	9	*[REDACTED]*
Unique Sellers Completing Some Contracts	8	88.9% (/9)
Unique Sellers Completing All Contracts	6	66.7% (/9)
Unique New Sellers	7	77.8% (/9)
Unique New Sellers Completing All Contracts	3	42.9% (/7)

The DRAM Research Plan defined a viable company as one that "bid into the DRAM pilots that [was] able to deliver the capacity for which [it was] awarded contracts."

Two proximate indicators were used to provide insights, including (1) market concentration, and, (2) contract reassignments and terminations. Analysis of these indicators also addressed the concern identified by the Commission when it authorized an additional DRAM 2018 auction for delivery in 2019 ("DRAM IV"): a key Commission rationale for authorizing DRAM IV was its desire to "gain further evidence on whether the third-party demand response provider market may be consolidating or has been stymied by limited opportunities."[25]

5.2.1 Market Concentration: Overall

An important indicator of market concentration was the percent of the total contract capacity and value awarded to each of the sixteen sellers (including the ten new sellers) across all three IOUs during the three DRAM auctions. Despite the robust bidding pool described above, five companies alone captured 94% of the total DRAM contract capacity and 95% of the total contract value across the three auctions before accounting for contract reassignments (see Table 9). Furthermore, only three companies with the largest share controlled up to 88% of the total DRAM capacity.

[25] D.17-10-017 at pp. 35-36.

Table 9: Market Concentration Before Contract Reassignments (DRAM I – III)

Seller	Percent Capacity (August MW)
#1	4%
#2	16%
#3	25%
#4	2%
#5	47%
Total	94%

Note: To avoid identifying a DRP by name, sellers were assigned a numerical ID.

Overall market concentration increased only slightly after accounting for contract reassignments. After contract reassignments, the three companies with the largest share controlled up to 91% of the total DRAM capacity (relative to 88% before contract reassignments). At the same time, the same five seller companies alone continued to capture 94% of the total DRAM contract capacity and 95% of the total contract value across the three auctions, on par with market share before contract reassignments (see Table 10).

Table 10: Market Concentration After Contract Reassignments (DRAM I – III)

Seller	Percent Capacity (August MW)
#1	1%
#2	15%
#3	32%
#4	2%
#5	44%
Total	94%

Importantly, however, the share of capacity and value won by the top three to five sellers and the composition of the top five sellers varied by year. ***[REDACTED]*** In other words, competition between the top three companies during the DRAM pilot appeared to be strong.

5.2.1.1 Market Concentration by Value per DRP (CONFIDENTIAL)

[REDACTED]

5.2.2 Market Concentration: Customer Segments (CONFIDENTIAL)

[REDACTED]

5.2.3 Market Concentration: IOU Service Territories (CONFIDENTIAL)

[REDACTED]

5.2.4 Contract Terminations and Reassignments

An important indicator of the viability of new DRPs participating in DRAM may be inferred from the frequency with which such companies terminated or reassigned their contracts.

Six DRPs terminated contracts and five DRPs reassigned contracts during the initial two years of the pilot (DRAM I and II) across the three IOUs. In addition, data generally indicated an increase in the number of contract "events" (either a DRP contract reassignment or termination) over time. Terminations declined between DRAM I and II from four to two; however, contract reassignments increased between DRAM I and II from zero reassignments in 2016 to five in 2017 (see Table 11). PG&E experienced the greatest number of contract terminations and reassignments following the DRAM I and II auctions. Three DRPs reassigned and one DRP terminated its PG&E contracts in 2017. Incidentally, the DRAM market leader purchased all contracts available for reassignment from other DRPs in 2017, further intensifying market concentration.

Table 11: Number of DRPs Terminating/Reassigning Contracts by IOU (2016 – 2017)

		SDG&E	PG&E	SCE	Total
2016	Terminations	2	1	1	4
2017	Terminations	0	1	1	2
	Sub Total	2	2	2	6
2016	Reassignments	0	0	0	0
2017	Reassignments	0	3	2	5
	Sub Total	0	3	2	5
Total DRPs Terminating and Reassigning Contracts (2016 – 2017)		2	5	4	11

Procedurally, DRAM pilot contracts allowed the IOUs to retain the performance assurance bond in the event of a contract termination (comprising twenty percent of contract value). In practice, the IOUs consented to not withholding performance assurance amounts in some cases; in other cases, the IOUs withheld not only the terminating DRP's bond, but also retained a settlement amount equal to the remaining contract value.

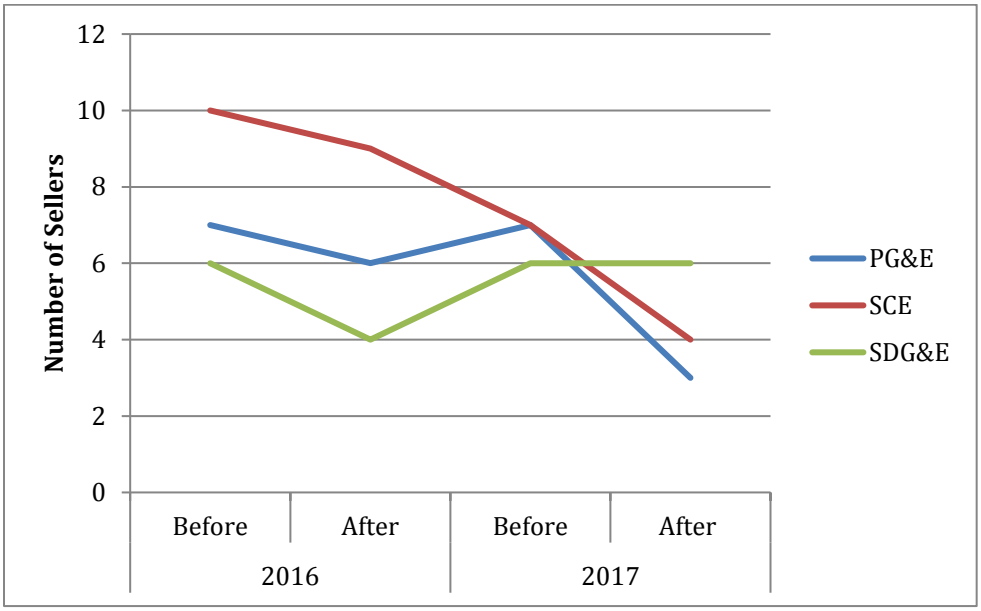
While the frequency of contract terminations and reassignments during the DRAM pilot period could be considered concerning, it may not be necessarily representative of future trends as there were factors that may be limited to the pilot phase. A major purpose of the DRAM pilot was to engage new DR providers and to develop and exercise

the data access, registration, and other systems and processes necessary to eventually transition to a permanent procurement mechanism. During this phase, DRAM pilot participants were not subject to penalties for failure to deliver, as generally required by Resource Adequacy contracts. In addition, for related reasons, CAISO's Resource Adequacy Availability Incentive Mechanism (RAAIM) was not applied to DRP bids into the wholesale market during the DRAM pilot. That is, CAISO waived RAAIM penalties in the pilot phase due to delays in improvements of its systems required to accommodate DR products. Section 5.3 discusses CAISO integration challenges in depth.

From another perspective, the contract terminations and reassignments experienced during the DRAM pilot could be an indicator of other concerns. First, the leading DRP purchased all contracts reassigned during the DRAM pilot, thus intensifying market concentration and potentially signaling an inadequate market structure for the auction mechanism. Second, the number of sellers completing their full contract terms during 2016 and 2017 declined − significantly so in 2017, also contributing to market concentration. Third, a majority of providers reassigning or terminating contracts cited IOU integration challenges as a major factor driving their decisions, as they felt that these challenges significantly dampened their performance and/or caused them to discontinue or curtail their involvement with the DRAM pilots. The IOU integration issues are also discussed Section 5.3.

The concentration of DRAM capacity among a select few DRP companies left standing following contract events could raise questions regarding the ability of the current DRAM design to sustain the viability of new providers. The concentration trend was stronger in 2017, when the number of sellers in the period between the execution of the contracts and the conclusion of the delivery period declined significantly. Just three and four sellers participating in the DRAM auction in PG&E and SCE territories, respectively, continued to deliver by year-end 2017− down from seven sellers in each IOU territory at the start of the year (see Figure 4 below).

Figure 4: Number of Sellers Before and After Contract Reassignments & Terminations



The prevalence of contract terminations and reassignments contributed to some concentration of contract capacity among the top three DRAM providers. At the start of 2016 and 2017 delivery years, the top three sellers for each IOU controlled around 73–85% and 68–91% of each IOU's market, respectively. After contract reassignments and terminations, the share of total capacity controlled by the top three sellers in each IOU service territory increased to 79–91% in 2016 and 77–100% in 2017 (see the confidential figure below).

[REDACTED]

In terms of number of providers, the number of sellers under contract ranged from a high of ten providers in SCE's territory (2016) to a low of just three sellers in PG&E's territory (2017) prior to and then after the various contract reassignments and terminations. Over two years (2016 – 2017), four new DRAM sellers terminated or reassigned their contracts, as did one seller that had previously provided DR in California (see data in next section).

In summary, this analysis indicated that although the DRAM I and II pilots engaged seven new DRPs out of a total of thirteen sellers, only three of these companies retained their contracts for the full year for delivery years 2016 and 2017; the others were unable to do so in either one or both of these years.

5.2.4.1 Contract Terminations and Reassignments by DRP (CONFIDENTIAL)

[REDACTED]

5.3 Integration Challenges

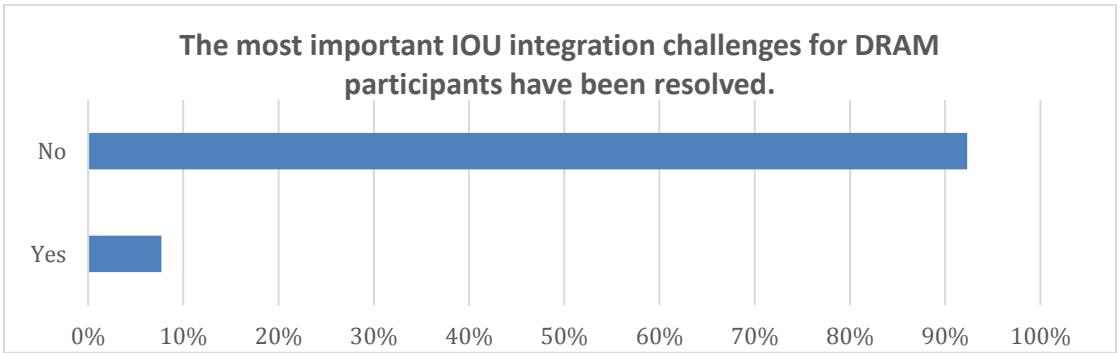
Per the DRAM Research Plan, the scope of criterion 1 also was expanded to include an examination of the challenges experienced by the DRPs in their engagement with the DRAM pilot. To explore this question, Staff conducted in-depth interviews and an online survey of DRAM participants.

Ten DRAM sellers were interviewed during this process. An additional two sellers and one scheduling coordinator (SC) offered to be interviewed (but time did not permit this) and two additional sellers did not respond to requests for interviews.

In November 2017, Staff sent an online survey to sixty participants of the bidders' conference hosted by the IOUs as part of the DRAM solicitation process and received twenty-three responses – primarily from sellers, but also from active bidders, aspiring bidders, and other interested market participants.[26] Most survey respondents (20) self-identified as DRPs and/or aggregators and had bid into at least one DRAM auction. Four respondent companies had bid into one or more DRAM auction, but did not win contracts. Two SCs participated in the survey. With regard to prior DR experience, eight responding companies indicated that their experience was limited to participation in the DRAM, but most companies had more than five to ten years of experience in providing DR services. Respondents collectively served all customer classes.

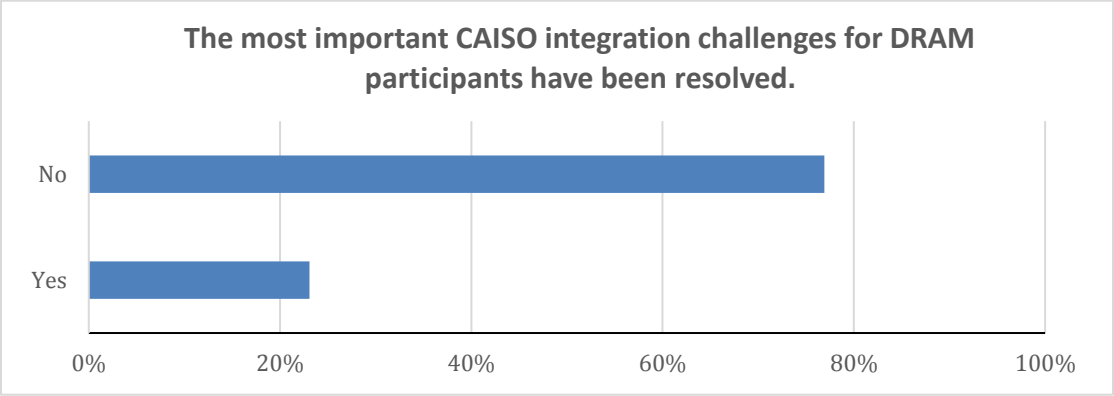
Survey respondents and interview participants identified a range of challenges experienced in their efforts to integrate with the required IOU and CAISO systems and processes and other barriers that affected their DRAM participation. Of the thirteen survey participants responding to the questions outlined in Figure 5 and Figure 6 below, 92% and 77% respectively indicated that the most important DRAM IOU and CAISO integration challenges had not yet been resolved.

Figure 5: DRP Responses on IOU Integration Challenges



[26] Nine of the 23 companies also identified as data analytics companies or technology manufacturers.

Figure 6: DRP Reponses on CAISO Integration Challenges



Integration challenges experienced by DRAM participants and their various perceptions are further described below[27] and are divided into three parts: IOU systems, CAISO systems, and Commission processes. Within the limited study timeframe, Staff chose not to attempt to quantify the impact of these integration challenges on the individual or collective DRAM performance. However, it was clear from this study that the integration challenges faced by DRPs in their efforts to participate in DRAM were real and pervasive. They were cited by some DRPs as significant factors in their ability or willingness to continue participating in DRAM.

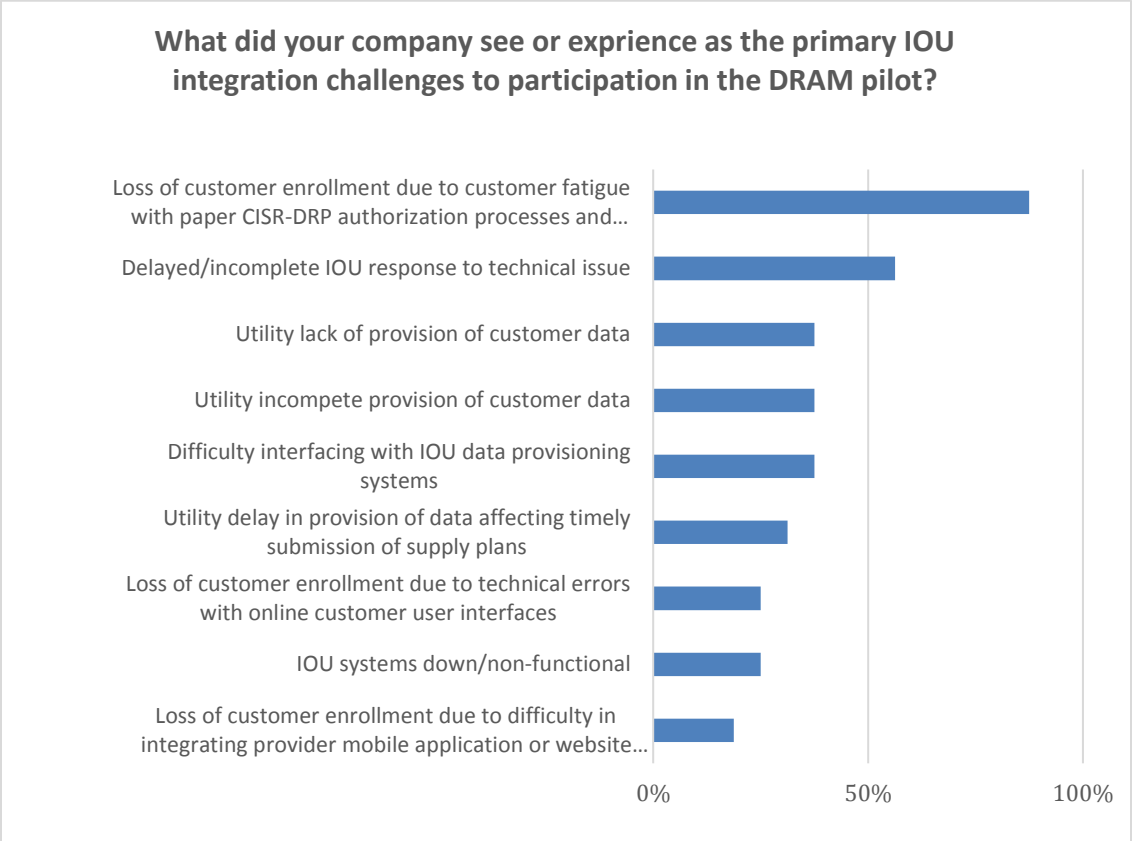
5.3.1 IOU Systems Integration Challenges

5.3.1.1 Customer Enrollment

Survey results indicated that ninety percent of survey respondents experienced integration challenges with utility processes to enroll customers during the DRAM pilots. Most DRPs (14 of 16) listed "loss of customer enrollment due to customer fatigue with the paper Customer Information Standardized Request form–Demand Response Provider (also referred to as the CISR–DRP form) authorization processes and related online customer user interfaces" as a barrier. Half as many (nine of 16) indicated that "delayed or incomplete IOU response to technical issues" also created challenges. Further, nearly a third (six of 16) indicated that utility lack of or incomplete provision of customer data or difficulty interfacing with IOU data provisioning systems created barriers. Three companies indicated that they lost customers during enrollment due to challenges with IOU websites or mobile applications, and four indicated challenges stemming from IOU systems being down or non-functional (see Figure 7).

[27] Survey responses have been anonymized; in addition, not all respondents provided answers to each question.

Figure 7: DRP Responses on Primary IOU Integration Challenges



Interviews provided additional insight into the range and specificity of the challenges encountered by each company. Interviewees' views of IOU performance varied widely, with respondents in some cases describing completely opposing experiences with the same IOU. According to one respondent, "technical pre-requisites and requirements to obtain information and data from the utilities are definitely barriers. It is complicated, challenging, and takes much longer to enroll customers into DRAM versus the utility DR programs." Another stated: "we spent a tremendous amount of money and time trying to get things working with the utility. In the end, the risk was not worth the reward nor headache as things stand currently."

Sellers described various types of CISR form challenges, including: 1) the CISR form authorization process slowed or derailed many third parties from successfully gaining customer approval for access to their data, 2) the lack of e-signature capability had a similar negative impact on DRPs' ability to gain customer approval for data access, and, 3) IOU concerns about the handling of confidential customer data slowed the processing of CISR forms.

Anecdotally, one DRP indicated that it invested significant time and expense in overcoming these CISR system challenges and expressed concern that moving to the

highly-anticipated "click-through" customer data release process would paradoxically entail additional investment of time and costs to learn the new systems and ensure system compatibility. A second company focusing on non-residential customers stated that enrolling residential ***[REDACTED]*** customers in DRAM was "off the table" until the "click-through process" was enabled. Another company noted that PG&E frequently changed customer Service Agreement Identification (SAID) numbers, and that each time this occurred the DRP was required to process a new CISR form with the affected customer. In the meantime, CAISO systems removed each such affected customer from its registration systems until the IOU and the affected DRP completed the updates.

Several respondents suggested that these types of challenges significantly hampered them from registering residential customers. One provider, EnergyHub, analyzed how IOU integration challenges hampered its ability to enroll DRAM customers in 2016 (this analysis was provided in a publicly available whitepaper). EnergyHub indicated that requiring customers to provide utility account numbers to enroll in DR programs – not required in programs in Texas – resulted in an 84% drop-off in customer enrollments. In addition, requiring customers to complete CISR forms resulted in a 39% decrease in customer enrollment applications, according to EnergyHub. These obstacles led EnergyHub to enroll just 3% of eligible California customers it targeted for DRAM, as compared with over 40% in Texas (see Table 12).

Table 12: Customer Enrollment Challenges: California vs. Texas[28]

Texas: ERCOT/TDSP programs (2015)		California: DRAM (2016)	
Customer receives program offer	100%	Customer receives program offer	100%
Customer agrees to participate in program (no service account number required)	55%	Customer agrees to participate in program and provides service account number	9%
		Customer completes CISR-DRP form on third-party site	5%
Customer is accepted into program	42%	Customer is accepted into program	3%

More generally, respondents found "non-trivial" differences between IOU customer data architectures and wondered if greater standardization was possible. One seller noted that third parties receive data from IOUs in any format in the PJM market – a benefit to those with system formats differing from those of the IOUs. Another seller said: "IOU culture is to assume that their systems are working 100%, and so working with IOU staff to resolve issues can create tensions." A different DRP interviewee expressed intense disappointment in the DRAM, stating that his company had expected DRAM, as a pilot, to entail "collaboration" between IOUs and third parties. His company

[28] Source: EnergyHub, "Optimizing the demand response enrollment process: Best practices for customer enrollment and a seamless customer experience," White Paper, 2016.

withdrew from further DRAM participation once it began to experience what he termed "aggressive treatment."

5.3.1.2 Meter Data Management

A large number of interviewees reported recurring problems obtaining Meter Data (MD) from the IOUs for use in CAISO settlement processes. One DRP stated that the MD data provided by IOUs was "often inaccurate or stale." Another DRP indicated it had incurred fines from CAISO due to IOU failure to provide accurate MD data in a timely fashion – and that the financial losses from these fines were not recovered from the IOU, nor did a clear process exist to allow for this. Several interviewees identified delays in receipt of MD in particular from SCE. Respondents also indicated that SCE and SDG&E had ceased providing MD in at least one instance, without warning, for one or more weeks. Different DRPs either pointed to PG&E's DRAM data management processes as being the most challenging, or, in contrast, being extremely well-managed. In other words, interviews with DRPs failed to identify any one or two issues as the most serious or egregious in terms of DRAM meter data-management processes.

Storage companies participating in the DRAM pilot wishing to use CAISO's Meter Generator Output (MGO) protocol to register CAISO products to individual customer meters (rather than to higher-level customer service accounts) identified some additional barriers unique to their service offering. Registering CAISO products to individual customer meters, as allowed for under the MGO tariff, would allow large customers with multiple meters in their service accounts to participate in a building load shed at one meter, for example, and in a storage-based DR event at another. However, according to the respondents, IOUs – specifically SCE– had not yet sufficiently upgraded their billing systems to accommodate this feature.

5.3.1.3 Customer Registration

CAISO systems require IOU confirmation of DRP customer registrations, and the processes surrounding this step created additional delays for many DRPs. As part of this process, load-serving entities (LSEs) must review and approve DRAM customer registrations with the CAISO. According to the DRPs, for residential resources with hundreds of registered customers, discovery of one flaw in one customer registration apparently led to the de-registration of the entire resource from the CAISO Demand Response System (DRS) or Demand Response Registration System (DRRS). This sometimes occurred on multiple occasions for the same resources (and involving successive customer data errors).

One frustrated interviewee pointed to the PJM regional transmission organization DR wholesale market as a place where IOUs are given "just one chance to review customer

registrations" before processing a customer registration, rather than multiple opportunities available in the CAISO process. Further, one seller reported that IOU staff had at least once unilaterally removed a resource from its IOU Supply Plan based on having reviewed an outdated or inaccurate CAISO registration report. One DRP summed things up as "IOUs were given too much power" in defining DRAM data sharing and acquisition processes.

5.3.1.4 Other Issues

One participant asserted that the IOUs had a competitive advantage in recruiting customers due to IOUs' ability to fully access customer data without needing to process CISR forms for their customers. This same DRP stated that customer recruitment costs constituted the primary barrier to DRAM participation.

External perceptions of issues with IOU systems and processes relevant to DRAM potentially contributed to other indirect repercussions beyond challenges experienced directly by individual DRPs. One company indicated that it had been unable to secure financing because the "market had heard that the IOUs were dragging their heels" on developing meter data-transfer systems, leading to too much perceived risk. In two cases, DRPs were surprised to learn that that their IOU partner would hold them liable in the event of a contract default in 2017 – not only for the performance assurance bond of twenty percent, but also for a settlement amount up to the remaining value of the contract. This contrasted sharply with one seller's understanding of the DRAM as a "collaborative pilot," as noted above, and led to his company's disengagement from DRAM.

Another seller indicated that the advanced timing needed for customer registration and enrollment was challenging. For instance, an agricultural customer typically may not know which pumps will have load 60 or more days in advance, thus decreasing the amount of curtailment the customer and DRP would be willing to submit. A different seller commented on the 18-month timeframe between bidding into an IOU DRAM capacity auction and delivering energy from customers into the CAISO market. He indicated that it was difficult to predict residential customer enrollment levels in a new area so far in advance– and yet DRPs faced financial liability with the IOUs for failure to deliver the contracted amounts.

5.3.1.5 Impact of Challenges

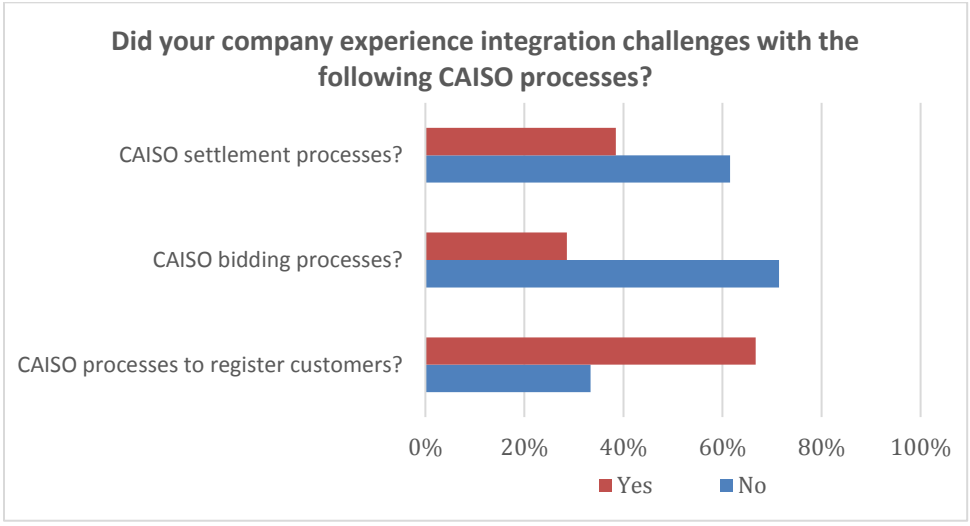
Survey respondents indicated that they responded to IOU integration challenges either by persisting until challenges were addressed (13 of 13), or by finding work-arounds (7 of 13). Two of thirteen sellers indicated they responded to IOU integration challenges by reassigning contracts or opting not to bid in subsequent DRAM auctions. Other

sellers reported responding to IOU integration challenges by contacting Commission staff as intermediaries, or by invoking article 1.5(b) of the DRAM pro forma contract. DRAM article 1.5(b) allowed companies inhibited by registration challenges stemming from IOU actions or the CAISO to reduce a Product Monthly Quantity in their 60-Day Supply Plans, if they could demonstrate that they made commercially reasonable efforts to register the products.

5.3.2 CAISO Systems Integration Challenges

Most sellers experiencing challenges with CAISO integration processes encountered difficulty in registering customers. Two-thirds of those responding reported having this experience (10 of 15), as compared with thirty percent of respondents that experienced challenges bidding into the CAISO market (four of 14). Nearly forty percent of those responding said they experienced challenges with CAISO settlement systems (five of 13).

Figure 8: DRP Responses on CAISO Integration Challenges



Registration Issues

When asked to describe the challenges in more detail, several interviewees referred to what they called a CAISO "registration gap." This occurred in 2016, they said, and during this time resources had to be completely removed from the CAISO market in order to add new customers. One DRP indicated that this "registration gap" resulted in his company's DRAM resources being out of market two to three out of four weeks during the period of June through August of 2016. The seller indicated that it took his company a minimum of a week and half to add new customers to a PDR resource during this period. This in turn led to "tough decisions" on whether or not to add customers — a particular challenge to residential DRPs. If the resource was out of market, the respondent stated, it could not be tested on a good weather day, for instance.

According to the affected DRPs, this problem persisted from June through August of 2016 and possibly as long as November 2016.

In addition, as noted earlier, an IOU's discovery of a single error with a customer's CAISO registration (i.e., an incorrectly listed address or customer class) could lead to de-registration of the entire product until the record was corrected. Until recently, however, communication systems were not in place to pinpoint the exact error and the customer record in question, according to an interviewee. This led DRPs to expend significant time searching through and making successive corrections to customer registrations, he said.[29] Another seller called the CAISO's customer registration system, even in 2018, "too hard," stating that his company has been "on the phone with CAISO daily for a month" and "the issue still is not resolved."

DRP interviewees mentioned various other problems with CAISO registration systems. They expressed concern with current registration systems that allow competitors, including IOUs, to hold a customer's registration for ten years, even if the DRP was not deploying the customer as part of a PDR/RDRR product. This created challenges according to several DRPs, as rules and processes are not in place to allow customers wanting to sign on with a new DRP to dis-enroll easily from their current product. Typically, a customer phone call would be required, said the respondent, as IOUs often do not provide online links for their customers to dis-enroll from programs. According to several sellers, the CAISO appeared "uninterested in getting involved" in such disputes, which seemed likely to become more common over time. For DRPs focusing on residential customers, this constituted a significant barrier and a source of unfair competition from IOUs, said one respondent.

Several sellers expressed concern about the frequency with which DRAM customers changed their load-serving entity (LSE) during the pilot period– observing that this trend will increase in in the future, perhaps dramatically, due to CCA-driven customer migrations.[30] An interviewee commented that each time a DRAM customer changed LSEs, the relevant resource could be out of market for some time. Another observed that Commission Rule 24/32 tariffs did not allow DRPs to receive advance notice of a customer that was changing LSEs but also did not indicate a specific timeframe after the change by which the notification must occur. This again led to delays and prolonged the time during which DRAM customers, and sometimes DRAM products, would be out of the CAISO market.

[29] The interviewee indicated that CAISO recently addressed this problem.

[30] Several DRPs and IOUs have urged the CAISO to re-consider its one LSE per resource restriction in the ESDER III process. Allowing one resource to comprise customers from more than one LSE would eliminate the need for a new CAISO resource ID for the customer and for re-registering locations (and needing to wait 10 business days for approval) in the event of an LSE change.

Market Rules

Several interviewees identified challenges with CAISO's Residual Unit Commitment (RUC) market rules. According to these interviewees, the Commission's original vision of supply-side DR resources was that PDR resources as RA products would be Day-Ahead products only. However, in practice, there was a potential for the DR resource to show up in the Real-Time Market due to the RUC mechanism. The RUC process was described as follows: CAISO inserted bids for all RA resources into the RUC market whenever its Day-Ahead Market scheduled partial quantity of a resource to meet the expected next-day demand; subsequently, the RUC inserted these resources starting with the least expensive products (in terms of commitment and start-up costs), which typically were DR products due to design features of the CAISO's Master File system.[31] Being committed in RUC obligated the resources to respond to five-minute dispatch instructions in Real Time if dispatched. The interviewees indicated that adding commitment costs to their PDR/RDRR bids to reduce the possibility of a RUC award was an "imperfect solution that reduced the opportunity for Day-Ahead awards."[32] Another seller called the five-minute dispatch instructions in the Real-Time Market due to RUC obligations for RA resources "infeasible."[33]

Several DRPs pointed to challenges with CAISO management of use-limited resources, market and bidding parameters, and CAISO baselines that underestimate contributions from weather-sensitive load.[34] In 2018, CAISO in fact began prioritizing these issues in its Energy Storage and Distributed Energy Resources (ESDER) Phase III process.

Settlement Processes

A number of interviewees pointed to challenges with CAISO settlement processes. One interviewee said, "CAISO always makes an error with settlement data," causing delays, sometimes of many months after which time the DRP simply declines to resettle with the CAISO. Another interviewee indicated that CAISO had not designed its settlement web interface in a way that easily accommodates DRP online access to settlement data for products with customers sometimes numbering in the thousands.

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[31] For instance, PDRs typically indicate a zero "PMin" in CAISO's Master File (or a zero minimum power level), as well as zero commitment and start-up costs. ESDER Phase III discussions are addressing these CAISO design issues.

[32] The CAISO is addressing Master File design issues in ESDER Phase III discussions. Design issues include the format for and expectations of DRP completion of fields in CAISO's Master File, originally created for generation resources, including fields for "PMin," "Minimum number of starts," "Minimum Run Time," and whether and how DRPs can reflect commitment and opportunity costs in the file.

[33] The respondent indicated that CAISO hopes to address this issue in the ESDER Phase III initiative.

[34] In 2017, CAISO submitted three new DR baseline approaches to FERC for approval that are intended to better reflect load curtailment from weather-sensitive DR. CAISO staff expects the new baselines to be approved for use in October 2018.

Several sellers decried the lack of a CAISO manual summarizing tariff rules and other requirements and processes relevant to DRAM participants. One reported that "there is too much information that is not well explained for DRPs less familiar with CAISO processes." Another stated that it took "three full-time staff three months to understand CAISO tariffs" sufficiently to effectively operate his company's DRAM-related registration, bidding, and settlement processes.

According to several sellers, the complexity of CAISO systems necessitated that they hire a scheduling coordinator (SC) rather than invest the time and resources to gain this expertise themselves. One commented that small third-party DRPs participating in DRAM could not justify or internalize these costs− unlike the IOUs that also serve as SC for their own and contracted generation assets. Several smaller DRPs elaborated that SC costs represented a significant expense for them. As a result, they said, participation in DRAM would not become profitable for their companies unless they were able to scale their DRAM capacity significantly. Similarly, interviewees from two DRPs stated that they were running at a loss from their DRAM participation.

A different DRP noted that CAISO's 2017 adoption of additional DR baseline options and relocation of the responsibility for assembling baselines from CAISO to SCs would result in even more demands on these companies.

5.3.2.1 CAISO Systems Integration Challenges – Continued (CONFIDENTIAL)

[REDACTED]

5.3.3 Other Challenges: Commission Processes or Rules

A number of Commission rules or processes affected DRP performance and engagement during the DRAM pilot, according to interviewees. For instance, DRPs struggled to prepare for the 2016 DRAM delivery year, which started in June 2016, given that DRAM I contracts for that year were only approved in February and March 2016. Another DRP cited a delay in Commission release of Self-Generation Incentive Program (SGIP) incentives in 2017 as slowing its customer acquisition process and therefore its ability to register and bid customer capacity at its contracted level. Other interviewees indicated that Commission rules prohibiting companies from dual participation in both the DRAM and an IOU DR rate or program − such as SCE's Peak Time Rebate program − was a major barrier inhibiting their DRAM participation. IOU supply-side DR programs were not subject to these restrictions during the DRAM pilots, and as such, IOUs could more easily retain or attract customers wishing to be on a DR rate and participate in the CAISO.

Two other companies commented that the IOU practice of allowing screen scraping to continue, despite threatening legal action, significantly influenced their engagement

with DRAM. One company that declined to bid in DRAM III said: "knowing that there were other players circumventing the rules irked us, so we didn't want to participate." Another claimed that his company desisted from screen scraping when asked to do so by the IOUs, which led to a 70−80% decrease in their DRAM customer enrollment rates. At the same time, the respondent noted, "other DRPs continued to scrape and didn't face legal action." Subsequent IOU touting of screen-scraping companies as "DRAM success stories" further alienated the company, which eventually concluded that it was "too risky" to participate in DRAM III given these and other ongoing challenges. In interviews, two of the four new companies terminating or reassigning contracts in 2017 cited concerns over continuing screen scraping or IOU integration challenges as their rationale.[35]

5.4 2018 Integration Challenges (New)

In October 2018, Staff sent a follow-up online survey. Thirteen responses were received– primarily from DR providers and aggregators (12 in total). Five survey respondents also self-identified as aggregators of providers, four as data analytics companies, four as energy management companies, one as a technology manufacturer, and three were scheduling coordinators. With regard to prior DR experience, six companies indicated having 2–5 years of experience in providing DR services either within or outside of California, three had 5–10 years of experience, and four had over ten years of experience. Respondents collectively served all customer classes, including residential, large industrial, agricultural, large commercial, small-medium commercial, and low income.

This follow-up survey sought to collect feedback on ongoing challenges experienced with IOU and CAISO systems. Specifically, Staff intended to assess to what extent roll-out of the click-through authorization process and other improvements by CAISO may have mitigated various challenges.

2018 IOU Integration Challenges

No specific feedback was received from the survey respondents on the customer enrollment process, including the click-through authorization process. Contrasting this with the previous survey results, this may suggest that DRPs' experience with customer enrollment and registration has improved.

Qualitative responses from several participants offered insight. One company indicated that IOU-related issues comprised its primary challenge in 2018. The company reported

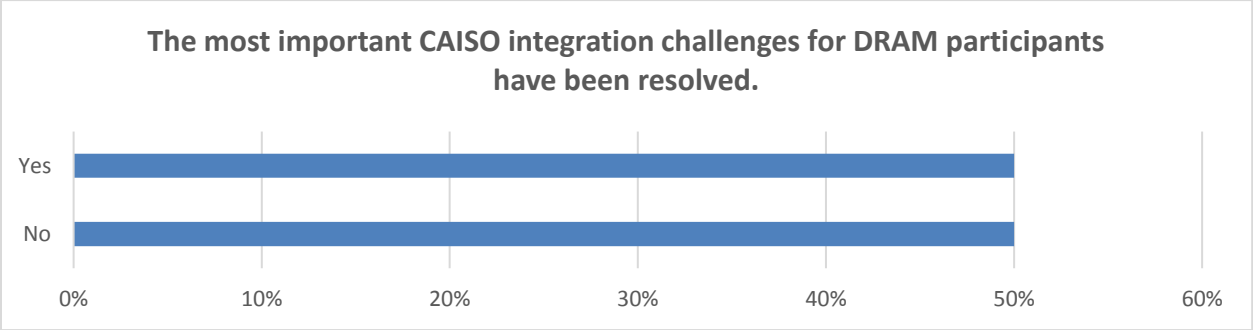
[35] The interviewee from the other company indicated that his firm was adjusting its business model and approach to DR and storage more generally. The fourth company did not respond to repeated staff requests for an interview.

needing to contact one IOU for multiple issues relating to missing meter data, service account changes, or poor-quality RQMD. They said these issues still require weeks and often months to resolve, which delays DRPs' ability to submit invoices and puts strain on customers receiving late payments. The company also cited lack of knowledge of new customer information as a key barrier; the company reported receiving no prior notice for customer LSE switches or account closures, making it difficult to time resource additions or quantity modifications in the CAISO market. Because of the RA timeline, any unforeseen change in this realm creates financial exposure for up to three months between the time Supply Plans are submitted and the showing month. Several companies lamented delays in IOU provision of RQMD and reported coordinating closely with the IOUs and SCs to repeatedly request this data. Another company indicated that the negative impact of the IOUs' lack of support for DRAM had driven them out of the California market – and until the perceived disconnect between CAISO/CPUC program design and IOU execution are resolved, they saw no value in participating in DRAM.

2018 CAISO Integration Challenges

Of the ten survey participants responding to the CAISO related questions, as outlined in Figure 9 below, 50% indicated that the most important CAISO challenges have been resolved, which represents an improvement over the 23% of respondents expressing this sentiment in the November 2017 survey (see Figure 6).

Figure 9: DRP Responses on CAISO Integration Challenges; Q4 2018 Survey



Survey results indicated that 60% of respondents experienced CAISO integration challenges related to errors in IOU systems, and 50% experienced challenges associated with customers changing LSEs (see Figure 10). To address these difficulties, one company reported that it started registrations as early as possible, tried to proactively work with customers on LSE changes, and overenrolled resource capacity wherever possible to mitigate capacity losses and closely approximate contracted quantities. At the same time, 50% of respondents acknowledged some improvements in 2018 regarding processes for 1) adding/removing customers to/from CAISO resources, or, 2) correcting errors in customers' CAISO registration (see Figure 11). In addition, 90% of survey participants continued to experience other challenges in 2018 with customer

registration in the CAISO market, and a majority indicated persistent difficulties related to changes in LSE and enrollment conflicts (see Figure 12).

50% of respondents also reported challenges associated with CAISO's Residual Unit Commitment (RUC) market rules (see Figure 10). In response, one participant cited its participation in ESDER 2 implementation and the ESDER 3 stakeholder process to try to alleviate concerns regarding infeasible Real-Time Market (RTM) dispatches. Another respondent correctly noted that removal of the single LSE per PDR regulation will not take effect until November 2019, as per ESDER 3. 60% of respondents expressed a lack of confidence that changes to CAISO bidding and RTM dispatch options, as proposed in ESDER 3, would alleviate RUC-related challenges (see Figure 13).

20% of survey participants cited the 'quality of settlement data' as a primary CAISO integration challenge, 10% cited 'other issues with settlement at the CAISO,' and another 10% cited 'errors in CAISO systems' (see Figure 10). Overall, many DRPs report a lack of understanding of the energy payments they receive and an inability to determine whether they are being appropriately compensated. In a recent interview with ED Staff, one DRP acknowledged that the CAISO settlement process is still "a little bit of a mystery, to be honest." To address CAISO data and settlement-related issues, one company reports filing Customer Inquiry, Dispute & Information (CIDI) tickets in the CAISO system, working with CAISO's PDR staff, and occasionally interfacing directly with CAISO software and customer support. However, according to this company, because support staff generally advises consulting one of CAISO's Business Practice Manuals (BPM) to resolve errors, even though most errors it faced involve CAISO systems operating in a manner deviating from the BPM, re-checking CAISO documents consumed significant time that could have been spent investigating bugs and software issues. Another company mentions working closely with CAISO and its engineering team to resolve data challenges, as well as attending webinars that address updates to the DR CAISO systems. To address short-term CAISO integration challenges, this respondent generally informs CAISO of any issues encountered and fills out CIDI tickets as necessary. However, due to the time-sensitive nature of many short-term issues [such as uploading resource registrations prior to closure of the Day-Ahead Market (DAM)], the company reports often being forced to escalate the issue through its customer representative and to the engineering team. Overall, despite some efforts being taken to overcome CAISO data-related challenges, 70% of respondents reported experiencing persistent CAISO errors with settlement data and difficulty with CAISO's web interface even in 2018 (see Figure 14).

Figure 10: DRP Responses on Primary CAISO Integration Challenges; Q4 2018 Survey

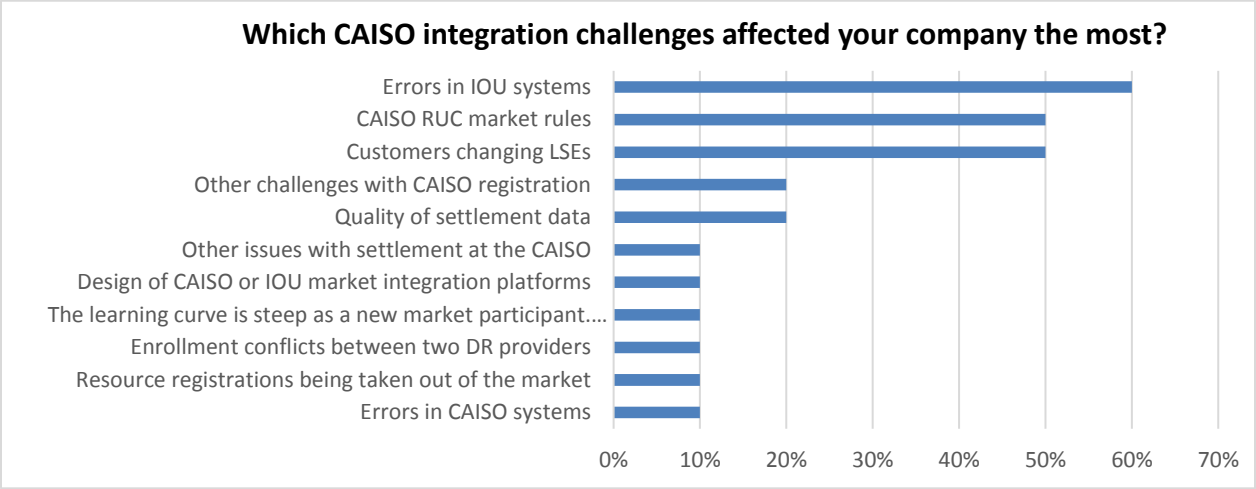


Figure 11: DRP Responses on Improvements to CAISO Customer/Resource Registration Processes in 2018; Q4 2018 Survey

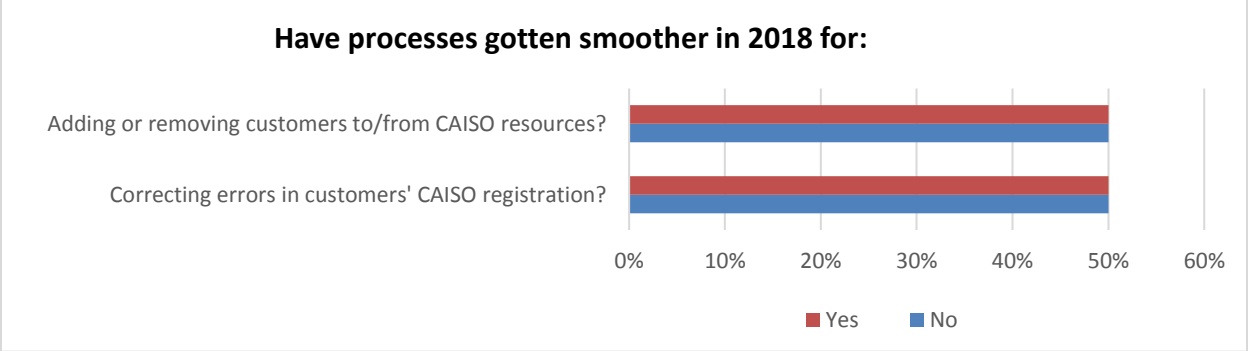


Figure 12: DRP Responses on Other Persistent CAISO Registration/Enrollment Challenges in 2018; Q4 2018 Survey

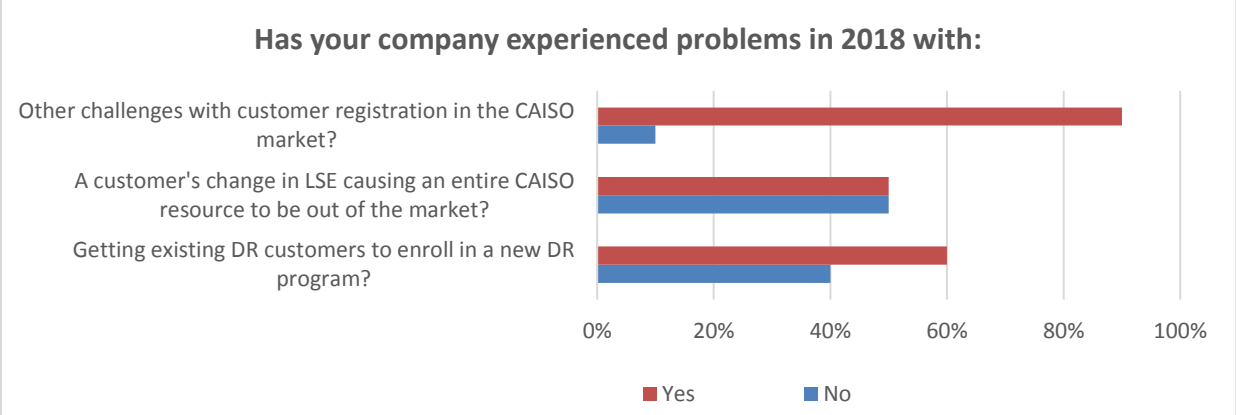


Figure 13: DRP Responses on CAISO RUC-Related Challenges; Q4 2018 Survey

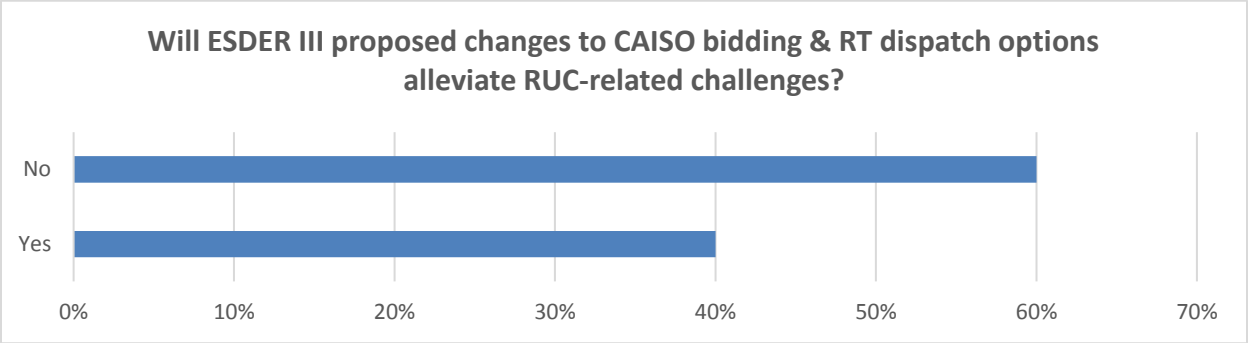
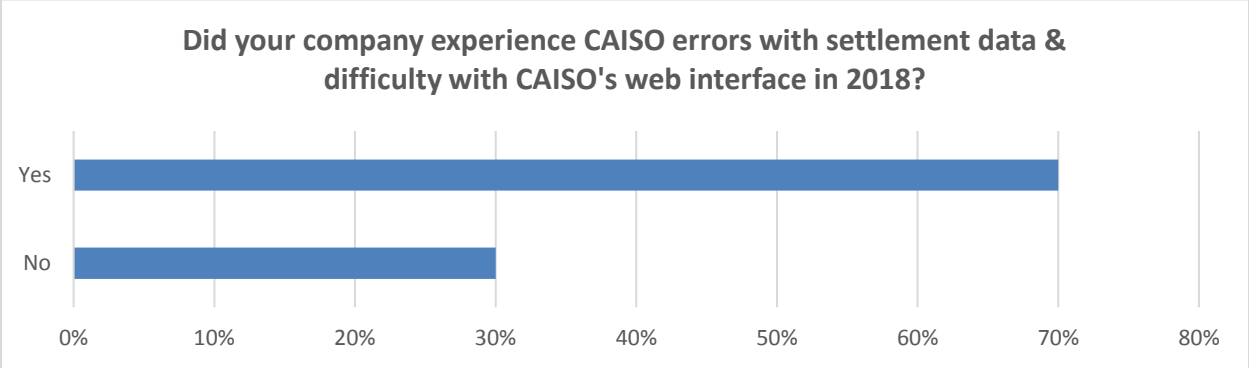


Figure 14: DRP Responses on Persistent CAISO Data Issues in 2018; Q4 2018 Survey



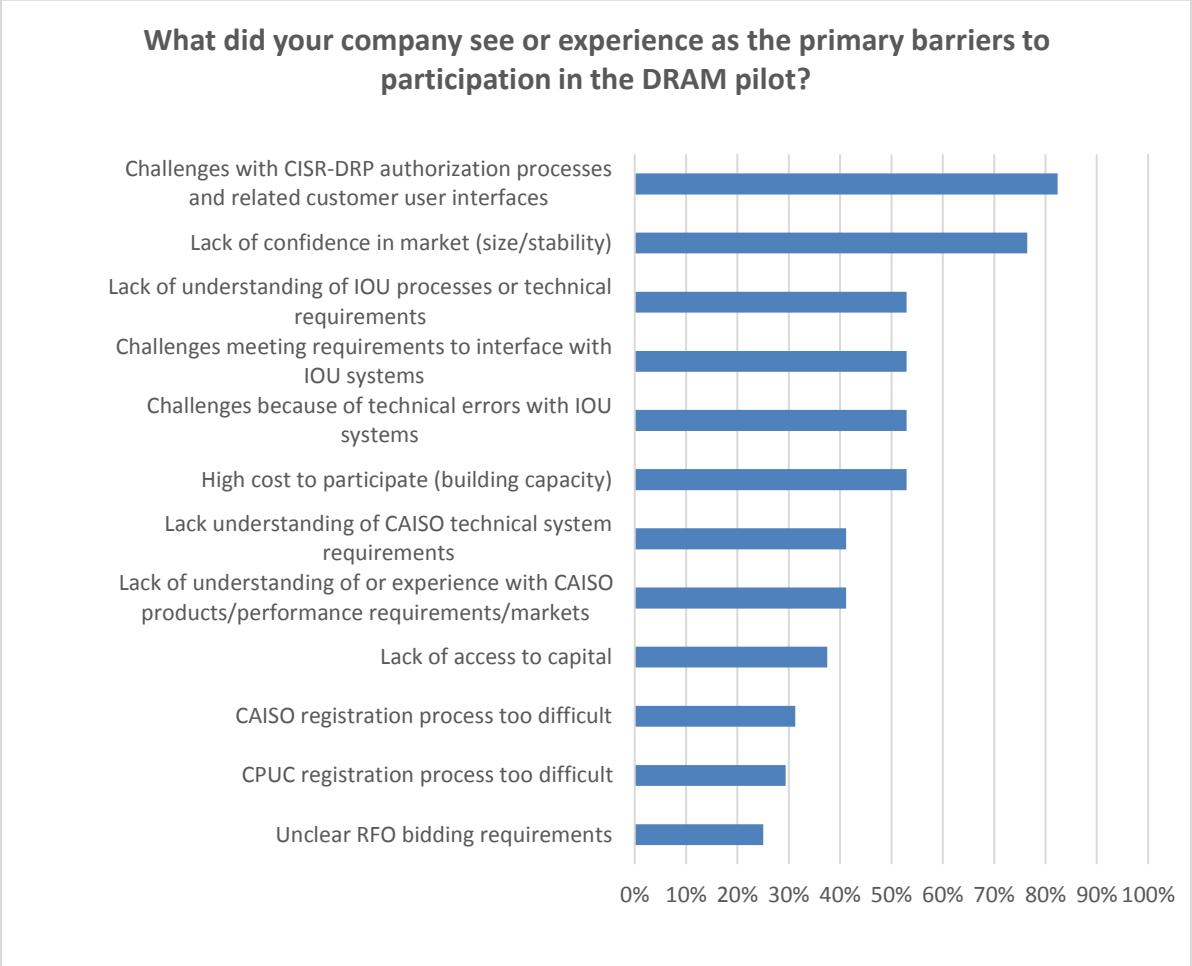
The survey results suggest that DRPs continue to experience challenges working with CAISO systems and that some type of collaborative process needs to be pursued to systematically address and resolve these issues.

5.5 Discussion

The 2016 – 2019 DRAM pilots engaged sixteen new third-party providers as DRAM bidders. Ten of these won contracts and became sellers across the DRAM I–III auctions, and seven for DRAM I – II alone. Of these seven, just three new providers retained their contracts for the full year for delivery years 2016 and 2017. In contrast, four new DRPs and one continuing DRP canceled or reassigned their contracts in these years. Furthermore, the DRAM market leader purchased all of the reassigned contracts in 2017, further intensifying market concentration.

It was difficult to pinpoint the exact causes for these contract reassignments or terminations (see Figure 15 below). Evidently, sellers encountered a myriad of IOU and CAISO integration challenges during DRAM I and II. In some cases, these challenges appeared to have directly influenced DRAM sellers' abilities to meet their contract obligations.

Figure 15: DRP Responses on Primary Barriers to DRAM Participation



These integration challenges were not the only reasons that third-party providers may have stumbled in their efforts to meet their DRAM contract obligations. DRP interviewees pointed to overly optimistic customer acquisition projections, lack of information about the bid-clearing price, delays relating to SGIP incentives or IOU integration of storage resources, dual participation restrictions, and other factors unrelated to IOU or CAISO integration challenges.

While this study did not isolate the extent of providers' performance issues stemming from integration challenges alone, it could be concluded that integration and other challenges reduced the number of "new" DRAM sellers able to continue with DRAM participation and/or fulfill the full set of their DRAM contract obligations. In the final analysis, just three out of the seven new DRPs bidding into DRAM I and II won contracts and completed the full terms of their contracts and presumably could be considered "viable."

Not surprisingly, DRP interviewees had much to say about the changes needed to diversify DRAM third-party provider participation and improve sellers' performance. Pivotal among these was the recommendation that California consider an auction design for the DRAM similar to that of the PJM market. The PJM market selects bids up to the point where demand and supply curves cross and pays all bids at or below this level the same "market clearing price." Several interviewees suggested that the DRAM auction's "price-as-bid" design led the most sophisticated, experienced, or well-capitalized bidders to bid below their costs of DR delivery− driving out competition and allowing a select few companies to dominate the marketplace, as was discussed above. Without knowledge of the market-clearing price, the interviewees said, their companies were effectively guessing how to price their bids to win DRAM contracts. During interviews, more than one DR company indicated that it had priced its DRAM bids at a level reflecting its known DR delivery costs but had failed to win a contract.

The successful DRAM sellers suggested that their success hinged on their ability to drive down customer acquisition and delivery costs, in turn leading to lower prices and expanded customer enrollment in DR. These sellers pointed to different competitive challenges that concerned them, including the eventual entry into the DRAM marketplace of well-capitalized and highly customer-savvy companies such as Google, Apple, and Nest. One interviewee noted that these experienced companies might not have yet entered the DRAM market due to the DRAM's limited size and contract terms of just one to two years. These companies, according to the interviewee, presented the greater risk of market concentration − not the currently successful companies. The interviewee also noted that the overall market winner in each of the DRAM auctions shifted each year. This indicated that the DRAM market was adequately competitive, according to this interviewee, not concentrated.

6. Criterion 2: Were New Customers Engaged?

#	Description	Criterion Weight	Criterion Type	Pass Threshold	Score
2	Did DRAM engage new customers?	0.10	Pass / fail	1 new customer participated in DRAM	**Yes**

A key objective of the DRAM pilots was engaging new customers to participate in DR. In this respect, data showed that the DRAM pilots were highly successful. Between 74 – 95% of customers participating in DRAM in 2016 and 2017 had never participated in an IOU DR program in California previously.

The number of DRAM participants increased fourfold between 2016 and 2017 (from about 12,500 to over 52,000). The number of DRAM participants with specified characteristics − such as being on California Alternate Rates for Energy (CARE) or Energy Savings Assistance (ESA), having received an energy efficiency incentive previously, living in multi-family (MF) housing, or being on a net energy metering (NEM) rate − increased across the board between 2016 and 2017. However, the total percentage of customers with such characteristics in some cases decreased (see Figure 16 and Figure 17). For instance, the total number of DRAM customers residing in MF housing increased from about 5,600 to nearly 23,000 between 2016 and 2017, even while the total percentages of MF customers in DRAM dropped from 45% to 44% over the same period. DRAM customers on NEM rates increased from 912 to 2,385 between 2016 and 2017, while the total percentage of such customers dropped from 7% to 5%.

Figure 16: DRAM 2016 and 2017 Customer Profile (Total Number)

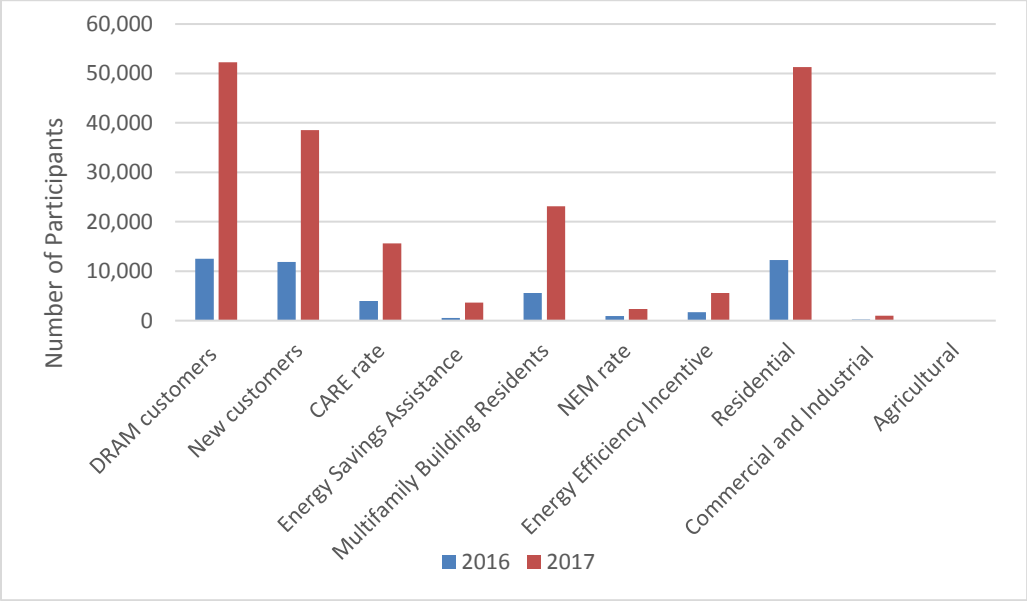
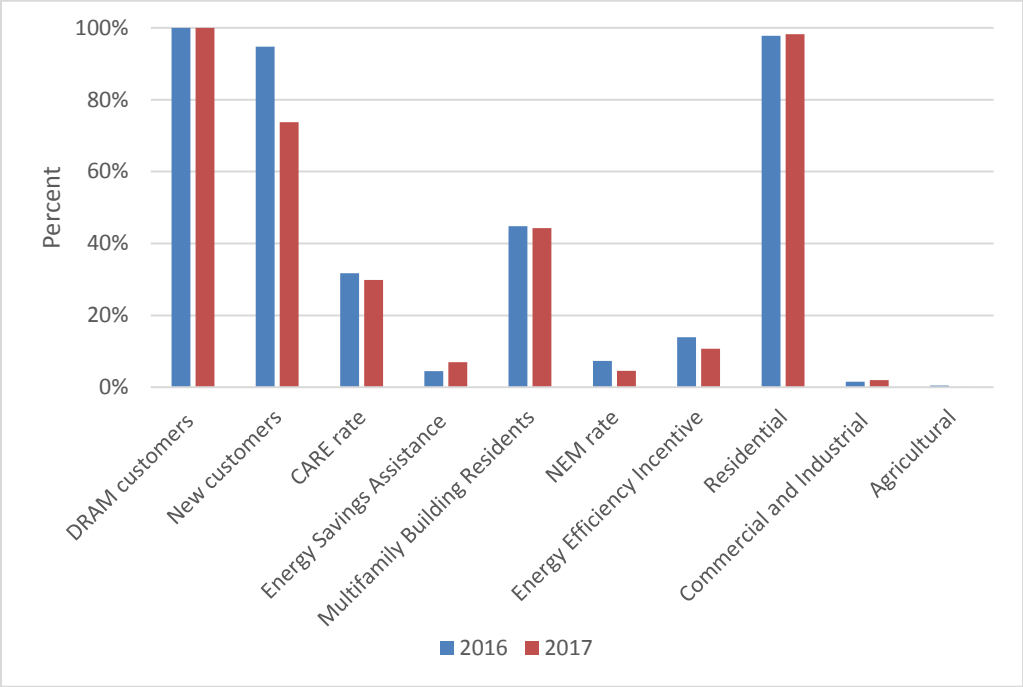


Figure 17: DRAM 2016 and 2017 Customer Profile (Percent)



6.1 DRAM I Customer Profile

Over 98% of DRAM I customers in 2016 were residential customers, with most of the remaining in the commercial and industrial customer classes. 95% of all new DRAM I customers had never participated in an IOU DR program previously (see Table 13 and Table 14). A somewhat surprising finding was the relatively high percentage – 45% – of customers residing in multifamily buildings.

Table 13: DRAM I Customer Profile (Number)

DRAM I (2016)	All IOUs
DRAM Customers	12,513
New Customers	11,854
CARE Rate	3,965
Energy Savings Assistance	563
Multifamily Building Residents	5,604
NEM Rate	912
Energy Efficiency Incentive	1,735
Residential	12,242
Commercial and Industrial	227
Agricultural	68

Table 14: DRAM I Customer Profile (Percent)

DRAM I (2016)	All IOUs
New Customers	95%
CARE Rate	32%
Energy Savings Assistance	4%
Multifamily Building Residents	45%
NEM Rate	7%
Energy Efficiency Incentive	14%
Residential	98%
Commercial and Industrial	2%
Agricultural	1%

With regard to the low-income participation, DRAM customers enrolled in CARE represented 32% of all customers in 2016.

A higher share of DRAM customers − roughly 14% of all 2016 customers − had previously used a mainstream energy efficiency program incentive. Customers were more likely to have accessed an energy efficiency incentive than to have enrolled in the Net Energy Metering (NEM) rate. Just 7% of customers were enrolled in a NEM rate.

In summary, the data analysis indicated that the 2016 pilot successfully reached new customers, many of whom were lower-income.

6.1.1 DRAM I Customer Profile (CONFIDENTIAL)

[REDACTED]

6.2 DRAM II Customer Profile

In 2017, 98% of all DRAM II customers were, again, residential customers; however, the percentage of DRAM customers that had not previously participated in an IOU DR program dropped to 74%. Participation of agricultural customers appeared to decline as well, with just eight participating in DRAM II. Participation of MF residents remained stable at roughly 44% of total participation in each year: over 23,000 MF residents enrolled in DRAM II, as compared with 5,600 MF participants in DRAM I.

Table 15: DRAM II Customer Profile (Number)

DRAM II (2017)	All IOUs
DRAM Customers	52,260
New Customers	38,532
CARE Rate	15,603
Energy Savings Assistance	3,623
Multifamily Building Residents	23,132
NEM Rate	2,385
Energy Efficiency Incentive	5,612
Residential	51,324
Commercial and Industrial	1,016
Agricultural	8

Table 16: DRAM II Customer Profile (Percent)

DRAM II (2017)	All IOUs
New Customers	74%
CARE Rate	30%
Energy Savings Assistance	7%
Multifamily Building Residents	44%
NEM Rate	5%
Energy Efficiency Incentive	11%
Residential	98%
Commercial and Industrial	2%
Agricultural	0%

Regarding low-income participants, the total percent and number of customers enrolled in CARE rates increased from 32% of customers in 2016 (3,965 total) to 30% in 2017 (15,603 total). ***[REDACTED]*** Customer participation in the ESA program also increased in 2017, to 3,623 customers, or about 7% of all participants. The percentages of DRAM II customers that utilized an energy efficiency incentive dropped from 14% to 11% (5,612 customers), and those enrolled in the NEM rate dropped slightly to 5% (2,385 customers).

6.2.1 DRAM II Customer Profile (CONFIDENTIAL)

[REDACTED]

6.3 High Energy Usage Customers in DRAM

A potentially interesting question examined was whether the DRAM pilots successfully targeted and enrolled the customers with energy usage on the high end. To answer this question, IOU data on DRAM customers found to be in the highest 5% of energy users for their customer segment was analyzed. This data was only available for SCE and PG&E (for 2016) and showed that just 3–4% of DRAM customers were also in the top 5% of their customer class in terms of energy usage, suggesting that additional strategies for targeting high-energy users for DRAM enrollment could be useful.

Table 17: DRAM Customers in Top Five Percent of Energy Usage for Customer Class

	Number	Percent
PG&E	560	3%
SCE	894	4%

6.4 Financial Risks and Residential Customers

As requested by The Utility Reform Network (TURN), Staff submitted data requests to DR providers to assess the extent to which they placed financial risk on residential customers for non-performance, such as contract provisions imposing penalties. Staff found that no DRP included such provisions in their DRAM contracts.

6.5 Discussion

The DRAM pilots clearly engaged many thousands of new, primarily residential customers in DR. Customer participation in the DRAM pilots increased over fourfold in just one year, from 12,500 in 2016 to over 52,000 in 2017. CARE customers enrolled in DRAM represented 32% and 30% of all participating customers over the same years, respectively. In summary, the DRAM appears to provide a promising pathway to DR participation for many new customers, including an approximate proportional number of lower-income participants.

To improve DR capacity contributions by customers, the Commission could explore policy mechanisms to allow better targeting and of high energy-usage customers and their enrollment in the DRAM program. One idea suggested to accomplish this was authorizing the IOUs to make available to DRPs aggregated and anonymized customer usage data, perhaps aggregated by zip code or census tract. This proposal has been an ongoing stakeholder request, but a solution design that is consistent with the Commission's customer privacy guidelines appears to be difficult.

7. Criterion 3: Were Auction Bid Prices Competitive?

#	Description	Criterion Weight	Criterion Type	Pass Threshold	Score
3	Were auction bid prices competitive?	0.20	Pass / fail	DRAM short-listed bid prices meet definition of competitive	**Mostly yes**

The DRAM Research Plan defined DRAM auction bid prices as "competitive" if the selected bids were, on average, not above the long-term avoided cost of generation and were dispersed "in a narrow range."[36]

With respect to the first measure, the DRAM auction bid prices were found to be largely competitive, at least for SCE and PG&E. With respect to the latter measure, the DRAM bids were found to be ***[REDACTED]*** in 2016 and 2017; however, the price dispersion appeared to ***[REDACTED]*** in 2018 and 2019.

7.1 DRAM Auction Bid Prices vs. Avoided Cost of Generation (CONFIDENTIAL)

[REDACTED]

7.2 All-In Cost of DRAM vs. IOU DR Programs (CONFIDENTIAL)

[REDACTED]

7.3 Dispersal of Bids (CONFIDENTIAL)

[REDACTED]

7.4 Discussion

Findings regarding the relative competitiveness of DRAM auction bid prices were positive to mixed. SCE and PG&E auction prices overall compared favorably to the benchmarked long-term avoided cost of generation, whereas those of SDG&E did not in two out of the four years (2016 – 2019). DRAM auction bids were ***[REDACTED]*** in 2016 and 2017, but the ***[REDACTED]*** significantly in 2018 and 2019.

[36] Research Plan for the Demand Response Auction Mechanism (DRAM) I, II, & III Pilots (2015–2017). California Public Utilities Commission, Energy Division, April 2017.

7.4.1 Discussion – Continued (CONFIDENTIAL)

[REDACTED]

8. Criterion 4: Were Offer Prices Competitive in the Wholesale Market?

#	Description	Criterion Weight	Criterion Type	Continuous Scoring Approach	Score
4	Were offer prices competitive in the wholesale market?	0.20	Continuous	DRAM bids and is scheduled at: + / - 15% of IOU supply-side DR - Good + / - 30% of IOU supply-side DR - Acceptable + / - 45 % of IOU supply-side DR - Needs Work	**No, but not unexpected per current pilot design**

Staff views this criterion as open to interpretation, as the Commission Decision directing the DRAM evaluation provides no guidance on how to judge "competitiveness" of DRAM bid prices in CAISO's wholesale energy market. Also, the proper point(s) of reference is unclear in contemplating a response to the question posed by the Commission: "Were offer prices competitive in the wholesale market?" For example, should DRAM resources be compared to other resources participating in CAISO's markets, and if so, which ones?

The DRAM Research Plan proposed to focus narrowly on comparing the quantity (MWh) and percentage of DRAM resources bid and scheduled in the CAISO Day-Ahead Market (DAM) relative to IOU supply-side DR to assess the competitiveness of DRAM wholesale market bid prices. However, widespread supply-side integration of IOU DR programs occurred only in 2018; few IOU DR programs were participating in the energy market in the 2016–2017 period, resulting in a rather limited data set with which to compare DRAM. To allow for greater market perspective and gain additional insights, ED Staff opted to broaden the scope of this research question by 1) looking at multiple metrics, and, 2) expanding the set of alternative market resources to compare with DRAM.

8.1 Methodology

8.1.1 Competitiveness Metrics

Subsequent to the Research Plan finalization, ED Staff further defined and used three proxy metrics to judge energy bid price competitiveness in CAISO's DAM, referred to as 'scheduling rate,' 'scheduling effectiveness,' and 'bid price distribution.'

The scheduling rate seeks to measure the frequency with which a market resource is awarded a DAM schedule relative to the total quantity bid in the DAM. This was determined by dividing the 'aggregate energy awarded' to a resource by the 'aggregate energy offered' by that resource in the DAM. That is, "scheduling rate" = aggregate

energy awarded / aggregate energy offered, with quantities aggregated over the time period of interest.

DAM bid price distribution analysis seeks to map the frequency of bid prices by a market resource type.

The scheduling effectiveness seeks to test a given resource's effectiveness in getting its available capacity scheduled in the DAM during the 120 hours of highest CAISO system load.

8.1.2 Market Resources

A variety of resources participate in CAISO's wholesale energy market using different participation models [PDR, Non-Generator Resource (NGR), generator, etc.]. These resources have widely different market attributes (dispatchability, physical asset vs. aggregated, fossil fuel vs. renewable, etc.) with distinct use profiles (use-limited vs. baseload, for example). Comparing a DR resource with a resource such as baseload Combined Cycle Gas Turbine (CCGT) in terms of competitiveness may not be meaningful. However, there are non-DR resources that are most likely to be used during high system load hours or high energy prices, such as IFOM (in front of the meter) utility storage or gas peaker plants. It seems reasonable to presume that in the absence of DR, these assets would be called upon to fill the gap. Thus, Staff reasoned that it may be of interest to compare DRAM and IOU DR resources with these physical assets in terms of competitiveness.

Table 18 below lists the categories of market resources assessed for the above metrics, along with a description of the resources aggregated in those categories for the purpose of analysis.

It is important to note that because a very small quantity of DRAM RDRR were contracted and integrated into the market in 2016–2017, Staff chose to exclude DRAM RDRR entirely from its analysis of the above metrics.

Table 18: Market Resources Assessed

	Resource	Description of Aggregation
Resource Category	DRAM PDR	Aggregation of all available DRAM PDR resources
	IOU DR PDR	Aggregation of selected IOU DR programs (PDR or RDRR bid economically)
	LCR BTM storage	Aggregation of selected LCR contracted BTM storage resources bidding as PDR
	IFOM storage	Aggregation of selected IFOM utility storage
	High-efficiency peakers	Aggregation of selected high-efficiency gas peaker plants
	Low-efficiency peakers	Aggregation of selected low-efficiency gas peaker plants
DRAM Sub-Category	Residential	Aggregation of selected DRAM PDR resources with residential customers
	Non-Residential	Aggregation of selected DRAM PDR resources with non-residential customers
	Storage	Aggregation of selected DRAM PDR resources with BTM storage customers
Selected Individual DRAM DRPs and IOU DR Programs	Selected individual DRAM DRP	Aggregation of all PDR resource IDs across all contracts of a single DRP with all IOUs
	Selected individual IOU DR program	Aggregation of all resource IDs associated with the individual IOU DR program bidding economically

8.1.2.1 Market Resource Category Details (CONFIDENTIAL)

[REDACTED]

8.2 Scheduling Rates

As noted earlier, the scheduling rate seeks to measure the frequency with which a market resource is awarded a DAM schedule relative to the total quantity bid in the DAM. This was determined by dividing the 'aggregate energy awarded' to a resource by

the 'aggregate energy offered' by that resource in the DAM. That is, the "scheduling rate" = aggregate energy awarded / aggregate energy offered, with the energy quantities aggregated over the time period of interest.

More specifically, to determine the scheduling rate for a specific resource category (see Table 18), the following calculations were performed:

1. Determine the 'aggregate energy awarded' (numerator): For a particular time period of interest (year, month, or some other period of time), the DAM energy awarded quantities (referred to as DAM_DISPATCH_QUANTITY in CAISO's bid file) were aggregated (summed) across all resource IDs associated with that resource category and market hours in the Availability Assessment Hours (AAH) window over the time period of interest.
2. Determine the 'aggregate energy offered' (denominator): For the same time period of interest as above, the energy quantities bid into the DAM (referred to as DAM_BID_QUANTITY in CAISO's bid file) were also aggregated (summed) as described above.
3. Determine the "scheduling rate" by calculating the ratio between the above calculated numerator and denominator, expressed as a percentage.[37]

For the analysis of scheduling rates, the energy aggregation described above was limited to the hours included in the PDR Availability Assessment Hours (AAH) time window for all resources categories, since DR PDR resources have a Must-Offer Obligation to bid their capacity into the DAM and RTM during the AAH window. This analysis utilized the CAISO data set for the period June 2016 – March 2018.

Table 19 below provides a summary of scheduling rates calculated for various DRAM DRPs and IOU DR programs. The selected data points listed below (in no particular order) reflect various time periods including June–December 2016, 2017, and Q1 2018. To anonymize the results, DRP/IOU program names and specific time periods associated with the data points listed in the table are not specified. Unfortunately, since the applicable time period for the different rates vary, no direct comparison or conclusion can be made from this table. However, comparative observations based on the confidential data provided in the next sub-section are noted in the Analysis and Discussion sections further below.

[37] In CAISO terminology, this ratio formula is 'DAM dispatch quantity'/('DAM bid quantity' + 'self-scheduled quantity'), with the quantities limited to the AAH window.

Table 19: Anonymized, Randomized DRP/IOU Scheduling Rates

DRP/IOU	DRPa	DRPb	DRPc	DRPd	DRPe	IOU DRa	IOU DRb
Rate	0.65%	3.04%	1.53%	0.18%	17.58%	1.27%	13.53%

Several DRPs who won DRAM contracts were mostly or entirely absent from the CAISO data set because they received few or no DAM awards throughout the assessment period. As detailed in a table in the confidential section below, this was likely attributable to these DRPs struggling to execute as indicated by the prevalence of contract terminations and reassignments across DRAM I and II among them.

In the absence of clear Commission guidance regarding the expected market activity level for DR resources, the question arises as to what scheduling rate should be considered competitive. As a "what-if" exercise, Staff reasoned that if DR resources were expected to bid during the required AAH window throughout the year and be fully dispatched at least 30 hours during the typical DR season (May – October), this would translate into a scheduling rate of 4.6 % (= 30 / (26 * 5 * 5)) over six months. [This benchmark was loosely based on the 20-hour annual dispatch requirement for SCE's Summer Discount Plan (SDP), which Staff opines ought to be slightly exceeded given that DRAM is largely PDR and SCE's SDP comprises economically-bid RDRR.] This assumes that the full capacity of that resource was utilized during those hours and holidays are ignored. Annualizing the six-month rate, assuming there are no dispatches in the remaining six months outside the DR season, leads to 2.3% for the year as the target scheduling rate.

8.2.1 Scheduling Rate Data (CONFIDENTIAL)

[REDACTED]

8.2.2 Analysis

IOU DR programs in general were found to be at least 4x more active in the DAM than DRAM DRPs over the assessment period. There were also instances of DRPs achieving higher scheduling rates than IOU programs for some time periods. It should be noted that a few DRPs did bid and receive schedules outside of the AAH window; this is not reflected in these observations.

Several DRPs who won DRAM contracts were mostly or entirely absent from the CAISO data set because they received few or no DAM awards throughout the assessment period. As detailed in a table in the confidential section below, this is likely attributable to these DRPs struggling to execute as indicated by the prevalence of contract terminations and reassignments across DRAM I and II among them.

Scheduling rates for DRAM segments based on type of customer (residential, non-residential, and storage) were analyzed over the assessment period. The results show that DRAM PDR storage had the highest scheduling rate, followed by DRAM PDR residential, and DRAM PDR non-residential was scheduled at the lowest rate.

Figure 18 below attempts to provide a visual sense of the dispatch activity level of various resource categories relative to each other. It is apparent that DRAM resources are far less active in the Day-Ahead Market than other resource types.

Figure 18: DAM Scheduling Rates, June 2016–March 2018, within AAH

8.2.3 Discussion

Assessing the competitiveness of DRAM scheduling rates (as a proxy for bid prices) necessarily leads to a discussion of what, if any, expectations should be placed on DR resources regarding how often and for what purposes they are utilized.

Dispatch Activity Level

Table 20 below compares various program design factors for the three primary vehicles in use today for procuring event-based DR resources: IOU DR programs, LCR contracts for BTM resources (that provide capacity and bid into CAISO markets as PDR), and DRAM.

Table 20: Program Factors Driving Resource Utilization

	LCR BTM Storage	IOU DR	DRAM (Current Design)
Dispatch control	IOU	IOU	3P
Marginal dispatch cost	Set in contract	Trigger set by CPUC	Perceived by DRPs to be high
Dispatch activity affects offer selection	Yes	N/A	No
Impact on customer service level	None (dedicated capacity)	Yes	Yes
Motivation to maximize energy value	Fiduciary responsibility	Fiduciary responsibility	Not clear
Expectations for # of dispatch hours	High	CPUC guidance	Minimal: 2016/2017: One test; 2018: One test or full market dispatch per 6 months
Factor encourages more dispatch activity			

In terms of contractual requirements, specific expectations for dispatch activity level was minimal: DRAM resources were only accountable for a single out-of-market test event over the entire contract period in 2016 or 2017. In 2018, the minimum dispatch requirement evolved to one test or full dispatch for every six months in the market (as well as a full dispatch in August).

In addition, conversations with DRPs suggested that the marginal cost of dispatching DRAM customers was perceived to be high. The DRPs' DRAM business model appears to rely primarily on capacity payments, with little impetus for maximizing revenue in the energy market; some DRPs stated that DAM energy prices in the CAISO system have generally not been high enough (at least to date) to induce customers to willingly dispatch.

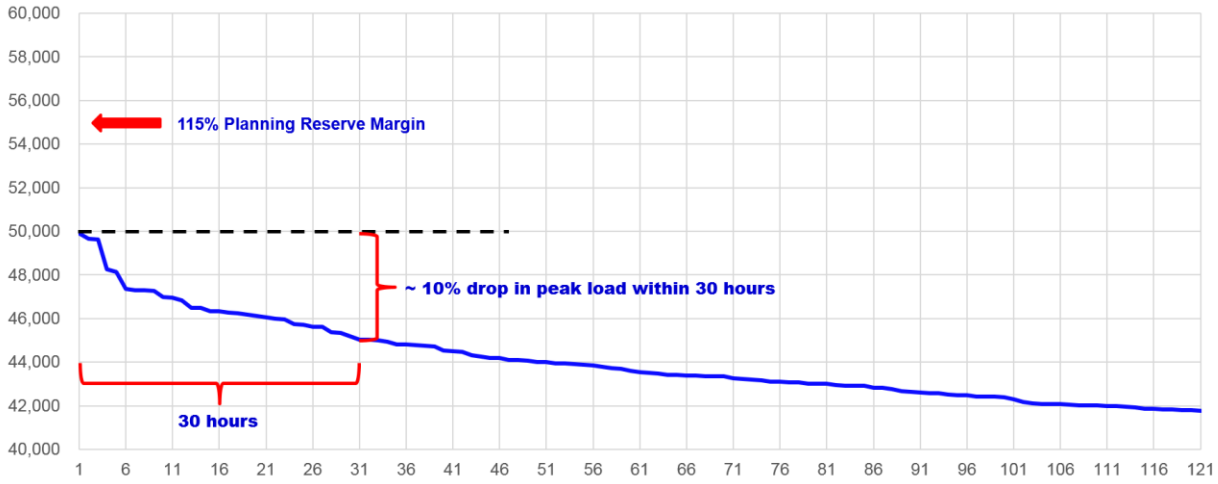
In contrast, several program design factors noted in the above table suggest a much higher level of expected or anticipated dispatch activity level for LCR storage and IOU DR resources, which presumably drives the bidding behavior of these resources.

Based on these observations, it is not surprising to find that IOU and LCR DR programs are substantially more active in the market in terms of dispatch events than DRAM. If the Commission considers the dispatch activity level of DR resources to be an important policy objective, then some changes to the current DRAM design should be considered to drive higher dispatch activity of DRAM resources. Potential ideas are discussed in the Recommendations chapter.

Dispatch Purpose

For another perspective on what objective should drive the dispatch of DR resources, it may be instructive to examine the load duration curve for CAISO system load. Figure 19 shows 120 hours of highest CAISO system peak load in 2017. Note that in the graph, the highest load hour is on the extreme left, with each consecutive hour on the right sequentially sorted in terms of declining peak load (with the hour on the extreme right associated with the lowest peak load among the 120 hours).

Figure 19: CAISO System Load Duration (2017), MW



From this figure, it is apparent that the maximum peak in 2017 was approximately 50 GW and that roughly 10% (about 5 GW) of the Resource Adequacy capacity in CAISO's system was utilized for only 30 hours to accommodate peak load. This observation highlights the potential role of DR resources (and the associated dispatch activity level) in peak load reduction, offsetting high energy prices, alleviating an imminent reliability situation, or reducing GHG emissions.

8.3 DAM Bid Price Distribution[38]

As noted earlier, DAM bid price distribution analysis seeks to map the frequency of bid prices by a market resource type. Specifically, the analysis examined the DAM bid price distribution of a market resource in terms of how frequently the resource bid energy prices within a defined price band (for example, a $20 price band from $200/MWh to

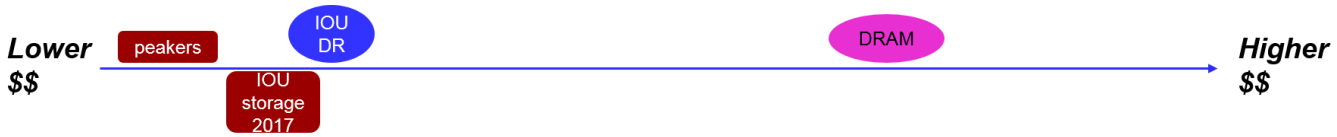
[38] This analysis was limited to the confines of the CPUC's "Subpoena [with CAISO] for General RA information necessary for the CPUC to evaluate Resource Adequacy program and policies," which only provides data on the highest bid price on a DR resource's supply curve for a given trade hour– often merely equivalent to the LMP at that node– rather than all bid prices per resource increment.

220/MWh) relative to all DAM bids by that resource (that is, the percentage of all bids falling within a particular price band).

Analysis revealed that both IOU DR and DRAM DAM bid prices – averaged over the period June 2016 through December 2017,[39] within the AAH window – were noticeably higher than other non-DR resources.

Figure 20 below attempts to provide a visual sense of average DAM bid prices of various resource categories relative to one another. It is apparent that DRAM bid prices were far less competitive in the DAM than bid prices for other resource types.

Figure 20: DAM Bid Price Distribution, June 2016–December 2017, within AAH



8.3.1 Bid Price Details (CONFIDENTIAL)

[REDACTED]

8.4 Scheduling Effectiveness

It is generally understood that DR resources can be used to offset the need for expensive, infrequently utilized, and/or polluting power plants during peak load. ED Staff sought to assess the extent to which DRAM and other resource categories were being used during the peak load hours via a "scheduling effectiveness" metric.

The scheduling effectiveness seeks to test a market resource's effectiveness in getting its entire available capacity scheduled in the DAM during the 120 hours of highest CAISO system load. For each of these hours, the scheduling effectiveness of a resource category was determined as follows:

- DAM energy award quantities (DAM_DISPATCH_QUANTITY) were aggregated across all resource IDs associated with a resource category for a particular hour ("numerator").
- For the same hour as above, the aggregate capacity that should have been available from the resource category for that hour (based on capacity contracts

[39] While pricing data was available through Q1 2018, this quarter was excluded from the analysis given that it preceded the traditional 'DR season' (i.e. the months extending from April – October, when DR resources presumably tend to dispatch more frequently commensurate with higher temperatures and greater grid need), and therefore might reflect higher bid prices.

for DRAM or nameplate value for physical assets) was determined ("denominator").

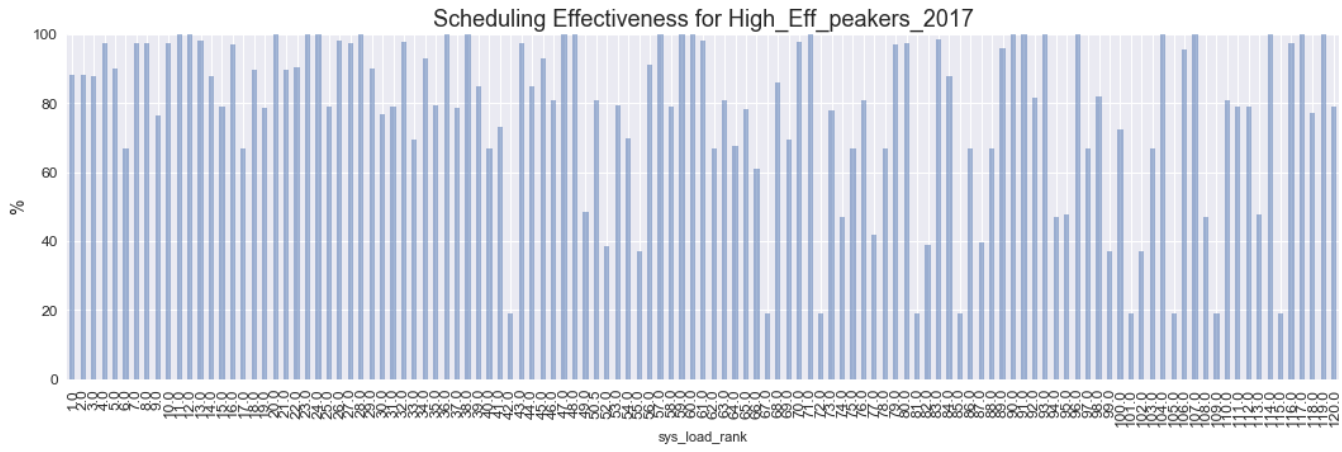
- Finally, the scheduling effectiveness of the resource category for the above hour was determined by computing the ratio of the above numerator and denominator, expressed as a percentage.

The scheduling effectiveness analysis was performed for the 120 highest CAISO system peak load hours in 2016 and 2017, independent of whether those hours were inside or outside the AAH window.

Focusing in on 2017 as a test case, the scheduling effectiveness calculated for various resource categories analysis is plotted in Figure 21 and another confidential figure below. Note that in these graphs:

- The highest peak load hour is on the extreme left, with each consecutive hour on the right sequentially sorted in terms of declining peak load (with the hour on the extreme right associated with the lowest peak load among the 120 hours).
- The graph for DRAM resources excludes certain DRPs with zero or very low DAM schedules during 2017
- Due to limited time, scheduling effectiveness analysis of IOU DR programs was not completed.

Figure 21: 2017 Scheduling Effectiveness for High-Efficiency Peakers



[REDACTED]

The analysis indicates that the scheduling effectiveness of gas peakers was quite high during the highest system peak load hours relative to IOU storage and DRAM resources.

In the case of IOU storage, the resource was able to get scheduled during quite a few hours, although not as frequently or fully utilized as peakers.

In contrast, DRAM resources were scheduled far less frequently during the same hours than any of the other resource categories. This suggests that peak load reduction may not be the most important driver for the bidding strategy utilized by DRPs for DRAM resources.

9. Criterion 5: Did DRPs Meet Their Contractual Obligations?

#	Description	Criterion Weight	Criterion Type	Continuous Scoring Approach	Score
5	Did DRPs aggregate the capacity they contracted in a timely manner?	0.20	Semi-Continuous	80-100% - Good; score = continuous 60 - 80% - Acceptable; score = continuous Below 60% - Non-performing (fail); score = 0	**Improving, but inconclusive (exposed key program design issue to fix)**

This section seeks to assess the extent to which DRPs aggregated their contracted capacity in a timely manner. To explore this, three key metrics were compared, including 1) DRPs' aggregated contracted capacity amounts, 2) DRPs' aggregated "Supply Plan" capacity amounts, and, 3) DRPs' aggregated "Demonstrated Capacity" amounts. With the extension of the evaluation since the interim report was issued, a fourth metric was added related to compliance with the CAISO market Must-Offer Obligation (MOO).

9.1 Definitions and Methodology (New)

As per the DRAM RFO Pro Forma contracts, contracted capacity comprises the Product Monthly Quantity (kW/MW amount for each day of the Showing Month) of a given Product (i.e. System, Local, or Flexible Capacity; Residential or Non-Residential Customer Product; PDR or RDRR) purchased by the buyer (the IOU) from the seller (the DRP), as executed in the DRAM RFO Pro Forma contract for a given DRAM solicitation.

Supply Plans must be submitted to the IOUs sixty days prior to each delivery month (also known as the Showing Month), and reflect the amount of contracted monthly Resource Adequacy (RA) capacity a DRP has aggregated in the market (i.e. indicative of a DRP's ability to enroll enough customers to provide the aggregated load drop it promised in its IOU contract).

Demonstrated Capacity is indicated to the IOUs through invoicing at the end of each delivery month, and reflects the amount of the Product Monthly Quantity for each type of Product for that Showing Month that the DRP was capable of delivering (i.e. indicative of a DRP's ability to make its resources available in the wholesale market). The invoice for Demonstrated Capacity can be based on one of the three options below:[40]

[40] List of options paraphrased from 2017 DRAM RFO Pro Forma DRAM Resource Purchase Agreement, or from 2018–2019 DRAM RFO Pro Forma if otherwise indicated.

- The results of a capacity test by a seller's scheduling coordinator (SC) during the applicable Showing Month, consisting of 1) at least two continuous hours of load reduction by the applicable DRAM resource for DRAM I and II, and, 2) the maximum hourly load reduction by the applicable DRAM resource for System or Local Capacity or the average hourly load reduction for Flexible Capacity during the test for DRAM III onward;

- The average amount of capacity for the applicable DRAM resource that the seller bid into the CAISO markets solely during the hours of the Showing Month in compliance with the CAISO Must-Offer Obligation (MOO); or

- The results of a dispatch of the applicable DRAM resource during the Showing Month, provided that the resource provided load reduction during all of the hours referenced in the Dispatch Instruction corresponding to the applicable MOO hours.

Per the contract, the option chosen for invoicing for any particular delivery month is at the DRP's discretion, with certain restrictions.[41]

The DRPs' reported Must-Offer Obligation (MOO) compliance through their Demonstrated Capacity invoicing was cross-checked with CAISO market bid data as set forth in the DRAM Research Plan, with the assessment period extended through Q1 2018.[42]

CAISO market MOO compliance is an indication of how well a resource is meeting its obligation to offer its capacity to the energy market during the required AAH time window. The compliance level of the DRAM market resource was determined as follows: for a particular time period of interest (year, month, or some other period of time), the energy quantities bid into the DAM (DAM_BID_QUANTITY) were aggregated (summed) across all resource IDs and contracts associated with the resource during all market hours in the Availability Assessment Hours (AAH) window. For the same periods of interest as above, the contracted quantities for that resource were also aggregated.

[41] These three options were available for election at the seller's sole discretion for all delivery months in DRAM I & II. However, DRAM III & IV required the results of a full dispatch in August to be used for Demonstrated Capacity in that Showing Month– or in the absence of a full dispatch during August, a capacity test must be conducted and the results provided to the buyer through their Demonstrated Capacity. In addition, in DRAM III & IV, the results of a test or full dispatch must be used as Demonstrated Capacity for every six months of contracted delivery that has elapsed in a given calendar year.

[42] Note that ED Staff opted to conclude the assessment period for CAISO market MOO compliance at Q1 2018 due to limited bandwidth in parsing DRAM resource IDs requiring a Resource Adequacy Availability Incentive Mechanism (RAAIM) exemption [pursuant to FERC's March 29, 2018 Order Granting Request for Waiver of Tariff Provisions (Docket No. ER18-838-000)] from bidding during CAISO's new Availability Assessment Hours (AAH) in various Summer months. This limited waiver for DRAM DR applies to resources participating in DRAM III that have delivery obligations between April–October 2018 and April–October 2019.

MOO compliance was expressed as the ratio between the summed bid quantities and the contracted quantities[43] in each period, expressed as a percentage.

9.2 Summary of DRAM Contract Obligations

The CPUC and CAISO created policies, rules, and tariffs governing DRAM contract obligations over a series of years. Table 21 below outlines the primary DRAM contract obligations and their origins.

[43] To be precise, MOO compliance level should be measured relative to the Supply Plan quantity (rather than the contract quantity) because DRPs are compensated by the IOUs based on the extent to which Demonstrated Capacity aligns with Supply Plan quantities. However, contract quantity was easier to use in the analysis.

Table 21: Summary of DRAM Contract Obligations[44]

Seller DRAM Contract Obligations: - Abide by all provisions of the DRAM Purchase Agreement - Provide Supply Plans to IOUs sixty days prior to each delivery month - Work with a scheduling coordinator (SC) to provide invoices to IOUs (at the end of each delivery month) indicating Demonstrated Capacity - Provide required registration data to IOUs if bidding DRAM residential resources - Use a CAISO-qualified SC to bid DRAM resources via appropriate CAISO product and market, and conduct all market and business transactions with CAISO - Work with SC to comply with RA Must-Offer Obligation (and RA measurement hours for DR) - Settle with customers and SC, and retain earnings from market participation - Construct DRAM residential products with a minimum 90% residential and small commercial customers - Comply with CPUC Prohibited Resources Restrictions - Provide 20% of contract value to IOU as collateral, in most cases - Secure buyer approval for all contract reassignment - Comply with all CAISO tariffs, Operating Procedures, and Business Practice Manuals - Comply with all applicable CPUC decisions
Seller Resource Adequacy Obligations: - Bid DRAM resource during adopted RA measurement hours for DR - Provide DR (load reduction) when dispatched by CAISO - Make DRAM resources available four hours per day, three days in a row (to receive RA credit) - Comply with RA Must-Offer Obligation for System RA, Local RA, and Use-Limited Flexible Resources - Establish Qualifying Capacity (QC) using contracted amounts (MW)
IOU DRAM Contract Obligations: - Validate customer eligibility upon receipt of CISR–DRP from sellers - Claim RA credit for DR resources provided by sellers - Provide meter data for settlement to sellers (per authorization provided in CISR–DRP) - Pay sellers for DR capacity after delivery month, upon receipt of demonstrated capacity invoice

9.3 DRAM Seller Contract Performance (Revised)

DRAM results have shown a mixed but improving record regarding DRPs' ability to align Supply Plan and Demonstrated Capacity amounts with contracted capacity. Per the Research Plan metrics, the aggregate performance of all DRPs in DRAM I and II (2016 – 2017) suggested that the DRPs performed at an "acceptable" – to – "good" standard in committing to their contracted capacity in the 60-day Supply Plans provided to IOUs, as well as in achieving the required Demonstrated Capacity indicated in the invoices to IOUs.

[44] See Appendix C for a more complete review DRAM policy history.

DRPs' aggregate Supply Plan and Demonstrated Capacity quantities comprised 65% and 58% of contracted capacity in 2016, respectively. The performance level increased to 90% and 88% of contracted capacity in 2017, respectively. Further improvement occurred in 1H 2018 with capacity aggregation performance levels reaching 97% (Supply Plan) and 86% (Demonstrated Capacity)[45] (see Table 22).

Table 22: Alignment of Supply Plan, Demonstrated, and Contracted Capacities

(All Data in % of Contract Capacity)	% in Supply Plan	% in Demonstrated Capacity
DRAM I	65% of MW	58% of MW
DRAM II	90% of MW	88% of MW
DRAM III (1H 2018)	97% of MW	86% of MW

As noted earlier, with the extension of the evaluation since the interim report was issued, DRPs' compliance with the CAISO market Must-Offer Obligation (MOO) was examined. The basic finding from analyzing CAISO market bidding data was that DRAM DRPs consistently improved their market MOO compliance level throughout the period. The overall compliance level was found to exceed 95% in Q1 2018, whereas the level in 2016 was around 70%.

Additional analysis of Demonstrated Capacity relative to the contract capacity (see section 9.3.2.2 below) exposed an important gap in the design of the DRAM pilot. This relates to the fact that resources were exempted from Load Impact Protocols (LIPs) during the DRAM pilot. However, no other ex-ante forecasting method to estimate the contract capacity or Supply Plan capacity was provided by the Commission. Therefore, there is no standard available to evaluate the accuracy of the capacity claimed on the Supply Plan as well as the Demonstrated invoices based on the MOO option. Consequently, Staff concluded that any comparison of Supply Plan or MOO-based Demonstrated Capacity aggregation level to the contract capacity could and should be regarded as *inconclusive* at best. This issue is further discussed in the Recommendations section.

9.3.1 Contract Performance – MOO Compliance Data (CONFIDENTIAL) (New)

[REDACTED]

9.3.2 2018 Contract Performance (New)

There were a total of 13 DRPs with DRAM contracts in 2018.

[45] However, please note a significant new caveat added at the end of this sub-section related to the aggregation performance.

In the first half of 2018, DRAM DRPs showed distinct improvement in their ability to align Supply Plan quantities with their contracted capacity; however, the aggregate Demonstrated Capacity compliance with contract obligations did not improve since 2017. From January through June 2018, DRPs' aggregated Supply Plan capacity averaged 97% of contracted capacity (788 MW vs. 816 MW), whereas aggregated Demonstrated Capacity comprised 86% of contracted capacity (705 MW vs. 816 MW) (see Figure 22 and Table 23).

Figure 22: Contract Performance (1H 2018)

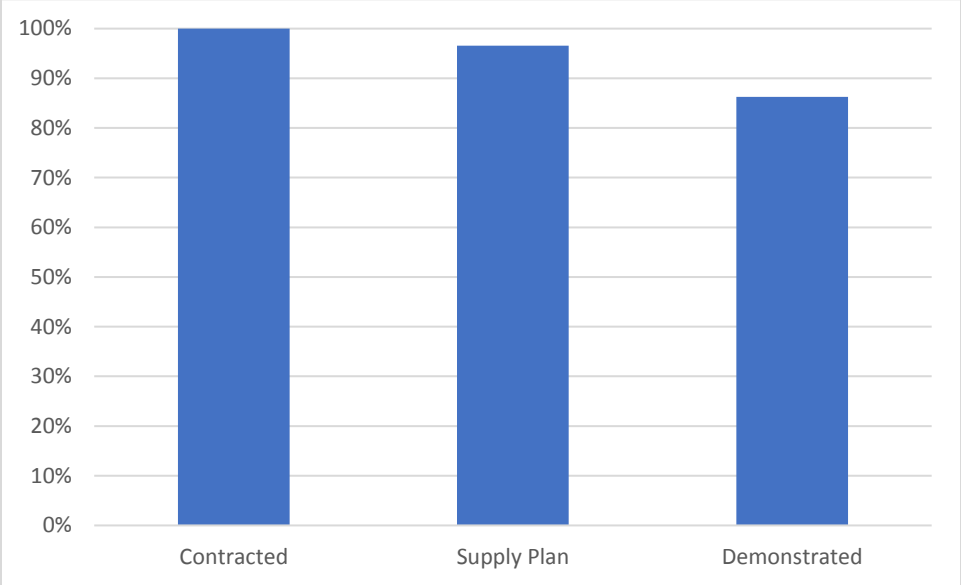


Table 23: Contract Performance by IOU (1H 2018)

1H 2018	Contracted (MW)	Supply Plan (MW)	Demonstrated (MW)
PG&E	421	421	395
SCE	337	326	273
SDG&E	57	40	36
TOTAL	816	788	705
Aggregation relative to contracted MW		97%	86%

9.3.2.1 2018 Contract Performance Data (CONFIDENTIAL) (New)

[REDACTED]

9.3.2.2 2018 Demonstrated Capacity (New)

In the 2018 delivery year, for the first time in the DRAM pilot, DRPs were required to demonstrate capacity based on a test or full market dispatch for every six months of contracted capacity in the market. There were 14 possible IOU and DRP contract combinations (with some DRPs repeated as they had contracts with multiple IOUs). The invoices using test or dispatch results for June 2018 showed the following:

- In two cases, Demonstrated Capacity ranged from roughly 98% to 100%.
- In three cases, Demonstrated Capacity ranged from roughly 50% to 75%.
- In two cases, Demonstrated Capacity ranged from roughly 10% to 30%.
- In three cases, June invoices had not yet been submitted, or were partially or incorrectly submitted.
- In the remaining cases, June invoices were either not submitted (but required) or not required to be submitted.

Several DRPs had their invoices for June and other months audited by IOUs. In some cases, the audit results aligned closely or fully with the capacity claimed by the DRP on the invoice. In some cases, the revisions were accepted by the DRP. However, there were a few notable cases where based on the audit results the IOU asserted that the Demonstrated Capacity should be revised downward by a significant amount. There have been disagreements between the IOU and the affected DRP on the invoice amount. Those disagreements are currently unresolved and exposed an important gap in the design of the DRAM pilot, as discussed in 9.3 above.

9.3.2.3 2018 Demonstrated Capacity Invoices (CONFIDENTIAL) (New)

[REDACTED]

9.3.3 2016 Contract Performance

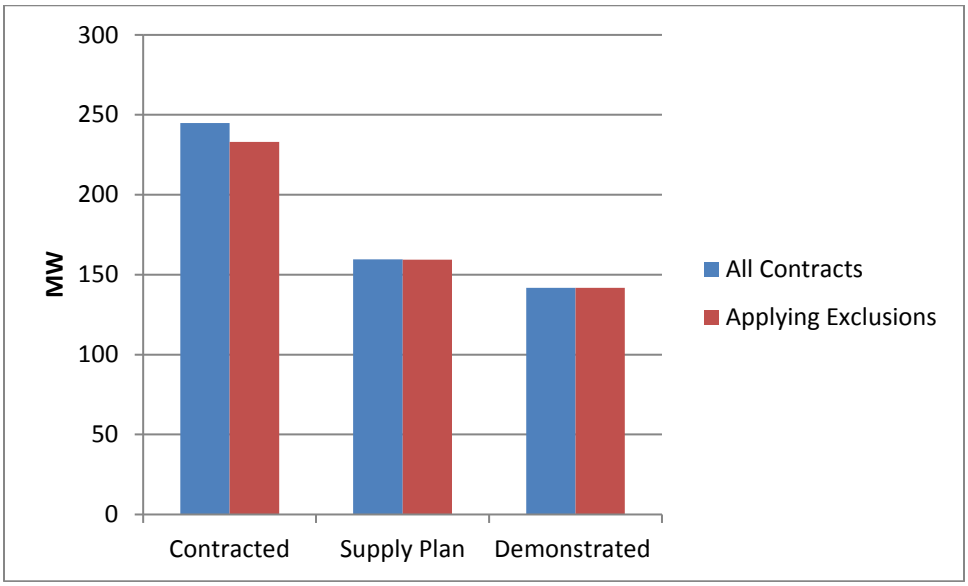
Table 24: Total Number of DRPs By Customer Segment (2016)

Total	**10**
Residential	***[REDACTED]***
Non-Residential	***[REDACTED]***

In 2016, a number of DRPs struggled to meet their DRAM Supply Plan and Demonstrated Capacity contract obligations. From June through December 2016, DRPs' aggregated Supply Plan capacity averaged roughly 65% of contracted capacity (160 MW vs. 245 MW – with the gross MW here representing the monthly MW for Supply Plan and contracted capacity accumulated, respectively, for the year). In comparison, the aggregated Demonstrated Capacity comprised 58% of contracted capacity (142 MW vs.

245 MW – again, with the gross MW here representing the monthly MW accumulated for the year). The aggregate performance improved by three percentage points if DRPs that terminated contracts were excluded from the analysis – rising to 68% for Supply Plan compliance (159 MW vs. 233 MW) and 61% for Demonstrated Capacity (142 MW vs. 233 MW) (see Figure 23).[46] Alternatively, Demonstrated Capacity represented roughly 89% of Supply Plan capacity (142 MW vs. 159 MW), suggesting that once DRPs were able to aggregate their resources by the Supply Plan deadline, their Demonstrated Capacity performance (as a percentage of Supply Plan capacity) was much better.

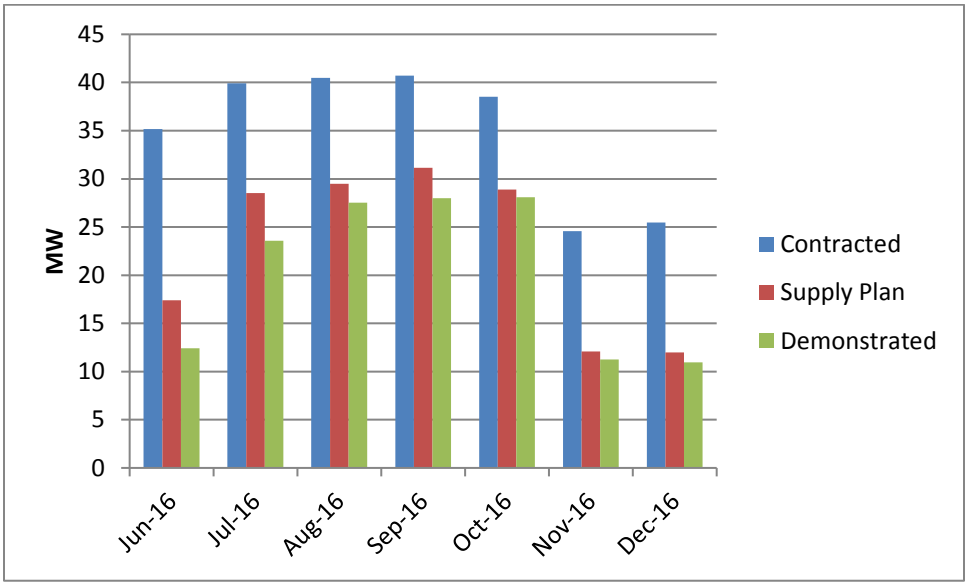
Figure 23: Fulfillment of Contract Obligations, All Contracts (2016)



Analysis by month indicated that the shortfall occurred across all delivery months in 2016 (see Figure 24).

[46] ***[REDACTED]***

Figure 24: Contract Obligations by Month, All Contracts (2016)



9.3.3.1 DRP Contract Performance in Non-Residential Segment (2016)

Per the Research Plan metrics, the 2016 aggregate performance of non-residential DRPs in aligning their Supply Plan and Demonstrated Capacity amounts with contracted capacity was "acceptable." Overall in 2016, non-residential DRPs aggregated 69% of contracted capacity in their Supply Plans (107 MW vs. 155 MW) and 60% of contracted capacity in their Demonstrated Capacity (93 MW vs. 155 MW). In addition, although one non-residential DRP struggled to meet its contract obligations in 2016 (which occurred in ***[REDACTED]***), excluding this DRP (which terminated one contract but struggled on with another contract) from the data set results did not measurably improve aggregate compliance ratios (see confidential figures below).

[REDACTED]

9.3.3.2 DRP Contract Performance in Residential Segment (2016)

While aggregated compliance levels did improve over time, several residential DRPs struggled to meet their DRAM Supply Plan and Demonstrated Capacity contract obligations in 2016. Overall in 2017, residential DRPs aggregated 59% of contracted capacity in their Supply Plans (53 MW vs. 89 MW) and 55% of contracted capacity in their Demonstrated Capacity (49 MW vs. 89 MW) (see the confidential figure below).

Factors driving the different contract performance levels among residential DRPs were difficult to establish. One of the leading residential DRPs linked its success in winning

bids and delivering on DRAM contract obligations to its ability to provide superior customer experience and use of social marketing methods. At the same time, there were other DRAM providers who were quite experienced in DR markets but nonetheless performed poorly in meeting their contract obligations. These DRPs pointed to IOU integration or other challenges as key drivers of their poor performance.

[REDACTED]

9.3.3.3 Factors Affecting Contract Performance

Screen Scraping

Perhaps coincidentally, a factor in differentiating performance across residential DRPs appeared to be whether a DRP utilized the "screen scraping"[47] technique for obtaining access to customer data. The confidential figure below illustrates the superior performance level recorded by the only residential DRP that appeared to persist in screen scraping even after IOUs threatened legal action.

Screen Scraping (CONFIDENTIAL)

[REDACTED]

Other Factors

Further data analysis could provide better insight into factors driving these non-residential and residential DRP performance patterns. We already observed in discussion of criterion 1 that the challenges experienced by many DRPs involved integration with CAISO and IOU systems, and other factors impacted performance and contributed to contract terminations or reassignments. Additional factors identified (through interviews) as contributing to performance issues, particularly for some DRPs new to DR, include: delay in release of Self Generation Incentive Program (SGIP) incentives (affecting one storage company's customer acquisition activities), delays

[47] Screen scraping refers to computer software that uses "bots" to simulate humans for gathering web-based content. In the context of customer energy data access, screen-scraping involves a customer sharing their utility login and password with a DRP, and then, the DRP logging into the customer's utility account to gather customer's data such as rate information, program enrollment, and meter interval data. If the customer gave informed consent to use their login and password, some argue that a legitimate agency relationship (between the customer and the third party acting on behalf of the customer) is created. However, the utilities have been concerned about customer protection, customer data privacy, and the operational IT problems that scraping creates.
For an in-depth assessment of the issues, see "Got Data? The Value of Energy Data Access to Customers," by More Than Smart (now GridWorks), and Mission: Data, January 2016, available at: http://www.missiondata.org/s/Got-Data-value-of-energy-data-access-to-consumers.pdf

caused by slow IOU approval of storage interconnections, and difficulties encountered in executing contracts with scheduling coordinators.

9.3.4 2017 Contract Performance

Table 25: Total Number of DRPs by Customer Segment (2017)

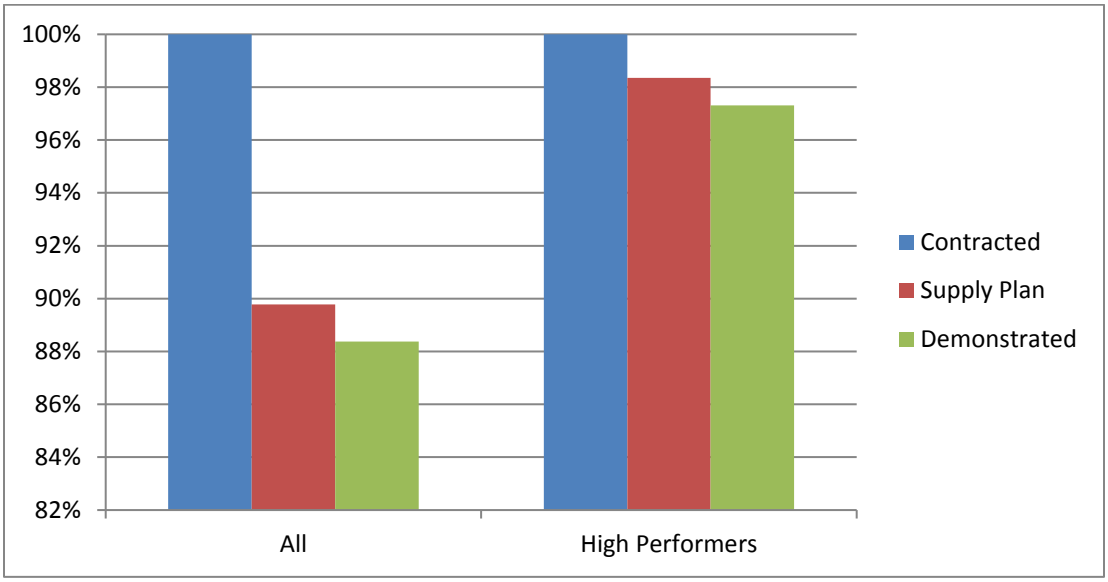
Total	**10**
Residential	***[REDACTED]***
Non-Residential	***[REDACTED]***

A number of DRPs failed to meet their Supply Plan and Demonstrated Capacity contract obligations in 2017, similar to what occurred in 2016. The shortfall in aggregated performance was largely driven by DRPs that eventually reassigned or terminated contracts or invoked clause 1.5(b) of the DRAM contract while retaining the capacity contract with the IOU.[48] Commission Staff grouped these companies as "struggling" DRPs in order to analyze the impact of this group on the aggregate DRP performance. Struggling DRPs (there were five) captured roughly ***[REDACTED]*** of contracted capacity in 2017. ***[REDACTED]***

DRPs that did not terminate or reassign contracts or invoke article 1.5(b) were grouped as "high performers." In interviews, these companies reported having experienced IOU and CAISO integration challenges but largely overcame them. High-performing DRPs provided 98% of their 2017 contracted amounts in their Supply Plans and 97% in their Demonstrated Capacity amounts. In contrast, all DRPs, including the struggling group, provided 90% of contracted capacity in Supply Plans and 88% in Demonstrated Capacity amounts (see Figure 25).

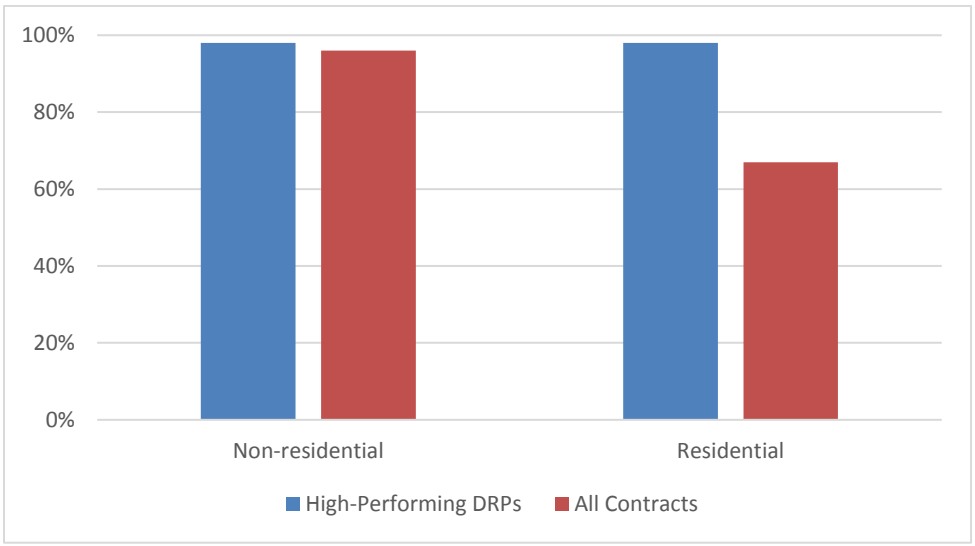
[48] DRAM article 1.5(b) allowed a DRP inhibited by registration challenges stemming from IOU or CAISO actions to reduce a Product Monthly Quantity in their 60-Day Supply Plans, if they could demonstrate that they made commercially reasonable efforts to register the products. But simply invoking this clause did not "prove" that the IOU/CAISO integration issues were, in fact, the main cause of the registration challenges.

Figure 25: Contract Performance: All DRPs and High Performers (2017)



Both classes of high-performing DRPs delivered 98% of contracted capacity in their Supply Plans in 2017; however, non-residential DRPs as a whole performed significantly better than the residential segment, delivering 96% vs. 67% of contracted capacity in Supply Plans, respectively (see Figure 26).

Figure 26: Contract Performance by Customer Class: All DRPs and High Performers (2017)



Among high-performing companies, residential and non-residential DRPs performed equally well in aggregating contracted capacity in Supply Plan and Demonstrated

Capacity amounts (see the confidential figure below). The second confidential figure below summarizes results for selected high-performing DRPs.[49]

[REDACTED]

9.3.4.1 DRP Contract Performance in Residential Segment (2017)

As shown in the confidential figure below, struggling residential DRPs accounted for the bulk of poor performance across aggregated residential DRPs in 2017, similar to what occurred in 2016. Only residential DRPs terminated or reassigned contracts; these companies managed to achieve just ***[REDACTED]*** of contracted capacity in their Supply Plans in 2017, as compared with the single high-performing residential DRP that achieved ***[REDACTED]*** of its contracted capacity. As in 2016, this single high-performing DRP was again the only residential company that appeared to use screen scraping throughout 2017.

[REDACTED]

9.3.4.2 DRP Contract Performance in Non-Residential Segment (2017)

Non-residential DRPs demonstrated high levels of compliance with contracted capacity in both Supply Plans and Demonstrated Capacity in 2017, with minimal difference between high performers and the segment as a whole. For instance, all non-residential DRPs were 94–95% compliant for both metrics, whereas high performers were 97–98% compliant.

[REDACTED]

9.3.4.3 Factors Affecting Contract Performance

Under-performance in 2017 appeared to be largely concentrated among DRPs that reported ongoing struggles with IOU and CAISO integration challenges. The residential segment comprised a smaller fraction of the overall contracted amount in 2017, but accounted for nearly all of the struggling DRPs ***[REDACTED]***.[50]

[49] ***[REDACTED]***
[50] ***[REDACTED]***

9.4 Discussion

IOU and CAISO integration challenges largely impacted residential DRPs more than non-residential DRPs in both the 2016 and 2017 delivery years. DRPs cited integration challenges not only as the major driver of their decision to terminate or reassign contracts, but also to explain the poor performance on contracts they retained. The DRPs impacted by the challenges depressed the aggregated performance of all DRPs against contract obligations. While DRPs as a whole provided 90% of their contracted amounts in Supply Plans in 2017, this figure rose to 98% for the high-performing DRPs (that did not terminate or reassign contracts or otherwise invoke article 1.5(b) to indicate substantial integration challenges).

The single residential DRP that appeared to use screen scraping delivered an average of ***[REDACTED]*** of its Supply Plan and Demonstrated Capacity amounts in 2016 and 2017. In contrast, those residential DRPs that did not screen scrape provided an average of just ***[REDACTED]***.

The significant difference in performance observed here suggested that integration challenges experienced by DRPs avoiding screen-scraping and utilizing alternative means to access to customer data could be a major driver of performance below contract expectations. As explained by the DRP, the use of screen-scraping allowed it to side-step IOU/CAISO integration challenges that were impeding completion of CISR forms, access to customer data, and subsequent registration of customers with CAISO. This suggests that the full implementation of "click-through" customer authorization processes could greatly mitigate relevant integration and registration challenges and improve contract performance of DRPs, at least in the residential segment. Resolution E-4868 directed the IOUs to implement "click-through" processes in a phased approach, completed by November 26, 2018. Staff recommends active monitoring of DRPs' relative contract performance throughout this process.

IOU and CAISO integration challenges, however, did not exclusively drive DRP under-performance against contract obligations. A number of DRPs indicated in interviews that other factors driving non-performance included overly optimistic capacity projections when submitting auction bids, difficulties related to restrictions on dual enrollment, and setbacks stemming in part from delays in receiving SGIP incentives.

IOU DRAM contracts with DRPs did not include explicit, universal penalties for non-compliance with contract obligations, although there was some discretion available to IOUs to impose penalties in certain cases. Going forward, consistent imposition of Resource Adequacy penalties on DRPs failing to meet contract obligations could help in reducing under-performance, assuming IOU and CAISO systems are functioning properly.

10. Criterion 6: Were Resources Reliable When Dispatched?

#	Description	Criterion Weight	Criterion Type	Continuous Scoring Approach	Score
6	Were resources reliable when dispatched?	0.25	Semi-Continuous	80-100% - Good; score = continuous 60 - 80% - Acceptable; score = continuous Below 60% - Non-performing (fail); score = 0	**Mixed; some DRAM DRPs delivered reliable performance, others did not**

The DRAM Research Plan viewed 'reliable when dispatched' as a performance metric measuring the extent to which a market resource performed when dispatched in CAISO's Real-Time Market (RTM) relative to the award schedules assigned to that resource in the Day-Ahead Market (DAM). This performance metric could also be referred to as 'dispatch performance.'

10.1 Methodology

The analysis of 'dispatch performance' focused on DRAM PDR responses to CAISO DAM awards, under the assumption that DRAM resources were only responding to CAISO DAM awards. The dispatch performance is defined as energy delivered in the RTM relative to energy awarded in the DAM.

An 'event' was defined as a PDR resource ID receiving a DAM energy award, referred to as a positive 'dispatch quantity' in CAISO market terminology, at partial or full capacity. More specifically, each hourly award for each resource ID was counted as a separate 'event' regardless of whether that resource ID was also scheduled in contiguous hours.

As noted earlier, the metric 'dispatch performance' seeks to measure the extent to which a market resource performed when dispatched in CAISO's RTM relative to the award schedules assigned to that resource in the DAM. This was determined by dividing the 'aggregate energy delivered' in the RTM by a resource by the 'aggregate energy awarded' to that resource in the DAM. That is, the 'dispatch performance' = aggregate energy delivered in the RTM / aggregate energy awarded in the DAM, with the energy quantities aggregated over the time period of interest.

More specifically, to determine the dispatch performance for a specific resource category (see Table 18), the following calculations were performed:

1. Determine the 'aggregate energy delivered' in the RTM (numerator): For a particular time period of interest (year, month, or some other period of time), the energy delivered quantities (referred to as METER_QUANTITY in CAISO's settlement file) were aggregated (summed) across all events associated with that resource category and market hours over the time period of interest.

2. Determine the 'aggregate energy awarded' (denominator): For the same time period of interest as above, the energy quantities awarded in the DAM (referred to as DAM_DISPATCH_QUANTITY in CAISO's bid file) were also aggregated (summed) as described above.
3. Determine the 'dispatch performance' by calculating the ratio between the above calculated numerator and denominator, expressed as a percentage. This ratio represents a weighted average of dispatch performances across events involving RIDs with different capacities (a simple arithmetic average of event performances would be far less meaningful, as the performance of a resource with small capacity would be given the same weight as the performance of a large capacity resource).

Note that the 'METER_QUANTITY' field from the CAISO settlement file referenced above is somewhat of a misnomer, as the label actually is defined by CAISO as the *difference* between a reference load baseline (aggregated across the customers associated with a RID) for an event and the actual aggregated metered load recorded for the customers associated with that RID during the specified event.

Given that the METER_QUANTITY value utilizes an event baseline, the estimate of energy delivered during an event by DR resources bidding as PDR and the related dispatch performance are of course highly influenced by the baseline methodology utilized to establish the reference load for the event of interest. The METER_QUANTITY field in the settlement data set analyzed was determined by CAISO using the 10-in-10 baseline. Recently, CAISO adopted multiple different baseline methods to provide more flexibility to the DRP to select and apply the baseline option to a specific resource ID that best reflects the characteristics of the aggregated customer load underlying that resource ID. The baseline options are available to DRPs from November 1, 2018 onward.[51] As of this date, DRPs or their scheduling coordinators (SCs) are also now required to determine the energy delivered (METER_QUANTITY) during an event and submit the results to CAISO via the Market Results Interface – Settlements (MRI–S) for financial settlement.[52] CAISO retains the right to audit all data being provided.

10.1.1 Data Processing

There are two specific nuances with the METER_QUANTITY data element as defined above that should be noted:

[51] ESDER 2 implementation included tariff provisions for additional baseline methodologies, including an additional day-matching baseline and the introduction of both a weather-matching and control group baseline methodology.

[52] This outcome of ESDER 3 created significant costs for DRPs, scheduling coordinators, and the DRAM ecosystem that have previously been bourne by CAISO.

- When the metered load during an event is lower than the baseline, the METER_QUANTITY value is positive (that is, load was reduced below the baseline as a result of the event dispatch, effectively leading to energy "delivered" to the RTM on a net basis relative to the baseline). In fact, if the load reduction during the event "overshoots," the delivered energy can exceed the amount of energy that was awarded (or was expected to be delivered) and the dispatch performance ratio for this event would exceed 100%.
- Conversely, if the metered load actually rises above the baseline in spite of a dispatch event, the raw METER_QUANTITY becomes negative in this case (that is, more energy was consumed relative to the baseline in the RTM).

A case can be made for calculating dispatch performance using raw METER_QUANTITY, leading to an event performance ratio that could be negative (load increased) or exceed 100% (load reduction overshot the target). Other possible variations include: METER_QUANTITY could be "floored" at zero if the raw data is negative, or "clipped" to not exceed the award quantity associated with the event if raw data is larger.

For PDR, it turns out that the CAISO settlement file follows the practice of flooring[53] but not clipping[54] the METER_QUANTITY.[55] ED Staff's dispatch performance analysis utilizes the same convention.

At the time the analysis was conducted, the available data set spanned two years, from June 2016 to June 2018. Also, the performance associated with any out-of-market capacity tests conducted by DRPs was excluded, as the focus of the analysis was the performance of dispatches in the CAISO market.

10.1.2 Data Sources and Challenges Encountered

CAISO bid/scheduling and settlement data, received by CPUC from CAISO under a standing subpoena, comprised the initial foundation for the Staff analysis of dispatch performance discussed in this section. There were some challenges encountered in processing data from CAISO settlement files, such as:

- Many instances of incomplete or missing data: In some cases, this appears to be caused by DRPs' receipt of Revenue Quality Meter Data (RQMD) from IOUs being

[53] Flooring means that negative 'meter quantity' values in CAISO settlement are increased to zero such that DRPs are not charged for negative performance (i.e. increase in the electricity load relative to baseline) during events, as the higher load during the event would have already been charged at the RTM price.
[54] Not clipping the 'meter quantity' values means that CAISO does compensate DRPs for Uninstructed Imbalance Energy (UIE) above 100% of the expected energy quantity.
[55] Scheduling coordinators will continue to adhere to this practice going forward.

delayed beyond the 55 business day settlement period[56] and DRP reluctance to resettle with CAISO once complete data was received due to costs[57];

- Zeros observed for METER_QUANTITY, as well as missing data, for events where energy was delivered in the RTM according to the DRP;
- In the case of one DRP, at least two data issues were identified. The METER_QUANTITY values were found to be missing from CAISO settlement files for almost all of 1H 2018, even though there were many DAM awards listed in the bid file. If this data set was accepted as correct, it would suggest that the DRP failed to dispatch and deliver energy in the RTM for any of the DAM awards. However, the DRP's records show that it actually received compensation from CAISO for the same period. In addition, the CAISO data set lists significantly fewer DAM awards for this DRP than were observed by the DRP itself in its SC data, which presents conflicting views of the DRP's performance and activity level. Staff brought both discrepancies to CAISO's attention recently, but the issues were not able to be resolved in time for this report.

In light of the data quality issues encountered in the CAISO data files, ED Staff obtained parallel data sets for most DRPs via their scheduling coordinators (SCs) to repeat the analysis (for dispatch performance in this section and scheduling rates in Section 8) and cross-check the results generated from the CAISO data set. For an additional cross-check, Staff engaged several (not all) DRPs directly to review the DRP-specific results for confirmation that the results are in line with the DRP's record of its performance. Not surprisingly given the data quality issues noted above, misalignments between CAISO and SC data sets were found; in these cases, SC data/results were given priority over CAISO data and used in this report. This approach was taken given that the raw SQMD used for CAISO settlements originates from SCs, and is thus considered the most reliable.

[56] Rule 24, Section F(2)(d) holds IOUs responsible for any costs incurred as a result of their inability to meet relevant deadlines in providing sellers (DRPs) with RQMD, which is processed for their consolidation into SQMD for CAISO, and sellers can use the CPUC's remedy and dispute resolution process for recourse. However, while Staff is anecdotally aware of several instances of delayed RQMD, no formal complaints have been filed to date.

[57] CAISO charges $1,000/day for resettlement as per a Rules of Conduct (ROC) late meter data penalty. If it is determined that meter data was inaccurate and there is a request to submit a new set of meter data to CAISO for resettlement, the ROC penalty is applied. Meter data is considered late after T+45B. The penalty is $1,000 per trade date in which meter data is resubmitted per scheduling coordinator. See http://www.caiso.com/Documents/Section37-Rules-Conduct-asof-Nov6-2018.pdf (Sections 37.5.2 and 37.11) and https://bpmcm.caiso.com/Pages/BPMDetails.aspx?BPM=Rules%20of%20Conduct%20Administration.

10.2 Performance Analysis & Discussion

10.2.1 DAM Dispatch Performance Summary

With data sourced from CAISO settlements and selected SCs, the basic finding from the DAM dispatch performance analysis was that the collective performance of the DRPs over the assessment period was rather mixed: some DRPs performed well and delivered reliable dispatch performance; some other DRPs essentially failed to perform.

Among the well-performing DRPs, some performed well above 80% in terms of the aggregate load reduction achieved in events coming close to the expected level (or sometimes exceeding it). One DRP delivered average performance in excess of 100% across the assessment period, and another performed at 92% reliability.

In contrast, there were other DRPs that were essentially missing in action in terms of rarely capturing awards in the DAM; and in the few cases they did manage to schedule resources, they failed to deliver any meaningful load reduction.

Table 26 below provides a summary of DAM dispatch performance calculated for various DRAM DRPs. The selected data points listed below (in no particular order) reflect various time periods including June–December 2016, 2017, and Q1 2018. To anonymize the results, DRP program names and specific time periods associated with the data points listed in the table are not specified. Unfortunately, since the applicable time period for the different performances vary, no direct comparison or conclusion can be made from this table, although it does serve as a reference point.

Table 26: Anonymized, Randomized DRP DAM Dispatch Performance

DRP	DRPa	DRPb	DRPc	DRPd	DRPe	DRPf	DRPg
Performance	92%	35%	39%	113%	73%	1.23%	78%

10.2.2 RTM Dispatch Performance Summary

Staff's analysis of 'dispatch performance' initially focused on DRAM PDR responses to CAISO DAM awards, under the assumption that DRAM resources were only responding to CAISO DAM awards. Later, it was discovered that a few DRPs chose to also respond to RTM dispatch signals for resources that had not been scheduled in the DAM, or were exclusively focused on RTM bids with no DAM schedules. Therefore, the analysis was expanded to examine the dispatch performance relative to RTM bids. Thus, a second type of dispatch performances could be defined as: RTM dispatch performance (energy delivered in the RTM relative to energy awarded in the RTM).

Note that for both types of dispatch performances, the energy delivered quantity is the same, but the energy awarded quantity used as a reference is associated with a different CAISO market.

Thus, for the 'aggregate energy awarded' (denominator) described earlier in the Methodology sub-section, the description changes to: For the same time period of interest as above, the energy quantities awarded in the RTM (referred to as RTM_DISPATCH_QUANTITY in CAISO's bid file) were aggregated (summed) as described earlier.

With data sourced from CAISO settlements and selected SCs, the basic finding from the RTM dispatch performance analysis was that the DRPs responding to RTM dispatch signals performed nearly as competitively as high-performing DRPs responding to DAM awards-only.

10.2.3 Dispatch Performance Data (CONFIDENTIAL)

[REDACTED]

11. Staff Recommendations

11.1. DRAM Program Next Steps

> **Recommendation**: Adopt a revised DRAM based on the evaluation results, with critical and necessary changes incorporated in the revised design.

In D.16-09-056, the CPUC directed Energy Division to "conduct an independent analysis of the 2015 and 2016 DRAM pilot auctions…[and]…present its findings and recommendations on whether to proceed from a pilot to permanent implementation of the mechanism."[58]

As discussed in this report, Energy Division (ED) Staff's evaluation of the DRAM pilot, based on an assessment of a limited data set encompassing approximately 24 months, found mixed results, with highlights and lowlights; key issues were also identified in the current DRAM design.

Some issues were associated with the barriers to entry, particularly in terms of the challenges experienced by DRPs enrolling customers in their resource aggregations and registering these customers with CAISO, and other integration challenges involving IOU and CAISO systems. These issues may have contributed to a series of contract terminations and reassignments, causing some DRPs to exit DRAM.

Some other issues exposed in the evaluation stemmed from the permissive program design for the DRAM pilot in terms of relaxed performance requirements and exemptions from RA-related penalties and other obligations. There appears to be a general consensus among parties that any continuation of DRAM should be associated with higher standards and stronger accountability for results.[59]

Specifically, the **positive** highlights found by the pilot evaluation include (in order of the CPUC-directed six evaluation criteria):

1. Despite integration challenges, DRAM engaged several DRPs new to the California DR market;
2. DRPs were able to enroll and register many new customers, particularly in the residential sector;

[58] D.16-09-056, p. 66.

[59] CESA Response to ALJ Hymes August 6, 2018 Ruling at 13; Joint IOU Response at 8 and 11; SDG&E Response at 2; CPower and Enel X Reply to Responses at 4; CLECA Response at 11; OhmConnect Reply to Responses at 5; Olivine Reply to Responses at 3; and Cal Advocates Response at 3 and 15.

3. DRAM auction bid prices for capacity were found to be generally competitive compared to the long-term avoided cost of generation, and declined over time for PG&E and SCE;
4. The report did not show positive results regarding criterion 4 for bid prices in the wholesale market, as described below;
5. DRPs exhibited an improving ability to aggregate capacity on Supply Plans and make this capacity available in the wholesale market, but this highlight is significantly tempered by a major caveat in criterion 5, listed below; and
6. Some DRPs delivered reliable performance when dispatched by the CAISO market; in fact, a few DRPs actually bid in the Real Time Market (RTM), responded to RTM dispatch signals, and achieved solid performance results.

There were **negative** findings as well summarized below, in order of the six criteria:

1. Some DRPs were not able to overcome the challenges and were forced to exit the market;
2. New customer involvement outside the residential section did not appear to be significant;
3. Auction bid prices were mixed for at least one IOU, SDG&E;
4. Bid prices for DRAM resources in the energy wholesale market were generally not competitive, as indicated by the proxy metrics examined in the evaluation;
5. The "improving" track record should be deemed *inconclusive* at best given the lack of an established *ex-ante* method to validate the capacity and extensive use of Must-Offer Obligation (MOO)-based invoices for Demonstrated Capacity; and
6. Some DRPs were essentially missing in action in failing to capture Day-Ahead Market (DAM) awards or deliver performance.

In D.18-11-029, the CPUC stated that after the release of Energy Division's DRAM evaluation report with findings and recommendations, the CPUC would determine whether to:

Option (1) Continue the pilot,
Option (2) Adopt the auction mechanism as is on a permanent basis,
Option (3) Adopt a revised auction mechanism based upon the evaluation results, or
Option (4) Decline to adopt any mechanism.[60]

[60] D.18-11-029 at 83.

Staff suggests that pursuing options 1 & 2 appears unreasonable given (a) the evaluation's finding of lowlights discussed above, (b) the identification of issues with the current permissive structure adopted for the pilot, and, (c) the consensus among parties that any continuation of DRAM should be associated with higher standards and stronger accountability for results.

Similarly, Staff suggests that option 4 also appears unreasonable and is not supported by ED's evaluation because of the several positive highlights summarized above.

To the extent that there were mixed results or issues identified with the DRAM pilot, there is a reasonable case to be made that some changes and improvements to the DRAM design could potentially avoid or mitigate the issues and lead to better results. In other words, Staff recommends that the CPUC pursue option 3 and adopt a revised DRAM based on the evaluation results, with critical and necessary changes incorporated in the revised design.

Staff has identified many improvements focused on increasing performance, accountability, competition, and resource value, which Staff recommends that the CPUC consider in conjunction with any extension of DRAM. These recommended improvements to the DRAM design are discussed further below and divided into four categories:

(1) program authorization and oversight,
(2) solicitation process,
(3) performance and accountability, and
(4) DRAM pro forma contracts.

Many recommendations discussed in this section are complex and require more work to fully develop implementation details. Staff suggests that detailed proposals for these recommendations be developed through a stakeholder process that includes collaborative working groups in the next phase of the DR Application 17-01-012 et. al. proceeding.

11.2. Program Authorization and Oversight

Program

> **Recommendation**: Authorize a 5 – 6 years DRAM extension, predicated on implementing the identified critical and necessary improvements in program design.

As noted earlier, Staff recommends that the Commission adopt a revised DRAM based on the evaluation results, with critical and necessary changes incorporated in the revised design. These changes are discussed in the recommendations throughout this section.

Continuing the revised DRAM as a short-term pilot would likely not provide enough continuity, certainty, and opportunity for the robust market development and growth necessary for long-term success. However, given the extent of changes proposed below, a permanent extension at this time without further evaluation of the impact of these revisions does not seem prudent. For these reasons, Staff recommends that the CPUC authorize a 5 – 6 years DRAM extension, predicated on implementing the identified critical and necessary improvements in program design, along with an oversight process to monitor the progress and adjust the design as needed. This approach appears to advance the CPUC objectives of developing a competitive market for DR with a preference for services provided by third parties, and enabling customers to participate in DR through a service provider of their choice.[61]

Staff's recommendation to authorize a 5 – 6 years DRAM extension could encompass multiple solicitations. Potential permutations for the time period associated with the solicitation include:

- One-year contract followed by two two-year contracts (1/2/2),
- Three two-year contracts (2/2/2), or
- Two three-year contracts (3/3).

In general, multiple-year contracts are likely to be more economical for ratepayers in delivering better value, and for IOUs in minimizing overall administrative budgets. In authorizing a program budget with multiple solicitations, the CPUC could consider incrementally increasing the budget over this period, using the annual allotments of the recent auctions as a starting point.

[61] D.16-09-056 at 46-52 and Ordering Paragraph 8.

Oversight

> **Recommendation**: Create a process that allows for ongoing monitoring and additional improvements to the DRAM program design.

Along with the DRAM 5 – 6 years extension, Staff recommends that the CPUC create a process that allows for ongoing monitoring and additional improvements to the DRAM program design. This should include (1) a stakeholder process with Staff-initiated CPUC resolutions to revise the solicitation design, and, (2) an authorization for a new evaluation of program results, with a specifically allocated budget, to be conducted by an independent consultant. The consultant could be contracted via the IOUs, with ED managing the selection of the consultant and the evaluation study. The evaluation could be targeted for mid-2023, which would be focused on assessing results from the 2019 deliveries and any other contracts awarded up to 2023.

The evaluation results, or any other issues arising during the program extension period that cannot be addressed via a resolution process, could be taken up by the CPUC in multiple procedural venues as needed. To the extent the results indicate marginal or no improvement in the operation of DRAM, the CPUC could consider scaling back or terminating the DRAM program as off ramps if needed and appropriate. These venues include future DR rulemakings, the recurring RA proceedings, or the next IOU DR portfolio budget application proceeding anticipated in mid-2021 for the program years 2023–2027.

11.3. Improvements to the Solicitation Process

This section discusses recommendations applicable to the DRAM solicitation phase, focused on improving competition and the valuation of offers.

The CPUC has set the parameters and budget for each of the four DRAM solicitations to date.[62] After the IOUs receive offers from bidders, the bids are ranked and then shortlisted based on their Net Market Value (NMV). Offers are assigned a higher value if they provide Local Capacity, Flexible Capacity, capacity in constrained areas, or if they respond in 20 minutes. If an individual offer would result in the IOU exceeding its budget, then it can be excluded by the IOU. As described below, offers cannot exceed the simple average August capacity bid price cap or the Long-Run Avoided Cost price cap, which act as a screen or filter.[63] Contracts are executed with the offers selected

[62] D.14-12-024; Resolutions E-4728 and E-4737; Resolution E-4754; D.16-06-029; D.16-09-056; Resolution E-4817; and D.17-10-017.

[63] SDG&E AL 3218-E, Attachment C, 2019 DRAM Request for Offers Independent Evaluator Final Report (PUBLIC) at 5, listing the solicitation parameters; note that the other IOU Independent Evaluator reports contain similar lists; SCE AL 3797-E, Attachment K at 4; PG&E AL 5284-E, Appendix D at 7.

from the shortlist and submitted by the IOU in an Advice Letter for Energy Division approval.

11.3.1. Market Share

> **Recommendation**: Consider setting a limit on the allowed market share of any one provider within a single IOU territory.

This report found that the DRAM market was becoming concentrated. Before contract terminations and reassignments, the market share of the top three DRPs was around 73-85% in 2016 and 68-91% in 2017 within the three IOU territories. After contract terminations and reassignments, the market share increased even further to 79-91% in 2016 and 77-100% in 2017.[64]

It is not clear whether, or to what extent, the market concentration itself is a problem. It may run counter to the CPUC's stated goals of increasing customer choice[65] and creating a competitive market.[66] On the other hand, market share limits may penalize efficient and lower-cost DR providers and could have an unintended effect of potentially contributing to an increase in capacity prices.

The California Large Energy Consumers Association (CLECA) supports limiting any DRP's market share to 20%.[67] Olivine also supports limiting market share.[68] OhmConnect opposes limiting market share because it believes that any cap could cause an increase in market prices and "could prevent DRPs from realizing economies of scale."[69]

As some parties have suggested, Staff recommends that the CPUC consider limiting the market share of any one DRP within a single IOU territory in order to prevent market concentration and increase competition. A proposed limit could be set at 25% share of the auction budget. Given the smaller market in SDG&E's territory, it may be reasonable to exclude SDG&E's auction from this restriction.

[64] ED DRAM Evaluation Final Report, Section 5.2., Viability of New DRPs.
[65] D.16-09-056 at 46 and 49, stating the CPUC Goal, "Demand response customers shall have the right to provide demand response through a provider of their choice…."
[66] D.16-09-056 at 46 and 51, stating the CPUC goal, "Demand response shall be market driven leading to a competitive, technology neutral, open market in California with a preference for services provided by third parties through performance-based contracts at competitively determined prices…."
[67] CLECA Response to ALJ Hymes August 6, 2018 Ruling at 10.
[68] Olivine Response to ALJ Hymes August 6, 2018 Ruling at 5-6.
[69] OhmConnect Reply to Responses to ALJ Hymes August 6, 2018 Ruling at 9.

11.3.2. Residential Set-Aside

> **Recommendation**: Maintain a reduced residential set-aside that is limited to new market participants to encourage market diversity.

The DRAM pilot included a 20% set-aside for DRPs focused on aggregating the load of residential customers. Resolution E-4728 approved the set-aside due to the "unique complexities associated with aggregations of residential customers, particularly in bidding into the CAISO market, and largely untapped demand response potential within this market segment…."[70] Further, Resolution E-4728 stated that "[t]he purpose of this set-aside is to attract new market players to the DRAM, and test the participation of residential aggregations…."[71] The set-aside is based on the total capacity procured, meaning "if the IOUs collectively procure 50 MWs worth of DRAM bids, then 10 MWs should be reserved for the residential set-aside."[72] D.16-09-056 maintained the residential set-aside because it saw "a need to allow this residential sector to grow and learn in this competitive environment before removing its 'training wheels.'"[73]

CPower, Enel X,[74] and CLECA support reducing the residential set-aside because they contend that the IOUs must skip over lower-cost non-residential bids and instead procure higher-cost residential aggregations in order to fill the 20% set-aside.[75] SCE and PG&E state that the residential set-aside is no longer needed because only one residential DRP, the DRP with the most market share, has proved viable.[76] Olivine recommends that the set-aside be considered a soft target that is reserved for new or previously underperforming DRPs.[77] SDG&E prefers to keep the residential set-aside because the bulk of its service territory includes residential and small business customers.[78]

As the evaluation found, there were significant integration challenges and barriers to customer enrollment and registration process in the early phase of the pilot that may have adversely contributed to the viability of several residential-focused DRPs, forcing them to quickly exit the market. Many of these issues were mitigated only recently —

[70] Resolution E-4728 at 19.
[71] Resolution E-4728 at 19.
[72] Resolution E-4728 at 19.
[73] D.16-09-056 at 72.
[74] Formerly EnerNOC, Inc. Note that the August 17 Response and the August 22 Replies to the Responses to ALJ August 6, 2018 Ruling were written under EnerNOC, Inc. On October 24, 2018 in A.17-01-012 et. al, Enel X, Inc. submitted a notice of name change from EnerNOC, Inc. to Enel X, Inc. This report refers to the new name, Enel X, Inc. (Enel X).
[75] CPower and Enel X Response to ALJ August 6, 2018 Ruling at 8; and CLECA Response to ALJ August 6, 2018 Ruling at 7.
[76] Joint IOU Response to ALJ August 6, 2018 Ruling at 6.
[77] Olivine Response to ALJ August 6, 2018 Ruling at 5.
[78] SDG&E Response to ALJ August 6, 2018 Ruling at 3.

for instance, with the launch of the click-through authorization process in 1H 2018 to streamline customer enrollment.

In the most recent DRAM IV auction, only one DRP managed to win contracts focused on residential customers for 2019 deliveries, as shown in Table 27 below.

Table 27: DRAM IV Contract Winners[79]

Contract Winners	Res/Non-Res	PG&E	SCE	SDG&E
Enel X, Inc.	Non-Res	x	x	
Enerwise	Non-Res			x
Engie Storage	Non-Res		x	
Leapfrog Power, Inc.	Non-Res	x	x	
NRG Curtailment Solutions	Non-Res		x	
OhmConnect, Inc.	Both	x	x	x
Stem, Inc.	Non-Res	x	x	x

This lack of diversity in the residential sector, apparent in the above auction results, suggests that there may still be a need for the residential set-aside to advance the CPUC's desire to "attract new players to the DRAM, and test the participation of residential aggregations…" and allow the residential market to experience more competition and grow before removing the 'training wheels.'[80] With the recent launch of the click-through authorization process, a key barrier to customer enrollment was alleviated. The combination of the launch of click-through process and maintaining the set-aside may help the residential market to develop and solidify with a greater diversity of providers. The CPUC could consider a reduced cap, limited to new residential DRPs. The CPUC could also consider limiting the contracts with the selected new DRPs to one year of delivery, while waiving other proposed requirements described in other sections for a limited time.

11.3.3. Market Dispatch

> **Recommendation**: Allow a voluntary offer bid parameter indicating the minimum market dispatch activity level that the DRP is willing to commit to for the resource capacity it offers to a DRAM auction.

The DRAM evaluation found that the 'scheduling rate' achieved by most DRPs was rather low. In fact, DRAM PDRs collectively were the least active relative to other market resources that are generally used to support peak load.[81]

[79] Based on IOU contracts in PG&E AL 5284-E, SCE AL 3797-E, and SDG&E AL 3218-E.
[80] D.16-09-056 at 72.
[81] Section 8.1 of this report, DAM Bidding and Scheduling Pattern Summary: Scheduling Rates.

DR resources could potentially be most useful when the grid is stressed due to: (1) high peak load, (2) high energy prices, or, (3) an imminent reliability situation. However, presently, during the offer valuation process in an auction, the IOUs are not able to distinguish offers involving DR resources with high marginal dispatch costs (and thus presumably less effectiveness in relieving grid stress) from resources with low marginal dispatch costs (and thus likely more effectiveness).

The separation between a resource's capacity cost in the RA market and marginal dispatch cost in the energy market is the norm for non-DR resources. That is, when procuring capacity in the RA market that is managed by a third party, it is generally presumed that the operator of the resource is motivated to earn revenues in the energy market and thus drive down the marginal dispatch cost. But the low scheduling rates for DRAM resources relative to non-DR resources suggest that many DRPs do not prioritize energy market revenues in their business models. Hence, a stronger signal to drive competition may be needed to stimulate more active participation of DRAM resources in the energy market.

Including a voluntary bid offer parameter indicating the minimum market dispatch activity level to be achieved by the DRP for the DRAM resource it offers into an auction may provide the desired competitive signal. An optional variation of this bid parameter could include the number of hours the DRP is willing to allow the IOU to schedule to increase the perceived value of its resource to the IOU.

Staff recommends a stakeholder process to develop implementation details for the proposed bid parameter, including:

- How to define the minimum activity bid parameter, along with the optional IOU controlled hours attribute;
- How the IOU should value the proposed bid parameter in assessing the NMV of an offer; and,
- How to account for the minimum activity level in invoicing Demonstrated Capacity.

11.3.4. Bid Fees

> **Recommendation**: Require bidders to deposit up-front bid fees to discourage bidders from declining offers after being shortlisted.

Many parties raised concerns about winning bidders who decline shortlisted offers.[82] Despite the offers being "binding" under the DRAM solicitation participant instructions and protocols,[83] there were several instances of bidders being shortlisted but then withdrawing their offers late in the selection process or after being selected. This can cause delays in completion of the solicitation,[84] underutilization of the auction budget, and additional time and expense for IOUs.

There appears to be broad consensus among parties that bid fees are needed in order to ensure that offers are serious.[85] SDG&E suggests a $10,000 fee to secure offers.[86] Alternatively, the bid fee could be set as a percentage of the offer value. If the offer is not shortlisted, then the fee would be returned with interest. If the offer is shortlisted but the bidder withdraws the offer, then the fee would be forfeited. If the offer is shortlisted and accepted, then the fee would be rolled into the collateral for the contracting phase, to be returned after the contract is executed.

11.3.5. Price Cap "Screens"

This section discusses recommendations regarding the simple average August bid price cap and the Long-Run Avoided Cost price cap.

11.3.5.1. Simple Average August Bid Price Cap

> **Recommendation**: Eliminate the simple average August bid price cap to improve offer valuation.

The simple average August price cap was first adopted by the CPUC in D.16-09-056 as one of the parameters of a future permanent auction mechanism. This Decision

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[82] *See for example*, SCE AL 3629-E at 9, describing the DRAM III solicitation in 2017 where, "[t]wo sellers declined to execute their residential contracts after they were notified that their offers were selected," and CLECA Response to ALJ August 6, 2018 Ruling at 9, raising concerns about a bidder who submitted and won multiples offers, chose to execute the most attractive offers, and declined the others.

[83] SCE 2019 DRAM 4 Participant Instructions at 6.

[84] *See for example,* OhmConnect Response to ALJ August 6, 2018 Ruling at 11, recommending that future DRAM solicitations be conducted on a faster schedule.

[85] SDG&E Response to ALJ August 6, 2018 Ruling at 2-3; CPower and Enel X Reply to Responses to ALJ August 6, 2018 Ruling at 4; CLECA Response to ALJ August 6, 2018 Ruling at 9; OhmConnect Response to ALJ August 6, 2018 Ruling at 11.

[86] SDG&E Response to ALJ August 6, 2018 Ruling at 2-3.

described the price cap as both a screen and as a procurement cap, with the screen set to "encourage competitive bidding behavior."[87] In other words, the IOU would procure all capacity that is below the simple average August price cap, excluding obvious outliers. In D.17-10-017, the CPUC declined to adopt changes to the DRAM pilot design, except that for the DRAM IV solicitation the IOUs should "offer contracts to all complying bids up to the simple average August capacity bidding price or their budget cap, whichever comes first."[88]

For the DRAM III and IV solicitations, the simple average August bid price cap was used as a screen or filter during the process of ranking offers based on Net Market Value (NMV), and offers that are above the cap were eliminated. The simple average August bid price cap was "calculated by (1) excluding the top 10 percent of August bids offered then (2) totaling all remaining August bid prices and (3) dividing by the number of bids in (2)."[89]

Most parties support the elimination of the simple average August bid price cap because bids under that cap may not reflect the best value available. The cap requirement forced IOUs to skip better priced offers in favor of lower value offers.[90] SDG&E stated that the simple average August bid price rule "led to a haphazard capping of offers, which did not help select out the best offers for SDG&E's ratepayers."[91] SCE and PG&E believe that it encouraged bidding behavior that did not create the best value for ratepayers. CPower and Enel X expressed concern that it caused bids to be selected out of order so as to fit certain bids under the price cap.[92] CLECA and OhmConnect are concerned that it caused the IOUs to skip bids that have a better NMV and that taking the average price in August causes flat pricing for each month or higher pricing in off-peak months.[93]

In the DRAM IV Final Report, PG&E's Independent Evaluator recommended eliminating or re-assessing the value of the simple average August bid price cap because:

> "Implementation of the average August price cap served to limit competition and remove several offers that had economic Net Market Value calculations. In addition, it appears that the August price cap may have encouraged bidders to

[87] D.16-09-056 at 74.
[88] D.17-10-017 at 53.
[89] D.16-09-056 at 73-74.
[90] Joint IOU Response to ALJ August 6, 2018 Ruling at 6.
[91] SDG&E Response to ALJ August 6, 2018 Ruling at 3.
[92] CPower & Enel X Response to ALJ August 6, 2018 Ruling at 8.
[93] CLECA Response to ALJ August 6, 2018 Ruling at 7; OhmConnect Response to ALJ August 6, 2018 Ruling at 12.

> offer flat pricing throughout the year as opposed to pricing based on market value."[94]

Additionally, the Independent Evaluator was concerned that:

> "the average August price cap will likely lead to flat pricing for each month or higher pricing in off-peak months. While there is a requirement that outliers be eliminated, if more bidders price this way, it will be difficult to define what is meant by an outlier."[95]

Staff agrees with the Independent Evaluator and parties and recommends the elimination of the simple average August bid price cap as a filter or screen for offers. The cap does not accomplish the goal of increasing competition because offers with higher NMV may be skipped over in favor of bids with a lower August price but lower NMV. As discussed below, Staff recommends that the CPUC consider a screen based on an adjusted or "net" Long-Run Avoided Cost instead of a cap based solely on price.

11.3.5.2. Long-Run Avoided Cost Price Cap

Recommendation: Replace the price cap based on Long-Run Avoided Cost (LRAC) with an NMV cap based on an adjusted or "net" LRAC.

The IOUs use the Long-Run Avoided Cost of supplying electricity as a benchmark to evaluate offers. If an offer's weighted average price per kilowatt of RA capacity offered per year is above the benchmark, then the offer is excluded.[96]

SDG&E suggests that comparing bids based on the LRAC cost alone does not offer a complete picture of the value of a resource.[97] SDG&E argues that offer valuation can be improved by moving from a price cap based on the long-term RA value to an NMV cap based on an adjustment to that value (which could be referred to as 'Net LRAC'), derived by deducting LRAC from the near-term RA benefit of the DRAM capacity offered.[98] A more detailed explanation with a hypothetical example can be found in Attachment A of SDG&E's Response to the August 6, 2018 Ruling, and in Appendix F of this report.

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[94] PG&E AL 5284-E, Attachment D, 2019 DRAM Request for Offers Independent Evaluator Final Report (PUBLIC) at 33.

[95] PG&E AL 5284-E, Attachment D, 2019 DRAM Request for Offers Independent Evaluator Final Report (PUBLIC) at 25. Note that this recommendation also occurred in SDG&E and SCE's Independent Evaluator reports.

[96] SDG&E's 2019 Request for Offers for Resource Adequacy via the Demand Response Auction Mechanism Protocols at 13, available at: https://www.sdge.com/sites/default/files/documents/2019_DRAM_RFO_Protocols.pdf. See also Attachment A of SDG&E's Response to the August 6, 2018 Ruling.

[97] SDG&E's Response to the August 6, 2018 Ruling at 3.

[98] SDG&E uses the term "LRAC NMV;" Staff suggests "Net LRAC" may be clearer.

Staff finds SDG&E's reasoning persuasive and recommends adoption of the revised cap as described to allow selection of better value offers in an auction. This revised cap has the potential to maximize the benefits relative to cost, or minimize the net cost of the offer, providing greater value. Staff recommends that a stakeholder process review and develop the details of the proposed "Net LRAC" methodology, ensuring consistency across the three IOUs and other supply-side resource procurement evaluations.

11.3.6. Qualitative Criteria

> **Recommendation**: Include qualitative criteria promoting past performance, bidder viability, and market diversity. Remove criteria penalizing bidders for suspected violations without a transparent review process.

The IOUs use qualitative criteria to select winning offers from the shortlist. The qualitative criteria augment or reduce the offer price based on a scoring matrix. This is generally done after ranking bids by NMV and attributing higher weight to Local and Flexible Capacity over System Capacity.[99] Qualitative criteria vary by IOU, allowing the IOU to give extra weight to bids that may better complement the IOU's portfolio or address various solicitation goals.

D.14-12-024 adopted a Settlement agreement that was used to design the first DRAM solicitation. The Settlement proposed to "evaluate and select bids using [each IOU's] respective valuation processes."[100] D.14-12-024 denied this proposal and instead ordered the pilot design working group to "develop transparent, standard evaluation criteria."[101] Resolution E-4728 that approved the DRAM I solicitation design found that qualitative criteria that can be applied differently by each IOU "are neither standard nor transparent," and ordered the IOUs to "develop a scoring matrix that will be applied equally across the IOUs."[102] The standard scoring matrix developed by stakeholders was available in the DRAM RFO and Protocol materials prior to the solicitations and in the Independent Evaluator reports.

In the September 1, 2016 ALs that sought approval for the DRAM III auction design, the IOUs proposed various qualitative criteria. Resolution E-4817 required the IOUs to "limit themselves in their 2018 DRAM bid evaluation process to the qualitative criteria

[99] SDG&E Advice Letter 3218-E 2019 DRAM Request for Offers Independent Evaluator Final Report (PUBLIC) at 5-7.
[100] D.14-12-024, Attachment A Settlement Agreement at 25.
[101] D.14-12-024 at 37.
[102] Resolution E-4728 at 25.

approved in this Resolution, and those not explicitly disallowed,"[103] which for DRAM III included:[104]

1. Will your DRAM resource require any permits, interconnection agreements, environmental studies, or additional land rights prior to operation?
2. Is there any ongoing investigation or an investigation that has occurred within the last five years with respect to any alleged violation of any rule, regulation, or law associated with any commodity, securities, environmental, or financial market regarding any DR services you were/are providing?
3. Are you a certified small business?[105]
4. Are you going to use Enabling Technology with at least 90% of the customers comprising your PDR customers?
5. Do you expect a majority of your resources/customers to emit GHG emissions (batteries charging from the grid are not 100% efficient and so they need more charging energy than discharged energy, thereby causing GHG emissions as opposed to digital thermostats that do not materially cause GHG emissions)?
6. Have you willfully terminated or defaulted on a past DRAM purchase agreement, or submitted offers that were subject to the non-competitive behavior provision?
7. Have you not signed a DRAM purchase agreement when extended a shortlist offer, or delivered Supply Plans to the IOUs for DRAM totaling, in aggregate, less than 50% of the contracted capacity for any or all contracted months in 2017 that the IOUs have received Supply Plans for, at the time of offer submittal? If you do not have a 2017 DRAM purchase agreement, have you delivered Supply Plans to the IOUs for DRAM totaling, in aggregate, less than 50% of the contracted capacity for both August and September 2016?

Resolution E-4817 further defined "non-competitive" in qualitative criterion 6 (above), modified qualitative criterion 7, and declined to authorize qualitative criterion 8, "Have you received a shortlist offer in [the IOU's] DRAM 2016 or DRAM 2017?"[106] The proposed qualitative criterion 8 would have rewarded new bidders and existing bidders who had not succeeded in DRAM 2016 or DRAM 2017.

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[103] Resolution E-4817 at 32.
[104] SCE AL 3466-E, PG&E AL 4900-E, and SDG&E AL 2949-E at 8-9, as modified by Resolution E-4817 at 32-35.
[105] For information about Small Business standards, please refer to one of the following sites: (1) California Department of General Services, available at: http://www.dgs.ca.gov/pd/Programs/OSDS.aspx, and (2) Small Business Administration, available at: https://www.sba.gov/contracting/getting-started-contractor/qualifying-small-business.
[106] Resolution E-4817 at 33-34.

For DRAM IV, each IOU used different criteria. For SCE, "[a]lthough Offerors [were] required to submit answers to several questions regarding the qualitative attributes of their Offers, these answers [were] not [sic] given any weight in the final selection process in this RFO."[107] For PG&E, the criteria with an above zero weight increased the DRP's bid price, making the DRP's offer more expensive and less desirable, whereas the criteria with a below zero weight lowered the DRP's bid price.[108] PG&E used criteria 3, 6, and 7 listed above in the DRAM IV solicitation for 2019 deliveries with weights of -1 to 15%. SDG&E used criteria 1–2 and 4–7. SDG&E's method increased the DRP's bid prices by 3% for all criteria except for the criteria for ongoing investigations, which increased prices by 30%.[109]

Qualitative Criteria Favoring New Bidders

Based on the diversity of DRPs participating in DRAM I (2016) and DRAM II (2017), it may not have been necessary to give qualitative boosts to new bidders at that time.[110] However, given the market concentration that this report found in the DRAM III (2018–2019) and DRAM IV (2019) solicitations,[111] Staff recommends including a qualitative criterion that favor new bidders. This added weight for new bidders could potentially reduce barriers to entry and help encourage participation from a greater diversity of DRPs.

Qualitative Criteria Rewarding Past Performance

Staff supports including qualitative criteria that reward past positive performance, as suggested by several parties.[112] Qualitative criterion 6 in the above list rewards DRPs that fulfill their contracts. Qualitative criterion 7 penalizes DRPs for declining shortlisted offers and delivering Supply Plans of less than 50% of contracted capacity. Additional criteria rewarding positive past performance could be considered in a stakeholder process.

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[107] SCE 2018 DRAM 4 RFO Instructions, Section 6.02 at 15. Available at: https://www.sce.com/procurement/solicitations/dram

[108] PG&E 2019 DRAM Request for Offers Solicitation Protocol at 12, available at: https://www.pge.com/en_US/business/save-energy-money/energy-management-programs/demand-response-programs/2019-demand-response/2019-demand-response-auction-mechanism.page?

[109] SDG&E Request For Offers 2019 DRAM, Offer Form at Columns BW-CC, available at: https://www.sdge.com/2019DRAMRFO.

[110] Resolution E-4817 at 34.

[111] ED DRAM Evaluation Final Report, Section 5.2., Viability of New DRPs.

[112] Joint IOU Response to ALJ Hymes August 6, 2018 Ruling at 6; CESA Response to ALJ Hymes August 6, 2018 Ruling at 11; CPower and Enel X Response to ALJ Hymes August 6, 2018 Ruling at 9; CLECA Response to ALJ Hymes August 6, 2018 Ruling at 11; and Cal Advocates Response to ALJ Hymes August 6, 2018 Ruling at 7.

Qualitative Criteria Penalizing Bidders for Past Actions

Criterion 2 (above) asks if there is an "ongoing investigation," or "an investigation that has occurred within the last five years with respect to any alleged violation of any rule, regulation, or law … regarding any DR services [DRPs] were/are providing." The criterion should be consistent with CPUC policy. Specifically, Staff suggests that the criterion not penalize a bidder for an "alleged" or "suspected" violation without that issue being subjected to an adequate review process, either at the CPUC or another approved venue. Open investigations or suspected rule violations are not final determinations and should not be used against DRPs.

This approach is consistent with general principles of fairness and the need to retain the CPUC's role as decision-maker and the IOU's role as program administrator. For example, D.13-09-025 declined to put the IOU in a fact-finding role regarding potential privacy tariff violations.[113]

SDG&E is the only IOU that used this qualitative criterion. Whereas SDG&E's other six criteria are given 3% weight, this criterion is given 30% weight. Staff is concerned that this criterion may be anti-competitive and overly punitive in its disproportionate weight and the absence of a definitive finding in a requisite review process.

Staff recommends that the stakeholder process review and finalize the qualitative criteria to be used in the DRAM evaluation process for fairness as well as consistency with other IOU procurement practices.

11.3.7. Information Disclosure

Recommendation: Require IOUs to publish summaries of awarded DRAM contracts and clearly report DRAM administrative costs.

Staff recommends requiring IOUs to publish brief summaries of awarded DRAM contracts that include:

- the names of the counterparties,
- product type (System/Local/Flexible Capacity),
- customer class (Residential/Non-Residential),

[113] In D.13-09-025, the IOUs proposed suspending data access in the event of a suspected tariff violation under the Privacy Tariffs. The Commission declined to suspend access prior to any Commission process to resolve the issue. The Commission declined to put the IOUs in a fact-finding role and maintained that role for the Commission. The Commission declined to suspend access based on a suspicion of a tariff violation by the IOU and instead left the Commission with the authority to resolve the matter administratively, through an investigation, or through resolving a customer complaint. D.13-09-025 at 51-53.

- contracted capacity (August MW volume), and
- the contract term (annual/partial).

Above is consistent with the disclosure requirements applicable to procurement contracts per D.06-06-066. SCE already follows this practice.[114] Staff believes the other IOUs' practices should be aligned as well. CPower and Enel X support this recommendation.[115]

In Comments on the August 6, 2018 Ruling, CPower and Enel X recommend that the IOUs reveal administrative budgets for DRAM to provide DRPs with a "realistic idea of the budget available for DRAM capacity."[116] Requiring disclosure of administrative spending is consistent with Resolution E-4754's requirement that IOUs "disclose the estimated dollar amount, in each IOU's respective DRAM budget, allocated to administrative costs … and capacity payments."[117]

Currently, the IOUs do publish some DRAM administration expenditures in their Monthly Interruptible Load and Demand Response Reports.[118] SDG&E's report appears to be the clearest regarding the breakdown of administrative and incentive expenditures.[119] PG&E's and SCE's reports do not appear to include a breakdown of administrative versus capacity payment ("incentive") expenditures.

Staff suggests that the IOUs work with Energy Division to improve the reporting template. The IOUs are required to use a "consistent monthly report format approved by Energy Division staff."[120]

[114] SCE AL 3797-E at 8.
[115] CPower and Enel X Reply to Response to ALJ Hymes August 6, 2018 Ruling at 9, recommending that PG&E provide more information in their ALs about why certain resources were chosen over others including preferred products and volume procured.
[116] CPower and Enel X Reply to Response to ALJ Hymes August 6, 2018 Ruling at 9.
[117] Resolution E-4754 at Ordering Paragraph 12.
[118] IOU expenditure data is available on a tab toward the end of the Excel sheets that are published monthly on the Commission's website: http://www.cpuc.ca.gov/General.aspx?id=3914. Reports are available from December 2009 – Present. Each month, when a new report is published, an old report is removed. The reports are cumulative such that only the latest report is needed.
[119] San Diego Gas & Electric Company Report on Interruptible Load and Demand Response Programs, 2018, "Total Cost and AMDRMA Account Balances" tab, available at: http://www.cpuc.ca.gov/General.aspx?id=6442456352.
[120] D.09-08-027 at 222, ordering revisions to the format of the monthly reports; subsequent decisions continued the monthly reporting requirement.

11.4. Improvements for Performance and Accountability

By design, the DRAM pilot had a permissive structure in terms of performance requirements and accountability, as further explained below. Most parties have commented that the standards and expectations should be raised going forward. This section discusses recommendations to set clear performance standards and requirements, as well as strengthen accountability for results. The proposed recommendations address: progress milestones, Qualifying Capacity, dispatch requirements, Demonstrated Capacity standards, performance penalties, and incentives.

11.4.1. Implementation Progress Milestones

> **Recommendation**: Require implementation progress milestones from contract execution to year-ahead RA showing.

Currently, in the time period between contract signing and year-ahead RA showing, DRPs are not required to demonstrate any performance in customer enrollment and capacity aggregation. The lack of performance requirements during this time leaves the IOUs without any assurance that the DRP is capable and ready to perform when the delivery period starts.

Staff agrees with the recommendations of SCE and PG&E, that DRPs should be required to "demonstrate achievement of milestones by a specific date … including completion of IOU DRP registration (if applicable), CPUC registration, and enablement of data sharing processes. Failure to meet or cure such milestones should be considered an event of default."[121]

11.4.2. Qualifying Capacity in Supply Plans

> **Recommendation**: Establish ex-ante standards for estimating the Qualifying Capacity of a DRAM resource applicable to Supply Plans.

The DRAM pro forma contracts describe the process for submitting Supply Plans to the IOU and to CAISO.[122] Unlike IOU resources, per D.16-06-045, DRAM resources are currently exempt from completing Load Impact Protocols (LIPs)[123] in order to determine

[121] Joint IOU Response to ALJ August 6, 2018 Ruling at 12.
[122] 2018 DRAM Pro Forma Contract, Section 1.5 Product Monthly Quantity and Corresponding Contract Price at 4-5, and Section 3.1, Delivery of Product at 8.
[123] The Load Impact Protocols were adopted in D.08-04-050 and the first Load Impact Reports were filed on April 1, 2009 in R.07-01-041.

Qualifying Capacity. Instead, D.16-06-045 permitted DRAM Sellers to use contracted capacity, which also was not based on any ex-ante standard, on Supply Plans.[124]

In the absence of a CPUC-approved ex-ante basis or standard(s), it is difficult to validate or verify to what extent the Qualifying Capacity entered on the DRPs' Supply Plans accurately reflects the available dispatchable capacity for RA purpose. Without verifiable standards, the IOUs question DRPs' ability to "deliver on their full bids if called upon [by CAISO] to do so."[125]

DRAM Sellers should be required to complete an ex-ante review of the dispatchable capacity claimed on Supply Plans for RA. Due to the complexity of the ex-ante review and the variety of approaches being used by third-party providers to aggregate customer load into a DR resource, a one-size fits all methodology will likely not suffice. Staff suggests that the DRAM Working Group be resumed as part of a stakeholder process to develop a proposal for one or more estimation methodologies. If this proposal has not been developed in time for the next Proposed Decision (PD) in the current DR Application proceeding, the CPUC could adopt a proposal via Staff-initiated CPUC resolution, if such a procedure is authorized.

Multiple options for the estimation methodologies that could be evaluated by the Working Group include:

(1) ex-ante assessment standard;
(2) simplified Load Impact Reporting;
(3) capacity testing; or
(4) performance from a past event.

These options are briefly discussed below.

(1) An Ex-Ante Assessment Standard

One option to assess the available capacity on an ex-ante basis is to develop a reasonableness standard based on the historical aggregated load associated with the customers included in the DR resource at the time of Supply Plan submission. For cases where the resource is expected to grow in the period between Supply Plan submission and the capacity delivery month, a required tolerance band could be agreed upon that must be met by the DR resource using the same standard when the Supply Plan is submitted.

[124] D.16-06-045 granted a temporary exemption from the Load Impact Protocols for DRAM Sellers through 2019; *See also* Joint IOU Response to ALJ August 6, 2018 Ruling at 9, explaining that the exemption seemed appropriate at the time in order to reduce barriers to entry for new DRPs.
[125] Joint IOU Response to ALJ August 6, 2018 Ruling at 9.

(2) Simplified Load Impact Protocols

Multiple parties have indicated support for the use of the Load Impact Protocols to determine Qualifying Capacity.[126] Other parties have raised objections to the compulsory use of this approach, such as the concern that the Protocol may become outdated because third parties "innovate at a rapid pace, such that historical performance data quickly becomes non-indicative of current performance capabilities."[127]

D.16-06-045 declined to adopt a simplified load impact report and accepted Energy Division's proposal to allow contract capacity for Qualifying Capacity.[128] The Decision found that "[g]iven the scale and experience of the IOU programs in comparison to the characteristics of the third-party programs, it is reasonable to use this simpler method at this time for the third-party DR that directly bids into the CAISO market."[129] To date, parties have not explored the possibility of a simplified load impact reporting method in the DR Application 17-01-012 et. al. proceeding, but could do so in the next phase of the proceeding.

(3) Capacity Testing

DRPs could complete full capacity tests, or aggregate test results on a per customer basis. SCE and PG&E support the use of full capacity tests.[130] SCE and PG&E believe that instead of using the max hourly reduction that is currently permitted on Supply Plans, DRAM Sellers should use test results plus the average hourly load reduction for System and Local Capacity.[131] SCE and PG&E also suggest a 10% tolerance band during the first year.

Additionally, SCE and PG&E recommend that DRPs with multiple contracts be required to conduct capacity tests of all contracts simultaneously or within the same day, in order to prevent double counting from customer migrations between DRP resources.[132] Alternatively, the number of customer migrations between resource IDs in a month could be limited to a certain number in a month for specified reasons, or a methodology could be established based on the principle of counting the results one customer per event only once for the duration of the test (if different resource IDs are dispatched at different times).

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[126] Joint IOU Response to August 6, 2018 Ruling at 12; SDG&E Response to August 6, 2018 Ruling at 5; CESA Response to August 6, 2018 Ruling at 13; and CLECA Response to August 6, 2018 Ruling at 14.
[127] OhmConnect Reply to Responses to ALJ Hymes August 6, 2018 Ruling at 7-8.
[128] D.16-06-045 at 38-42.
[129] D.16-06-045 at 41-42.
[130] Joint IOU Response to August 6, 2018 Ruling at 11-12.
[131] Joint IOU Response to August 6, 2018 Ruling at 11-12.
[132] Joint IOU Response to August 6, 2018 Ruling at 12.

OhmConnect raised concerns with testing, explaining that "[t]he major problem with testing DRAM resources prior to the Supply Plan deadline 60 days before the start of the delivery month) is that customer loads and enrollments at the time of the test may not reflect what is anticipated during the actual delivery month."[133]

(4) Performance from a Past Event Dispatch

This approach has the advantage of being simple. However, it requires or assumes that the aggregated load within a DR resource targeted for a future Supply Plan month, or the various conditions like weather that affect variable load, are substantially the same as at the time of the past event. Hence, this approach is not useful for a newly-formed resource or a dynamic resource that experiences changes in customer mix or load types.

11.4.3. Dispatch Hours

> **Recommendation**: Require DRAM resources to be dispatched at least 30 hours between May through October, during the hours most beneficial to the grid.

As noted earlier, Staff's DRAM evaluation found that the 'scheduling rate' achieved by most DRPs was rather low. In fact, DRAM PDRs collectively were the least active relative to other market resources that are generally used to support peak load.[134] The IOU DR programs were found to be substantially more active in the market than DRAM during the AAH window in terms of dispatch events or Day-Ahead Market hours scheduled for dispatch.

The CPUC should consider whether there should be any expectation set for the activity level of a DR resource. The discussion of scheduling rates (Section 8.2.3) noted that the program design in the case of LCR behind-the-meter storage and IOU DR programs appears to be oriented toward resource dispatch activity, suggesting that there is value in DR resources being active.

Having a DR resource be active and achieve a specified dispatch threshold may have some advantages, including:

(1) improving resource reliability by ensuring that the technology infrastructure to enable dispatch is exercised and robust;

[133] OhmConnect Response to August 6, 2018 Ruling at 16.
[134] Section 8.1 of this report, DAM Bidding and Scheduling Pattern Summary: Scheduling Rates.

(2) increasing customer awareness, leading to better planning for load reduction events;

(3) increasing confidence that capacity associated with a DR resource will actually be available when the resource is called upon to relieve grid stress; and

(4) ensuring that resources are bid economically.

There is precedence for requiring a DR resource to be dispatched for a minimum number of hours in a year. SCE's air conditioner cycling program is an example of a program with a minimum dispatch requirement. SCE's program has had a minimum dispatch requirement since 2015.[135] In 2015, the program was required to dispatch at least 35 hours per year, which was subsequently reduced to 20 hours per year.[136]

To encourage more frequent dispatches of DRAM resources, Staff recommends that a requirement be set for DRAM resources to be dispatched a minimum number of hours during the May – October DR season. Staff initially proposes that the minimum number be 30 hours.

The required minimum dispatch hours could be limited to a designated time window of the day that provides the best value to the grid in terms of reducing grid stress, applying downward pressure on high energy prices, or offsetting peak demand. The designated time window should align with the Resource Adequacy (RA) Measurement Hours[137] set by the CPUC. Typically, the RA Measurement Hours have coincided with the CAISO Availability Assessment Hours (AAH), which CAISO sets based on its assessment of the hours of greatest need to the grid.[138] CAISO updates these hours annually in its Business Practice Manual (BPM) after the release of the annual Flexible Capacity Needs Assessment.[139] The AAH are the "[t]op 5% of load hours within each month using hourly load distribution."[140]

For partial-year DRAM contracts, the minimum hour requirement could be prorated as needed based on the number of months within the May – October period included in the contract. For example, if a contract spans only January – June, the applicable minimum would be reduced to 10 hours (30 x 2/6).

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[135] A.17-01-018, SCE-02, SCE Testimony: Demand Response V.2 at 22-31, describing the history of the SDP program and the proposed changes for the 2018-2022 budget cycle.
[136] D.16-06-029 at 18-21 and 23.
[137] D.18-06-030 adopted RA Measurement Hours for the 2019 RA that aligned with the AAH for 2018, due to the timing of the CAISO Flexible Capacity Needs Assessment.
[138] Presentation, Final Availability Assessment Hours Technical Study for 2019 at 3, available at (accessed December 2, 2018): http://www.caiso.com/Documents/Presentation-2019FlexibleCapacityNeedsAssessment-FinalAvailabilityAssessementHours.pdf
[139] *See* http://www.caiso.com/informed/Pages/StakeholderProcesses/FlexibleCapacityNeedsAssessmentProcess.aspx
[140] *Ibid.* at 4.

It should be noted that this recommendation is separate from and in addition to the recommendation, discussed earlier in section (11.3.3), to allow a bid parameter indicating the minimum market dispatch activity level, which would value offers with additional dispatch commitments. The objective of the recommendation here is to set a "floor" for dispatch activity; the objective of the previous recommendation (Section 11.3.3) is to stimulate competition in driving dispatch activity higher than the floor level.

11.4.4. Demonstrated Capacity Invoicing

This section discusses two recommendations regarding DRP invoices to IOUs for Demonstrated Capacity (1) requiring dispatch results when available, and, (2) capping invoices that rely on Must-Offer Obligation (MOO) bidding requirements.

11.4.4.1. Dispatch Results on Invoices

> **Recommendation**: Require Demonstrated Capacity to be invoiced based on dispatch results when available.

The current DRAM pro forma contracts allow DRAM Sellers to use any one of three options to establish the Demonstrated Capacity entered on the monthly invoice submitted to the IOUs.[141] These options include: (1) a CAISO market dispatch, (2) an out-of-market capacity test, or, (3) the Must-Offer Obligation (MOO) bid amount. From DRAM III onward, DRAM Sellers are also required to use the results of a test or full dispatch as Demonstrated Capacity for every six months of contracted delivery that has elapsed in a given calendar year, as well as the results of a full dispatch or test in August.[142]

Several concerns arise regarding the current frequent use of MOO to demonstrate capacity, leading to reduced confidence that the capacity being invoiced can be relied on for RA:

(1) MOO bids are not required to be economical, which allows DR resources to bid at high prices and avoid being dispatched by the market;

(2) If MOO bids are used to demonstrate capacity during most of the year, DRPs' capacity would be verifiable on an ex-post as little as twice a year; and,

[141] 2018 DRAM Pro Forma Contract, Section 1.6, Demonstrated Capacity at 5-7.
[142] 2018 DRAM Pro Forma Contract, Section 3.3(b) Provision of Information and Testing at 9.

(3) When the contracted capacity is used as Qualifying Capacity on Supply Plans and MOO bids (which reference that Qualifying Capacity) are used for Demonstrated Capacity on invoices, neither ex-ante nor ex-post capacity is verifiable.

Staff's evaluation found that the vast majority of the invoices submitted by DRPs were based on the MOO option. This can lead to a problematic situation as observed in the 2018 delivery year. That is, as late as November 2018, the entities jointly responsible for ensuring system reliability (CPUC, CAISO, and IOUs/LSEs) still had no visibility into the actual capacity available for a significant portion of the DRAM portfolio, since the Qualifying Capacity for DRAM resources was untested at the time of the year-ahead RA filing or 60-day Supply Plan submission. As of mid-December 2018, IOUs still had not received from some DRPs the required June 2018 invoices based on full dispatch or test results.

While no parties specifically address reducing MOO bids, parties do generally support stronger performance requirements including stricter Demonstrated Capacity requirements. OhmConnect "supports a paradigm for establishing ex post reliability … based primarily on performance during CAISO dispatch or test events," and also supports aligning "intervals used to establish Demonstrated Capacity with intervals of greatest CAISO grid need."[143]

In line with the goal of clarifying the standards and increasing accountability for performance, it appears appropriate to seek reduction in the number of MOO-based invoices and instead rely more on market dispatch results. Along with the earlier recommendation for setting minimum dispatch hours, more dispatch results should be available for invoicing Demonstrated Capacity.

In cases where the aggregate monthly Qualifying Capacity consists of multiple resource IDs, it is conceivable that the target aggregate Qualifying Capacity was achieved by dispatch results with some resource IDs over-performing and offsetting other under-performing resource IDs. The current invoicing requirement of limiting the billable capacity of an over-performing resource ID to the Qualifying Capacity specified for that resource ID may need to be revisited as it potentially reduces the aggregate performance.

11.4.4.2. Must-Offer Obligation-Based Invoices

Recommendation: Cap the Demonstrated Capacity on MOO-based invoices to an averaging function of available test/dispatch results.

[143] OhmConnect Response to August 6, 2018 Ruling at 17.

Staff found that some DRPs failed to demonstrate capacity using a test or market dispatch equivalent to the Qualifying Capacity indicated on their Supply Plans at any time during the contract period. In these cases, it seems reasonable to question the accuracy of invoices based on MOO bids, especially since the Qualifying Capacity was never verified using an established methodology.

To avoid this situation, some type of averaging using the best results of an available capacity test or full market dispatch could be used as the cap on the amount of capacity the Seller can claim on Demonstrated Capacity invoices based on MOO during the contract delivery year. This is similar to the proposal suggested by SCE and PG&E.[144] A tolerance band could be set such that test or dispatch results falling within that band would be treated as 100% in the averaging mechanism.

11.4.5. Penalties and Incentives for Performance

In D.16-09-056, the CPUC required DRAM resources to be subject to the same "penalty structure as Resource Adequacy contracts, which is an obligation to replace Resource Adequacy capacity not delivered."[145] Further, D.16-09-056 recognized that CPUC RA penalties alone might be insufficient and explained that "beginning in 2018, third parties bidding into wholesale markets will face penalties for failing to fully offer their capacity into the CAISO wholesale market under the Resource Adequacy Availability Incentive [M]echanism [RAAIM]."[146] D.16-09-056 found that "[t]his combination of potential penalties should ensure that ratepayers are not financially liable if contracted capacity is not delivered."[147]

During the DRAM pilot, CAISO RAAIM penalties and replacement capacity requirements under the CPUC's RA program have not effectively incentivized performance. Olivine stated that many DR resources are smaller than the 1 MW threshold required for RAAIM to apply.[148] SCE and PG&E are concerned that RAAIM penalties do not sufficiently mitigate the risk to the IOUs.[149] The Public Advocates Office of the CPUC (Cal Advocates)[150] is also concerned about RAAIM and believes that stronger performance

[144] Joint IOU Response to ALJ Hymes August 6, 2018 Ruling at 12.
[145] D.16-09-056 at 71; while the decision described the requirements for the permanent mechanism, the subsequent Resolution E-4817 required DRAM pilot contracts to include the obligation to replace RA capacity.
[146] D.16-09-056 at 72.
[147] D.16-09-056 at 72.
[148] Olivine Response to ALJ Hymes August 6, 2018 Ruling at 11.
[149] Joint IOU Response to ALJ Hymes August 6, 2018 Ruling at 10.
[150] Formerly known as the Office of Ratepayer Advocates of the CPUC (ORA); the Office of Ratepayer Advocates was renamed the Public Advocates Office of the Public Utilities Commission (Cal Advocates) pursuant to Senate Bill No. 854, which the Governor approved on June 27, 2018; the name change did not go into effect until August 31, 2018, so the Responses to the August 6, 2018 Ruling were filed as ORA. This report refers to Cal Advocates.

requirements could resolve these issues.[151] Further, no DRPs have provided replacement capacity under the CPUC's RA program, despite multiple contract terminations.[152]

While an effective DRAM penalty structure is needed, caution should be exercised when designing penalties[153] to maintain competitive neutrality between IOU DR programs and DRAM resources offered by DRPs. Some options to consider for both penalties and incentives are discussed below.

11.4.5.1. Penalties

Penalties for shortfalls in ex-ante Qualifying Capacity and ex-post Demonstrated Capacity are discussed below.

Shortfall in Qualifying Capacity

> **Recommendation**: Establish penalties for non-performance when Qualifying Capacity indicated on Supply Plans falls significantly below contracted capacity.

A tolerance band for Qualifying Capacity, such as 40% to 60% of contracted capacity, could be established in the year-ahead Supply Plan showing.

If a DRP fails to achieve the tolerance band for Qualifying Capacity, a penalty could be imposed, such as:

- The contract could be considered in default;
- The capacity price could be de-rated for the delivery month by a pre-set percentage; or,
- A pre-set portion of the contract collateral could be withheld.

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[151] Cal Advocates Reply to Responses to ALJ Hymes August 6, 2018 at 6.

[152] ED DRAM Evaluation Final Report, Section 5.2., Viability of New DRPs.

[153] *See for example,* the following excerpt from a March 26, 2016 ED Staff proposal adopted in D.16-06-045, is an example of the reasoning behind why ED Staff has proposed leniency in the past:

> Staff's rationale was that the capacity delivered by these parties [the DRPs] is arguably held to a higher standard than IOU DR programs, due to current and likely future provisions in capacity contracts. IOUs do not face the risk of these penalties, nor is their DR resource portfolio funded based on the capacity that was actually delivered after the fact.

ED proposal available at: http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=10600

To pursue this penalty, stakeholders could work with CAISO in the Supply-Side Working Group (SSWG)[154] or in a CAISO stakeholder process.

Parties also suggested several other penalties for Qualifying Capacity shortfalls. For example, PG&E and SCE recommend passing on to the DRP any costs incurred under CAISO's Capacity Procurement Mechanism resulting from a DRP's performance shortfall on a 60-day Supply Plan showing.[155] The current DRAM contracts likely permit the IOU to pass on such costs,[156] but the process for allocating those costs may require clarification.

The California Energy Storage Alliance (CESA) supports taking off the "training wheels" and subjecting DRAM Sellers to RAAIM penalties.[157] To pursue this penalty, stakeholders could work with CAISO in the Supply-Side Working Group (SSWG) or a CAISO stakeholder process.

Shortfall in Demonstrated Capacity

> **Recommendation**: Establish penalties for non-performance when the Demonstrated Capacity falls significantly below the Qualifying Capacity for the delivery month.

Currently, DRPs receive payment in proportion to the capacity demonstrated, with no consequences when the delivered capacity falls short of the Qualifying Capacity for that delivery month.

To discourage sub-par performance, a financial consequence could be imposed. Multiple options for such a penalty have been suggested by parties.

PG&E and SCE suggest reducing the capacity price when DRAM Sellers do not demonstrate capacity within a "tolerance band."[158]

Alternatively, SDG&E supports imposing a penalty when Demonstrated Capacity is less than 85% of contracted capacity.[159]

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[154] D.17-10-017 required the SSWG to issue its final report by June 30, 2019. If the CPUC wishes to use this venue to explore this DRAM penalty, the CPUC should extend the SSWG.
[155] Joint IOU Response to ALJ Hymes August 6 Ruling at 11.
[156] 2018 DRAM Pro Forma Contract, Section 11.1, Seller's Indemnification Obligation at 33-34, requiring the Seller to indemnify the IOU against any expense or fine resulting from Seller's failure to fulfill Resource Adequacy Benefit obligations.
[157] Joint IOU Response to ALJ Hymes August 6, 2018 Ruling at 10-11.
[158] Joint IOU Response to ALJ Hymes August 6, 2018 Ruling at 10-11.
[159] SDG&E Response to ALJ Hymes August 6, 2018 Ruling at 5.

As yet another option for a potential penalty, CLECA supports a more stringent approach, suggesting that if a resource delivers less than 75% of its RA value, it should be denied a capacity payment.[160]

Staff recommends that the stakeholder process review these and other options and develop a consensus proposal for implementing a penalty to be imposed in the delivery month in which the Demonstrated Capacity falls significantly short of Qualifying Capacity.

As noted earlier, in cases where the aggregate monthly Qualifying Capacity (QC) consists of multiple resource IDs (RIDs, the current invoicing requirement of limiting the billable capacity of an over-performing RID to the QC specified for that RID may need to be revisited as it potentially reduces the aggregate performance.

11.4.5.2. Incentives

> **Recommendation**: Establish an incentive to encourage dispatch performance exceeding the Qualifying Capacity.

When Demonstrated Capacity is invoiced based on test/dispatch results, DRPs could be rewarded for achieving test or dispatch performance over the Qualifying Capacity, as suggested by OhmConnect.[161] One approach could be to apply the capacity price to any incremental Demonstrated Capacity exceeding the Qualifying Capacity, up to a pre-set limit such as 115% of Qualifying Capacity, and add the resulting amount in the Demonstrated Capacity payment for the month.

11.4.6. Performance Reports

> **Recommendation**: Require DRPs to submit market performance data to the CPUC on a periodic basis.

Most DRAM Sellers responded to Energy Division's requests for information. However, there is some delay in the receipt of data and considerable effort is required to process the data, as the data is not standardized when received from DRAM Sellers and/or their scheduling coordinators. Cal Advocates recommends "[t]o avoid delays in these evaluations going forward, a potential remedy for a DRAM pilot auction in 2019 is to require all awardees to provide their bid data and ex post load impacts to Energy Division on a monthly basis."[162]

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[160] CLECA Response to ALJ Hymes August 6, 2018 Ruling at 13.
[161] OhmConnect Reply to Responses to ALJ Hymes August 6, 2018 Ruling at 6-7.
[162] Cal Advocates Response to ALJ Hymes August 6, 2018 Ruling at 4.

Staff agrees and recommends that DRAM Sellers should be required to submit periodic reports to the CPUC. Information provided could include bid/award data and dispatch performance results. Details regarding reporting frequency, data elements to be reported, and report format could be developed in the stakeholder process.

11.5. Improvements to DRAM Pro Forma Contracts

This section recommends improvements in the DRAM standard contract pro forma language regarding contract reassignments, IOU audits, invoice deadlines, deadlines for data delivery, and CPUC DRP registration.

11.5.1. Contract Reassignments

In the criterion 1 section of this report about DRP viability, Section 5.2.4 addressed the issue of contract reassignments. Energy Division found that the reassignments during the DRAM pilot intensified market concentration, the number of DRAM Sellers completing their full contract terms declined between 2016 and 2017, and some DRPs that cancelled contracts declined to bid in future solicitations.[163]

Contract changes to address the above concerns are discussed below.

11.5.1.1. Partitioning Contracts

> **Recommendation**: Allow DRAM Seller at risk of defaulting on its contract to partition the contract for reassignment.

OhmConnect suggested this contract modification.[164] Partitioning and reassigning only part of the contract would allow a DRP at risk of default to retain a portion of the contracted capacity that it is capable of providing instead of defaulting or cancelling the entire contract, which may encourage that DRP to remain in the DRAM market. In addition, allowing partitioning would reduce the amount of capacity needing to be reassigned and could thus mitigate further market concentration.

11.5.1.2. Reassigning Contracts

> **Recommendation**: Develop an improved process for reassigning contracts.

[163] ED DRAM Evaluation Final Report, Section 5.2., Viability of New DRPs.
[164] OhmConnect Response to August 6, 2018 Ruling at 13.

Currently, the defaulting Seller and the IOU have discretion regarding which DRP is offered the contract and how the contract is reassigned.

Several parties expressed concerns about this discretionary process used by the IOUs to reassign contracts during the DRAM pilot regarding its potential to increase market concentration, its potential for unfair competitive advantage, and its lack of transparency.

CLECA believes that reassignments should be prohibited.[165] Cal Advocates supports prohibiting contract reassignment if they could lead to more market concentration.

Cal Advocates expressed the concern that reassignments result in bidding and price information discovery, which give the Seller approached for taking over the contract a competitive advantage in future solicitations.

To ensure a transparent and fair process, CPower, Enel X, and Cal Advocates suggest that the IOU offer the capacity to the next bidder in the bid stack.[166]

However, SCE and PG&E believe that offering bids to the next bidder in the stack could be too administratively burdensome and may not be possible within existing budgets.[167]

Staff agrees the reassignment process could be improved but is unable to endorse a particular solution at this time and suggests that a stakeholder working group explore alternatives. Based on the comments, the ideal reassignment process should be administratively simple to implement, be transparent and fair, prevent market concentration, and avoid conferring unfair competitive advantage.

11.5.2. Guidelines for IOU Audits

Recommendation: Clarify guidelines related to IOU audits of Demonstrated Capacity invoices to ensure a level playing field.

In D.16-09-056, the CPUC emphasized customer choice and competitive neutrality by encouraging "the use of fair competition between the utilities and third-party providers."[168] The provision permitting IOU audit of an invoice could be improved to better align with this goal.

[165] CLECA Response to August 6, 2018 Ruling at 9.
[166] CPower and Enel X Response to August 6, 2018 Ruling at 10; CLECA Response to August 6, 2018 Ruling at 9; and Cal Advocates Response to August 6, 2018 Ruling at 6.
[167] Joint IOU Reply to Responses to August 6, 2018 Ruling at 10.
[168] D.16-09-056 at 55-56.

Section 1.6(g) of the 2018 DRAM RFO Pro Forma contract regarding audits after receipt of Demonstrated Capacity invoices states:

> "Following Buyer's receipt of Seller's invoice and Notice of Demonstrated Capacity, Buyer may, upon Notice to Seller, require Seller to provide documentation from Seller or Seller's SC that establishes to Buyer's reasonable satisfaction the Demonstrated Capacity of each Product type from a PDR, RDRR or Joint Resource as stated by Seller in its invoice for the applicable Showing Month. In the event that Seller does not provide such documentation within ten (10) Business Days from Buyer's Notice or such documentation is not reasonably satisfactory to Buyer, then Buyer may require an audit of Seller or Seller's SC records upon Notice ("Audit Notice"). With respect to an Audit Notice, Seller shall cause its SC to allow Buyer or its designated independent third-party auditor to have access to the records and data necessary to conduct such audit within five (5) Business Days of Seller's receipt of an Audit Notice; provided, such audit will be limited solely to verification of the data upon which Seller based its claim of the amount of the Demonstrated Capacity…."

There are at least three ambiguities of concern in the above language that appear to leave the IOU with significant discretion that could potentially lead to an uneven playing field:

- Absence of clear guidelines on what conditions can trigger an audit ["Buyer's reasonable satisfaction"];
- Scope of "records and data necessary to conduct an audit"; and,
- Absence of a timeline for triggering or completing an audit.

The contract does not explain what constitutes "Buyer's reasonable satisfaction" and "records and data necessary." Each IOU could potentially apply different interpretations to these elements. Stakeholders should develop clear expectations for the invoices and supporting documentation.

In addition, the contract should be modified to include deadlines for starting (such as, within three months of invoice receipt) and completing an audit (such as, four months).

11.5.3. Invoice Deadline

Recommendation: Add deadline for Seller submission of Demonstrated Capacity invoices.

It is Energy Division's understanding that some DRPs submitted their June 2018 invoices in November 2018 and that IOUs still had not received June invoices from some DRPs as of mid-December 2018. Staff found this situation problematic in terms of the lack of visibility into delivery results on a timely basis.

Section 4.2(b) of the 2019 DRAM RFO Pro Forma contract regarding the invoice and payment process describes the deadline for IOU payment on invoices as:

> "Buyer will pay Seller all undisputed invoice amounts on or before the later of (i) the twentieth (20th) day of each month, or (ii) the tenth (10th) day after receipt of Seller's invoice and Demonstrated Capacity or, if such day is not a Business Day, then on the next Business Day."

The contract further specifies in Section 4.2(c) that, "Any amounts not paid by the due date will be deemed delinquent and will accrue interest at the Cash Interest Rate…"

However, the deadline for the Seller to submit invoices is not defined. Section 4.2(a) states:

> "As soon as practicable after the end of each Showing Month, Seller will render to Buyer an invoice for the payment obligations, if any, incurred hereunder with respect to such Showing Month."

This section of the contract should be modified to include a deadline for the Seller's submission of invoices. For example, the Seller could be required to submit invoices within 30 business days of receipt of Revenue Quality Meter Data (RQMD) from the IOU. Issues surrounding RQMD are discussed below.

11.5.4. Disputes & Payments

Recommendation: Clarify dispute resolution process and IOU's discretion to adjust invoices and withhold payment.

The pro forma contract describes three options for resolving a dispute between a DRP and an IOU: informal dispute resolution, mediation, and arbitration. It is not clear how the process for informal dispute resolution (the first option) is supposed to work and what timeline applies to it. This process should be clarified.

With respect to invoice adjustment and payments, two sections of the 2019 DRAM RFO Pro Forma contract apply:

- **Section 4.2(d) states:**
  "Buyer may offset against any future payments by any amount(s) that were previously overpaid."
- **Section 4.2(e) states:**
  "Either Party may, in good faith, dispute the correctness of any invoice, bill, charge, or any adjustment to an invoice, rendered under this Agreement, or adjust any invoice for any arithmetic or computational error within twelve (12) months of the date the invoice, bill, charge, or adjustment to an invoice, was rendered."

Under the above language, pending the resolution of a dispute, the IOUs appear to have wide discretion to unilaterally adjust Demonstrated Capacity invoices or withhold payments to offset claimed overpayments on past invoices (including invoices paid under a prior contract already completed). This discretion should be clarified with more specific guidelines and limitations.

11.5.6. CPUC Registration Requirements

Recommendation: Condition IOU payment of invoices upon the Seller meeting CPUC registration requirements.

The CPUC registration process under Rule 24/32 is relatively simple for DRPs serving non-residential customers (excluding small commercial customers).[169] For providers serving small commercial and residential customers, there are additional requirements[170] because the CPUC saw the need to further protect these customers.[171]

While Energy Division has successfully registered many DRPs, Staff is concerned about the lack of an automatic enforcement mechanism that would prevent an unregistered DRP from operating in the market and recommends that an additional mechanism be established. This can be achieved by requiring IOUs to confirm with Energy Division that the provider has met all registration requirements and that the registration is up to date. If this recommendation is adopted, the CPUC, not the IOU, would still retain the authority to enforce the registration requirements.

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[169] Rule 24/32, Section E.1. requires: (1) a DRP registration form, (2) an application fee of $100 via certified or commercial check, and (3) a signed IOU-DRP service agreements for each IOU territory in which the DRP intends to do business; *See also* CPUC DRP Registration webpage, available at: http://www.cpuc.ca.gov/General.aspx?id=8314.

[170] In addition to the requirements described *id.* (1) - (3), DRPs serving small commercial and residential customers must provide: (4) a performance or security bond; and (5) a customer notification form letter. Rule 24/32 Sections E.1.d. and C.7.

[171] D.12-11-025 at 26 and 55.

11.5.5. Revenue Quality Meter Data (RQMD)

> **Recommendation**: Develop a remedy in the DRAM RFO Pro Forma contracts for IOU failure to deliver timely, complete, and correct Revenue Quality Meter Data (RQMD).

Third-party DRPs have reported difficulties obtaining timely, complete, and correct RQMD from the IOUs. Further study may be needed to verify these reports and to understand the scope of the issue.

Under Rule 24/32, the IOU as the Meter Data Management Agent is responsible for:

- **Section F.2.a**: Reading meters and converting that interval data into RQMD;
    - **Section C.2.h**: Note that the third-party DRP's scheduling coordinator (SC) is responsible for converting the RQMD into Settlement Quality Meter Data (SQMD);
- **Section F.2.a**: Providing the third-party DRP with reasonable and timely access to meter data for the purposes of billing, settlement with the CAISO, scheduling, and forecasting, among other functions;
- **Section C.1.a(1)**: Ensuring that the RQMD meets the validated, edited, and estimated standards established in the Direct Access Standards for Metering and Meter Data; and,
- **Section D.1.d**: Providing RQMD on a monthly basis.

Rule 24/32 does not set a specific deadline for providing RQMD beyond "timely access" needed to facilitate the listed purposes: billing, CAISO settlement, scheduling, and forecasting. Historically, a DRP's SC has been required to submit SQMD 48 business days after the trade date (T+48B) in which resources were dispatched in the market.[172] Failure by the SC to submit SQMD by T+48B due to a delay by the IOU in providing RQMD to the DRP has multiple consequences for DRPs, the CPUC, and the IOUs, including:

1. **Impact on CPUC Processes**: CAISO zeroes out settlement data for that trade date for any recalculation settlement statement.[173] The zeros in the data make the

[172] CAISO Corporation Fifth Replacement FERC Electric Tariff (CAISO Tariff), Section 10.3.6.3. at 20-21, available at: http://www.caiso.com/Documents/Section10-Metering-asof-Nov1-2018.pdf; *See also* CAISO Business Practice Manual for Settlements & Billing, Version 20, Section 3.6.1.3. *Outputs to the Estimation Calculation* at 57, available at: https://bpmcm.caiso.com/BPM%20Document%20Library/Settlements%20and%20Billing/BPM%20for%20Settlements%20and%20Billing_v20.docx.

[173] CAISO Tariff, Section 10.3.6.3(c) at 21.

evaluation of market activity and performance difficult, especially when calculating customer baselines.

2. **Impact on DRP Processes**: DRP SCs face penalties of $1,000 - $3,000 per trade date, per SC ID, for failure to submit SQMD by T+48B.[174] Further, CAISO will not estimate SQMD for outstanding meter data for the T+55B recalculation settlement, which effectively prevents the DRP from seeking any energy payments. The DRP has one more opportunity to seek settlement with CAISO between the T+168B and T+172B for use in the recalculation settlement statement occurring at T+9 months.[175] However, submitting the data at T+168B would subject the DRP's SC to the penalties described above.
3. **Impact on IOU Processes**: Without RQMD from the IOU, DRPs cannot use market dispatches on Demonstrated Capacity invoices. If customers have AMI meters, the DRP may be able to make estimates using lower quality customer usage data. The DRP may also elect to use MOO bidding data or out-of-market tests. However, the likely preferred method for Demonstrated Capacity is through market dispatches, requiring RQMD.

Stakeholders in the development of Rule 24/32 contemplated these potential negative consequences for DRPs. As a result, Rule 24/32 allows DRPs to recover CAISO penalties from the IOU for the IOU's failure to deliver RQMD.[176] To recover any penalties, the DRP is required to use the CPUC dispute resolution process, which involves filing a formal complaint. The time and effort required to file a formal complaint may be prohibitive for many DRPs, particularly if CPUC's resources to process the complaints becomes limited. DRPs have reported issues with the delivery of timely, complete, and correct RQMD, but no complaints have been filed.

Energy Division recommends that stakeholders develop a remedy in the DRAM RFO Pro Forma contract for IOUs' failure to deliver RQMD, as suggested by some parties,[177] in addition to the CPUC dispute resolution process. Some ideas include:

[174] CAISO Tariff, Section 37.11.1. and 37.11.2. at 13-14, available at: http://www.caiso.com/Documents/Section37-Rules-Conduct-asof-Nov6-2018.pdf.
[175] CAISO Tariff, Section 10.3.6.4. at 21.
[176] Rule 24/32, Section F.2.d.
[177] Olivine Response to ALJ August 6, 2018 Ruling at 9-10, recommending imposing consequences for the IOUs for incomplete or incorrect provisioning of meter data; and OhmConnect Response to ALJ August 6, 2018 Ruling at 14.

- The IOU could be required to notify the DRP and/or CAISO if it expects delays in the delivery of RQMD;[178]
- The IOU could be required to pay an up-front fee that would compensate the DRP's SC for penalties incurred under CAISO Tariff 37. This would allow the DRP to seek settlement and payment from CAISO in the T+168B to T+172B recalculation settlement window.

11.6. Other Potential Improvements for Consideration

Parties' responses and replies to the August 6, 2018 Ruling included additional ideas that may warrant further examination. There may be an opportunity to pursue these ideas, and other suggestions noted below, in the DRAM stakeholder process beginning in January 2019. These ideas include:

1. Waive CPUC specific review and approval of DRAM contracts. The contracts would be effective as executed, but the IOUs would still be required to file of Advice Letters and Independent Evaluator reports.
2. Shift DRAM procurement focus from System RA to Local and Flexible capacity.
3. Limit DRAM procurement to PDR for the near term.
4. Pursue a collaborative process with CAISO and stakeholders to systematically address and resolve various issues noted in the report involving DRP interaction with CAISO markets and systems.

CPUC Review of DRAM Contracts

The CPUC should consider waiving specific review and approval of DRAM contracts. The contracts could be effective as executed, but the IOUs could still be required to file of informational Advice Letters and Independent Evaluator reports. The CPUC has the authority to issue a resolution on its own initiative if the need arises.

Waiving CPUC review would allow DRPs and IOUs more certainty and time to prepare for the October 1 Supply Plan filing for the RA program.[179] Requiring CPUC review was appropriate for the pilot program as a new procurement mechanism was being tested. However, with the experience gained in the multiple auctions, additional review of every future contract may not be needed.

[178] This recommendation is similar to the IOU notification required by Ordering Paragraph 19 of Resolution E-4868 at 102, when the IOU expects data delivery after an authorization to exceed two business days.

[179] *See for example* Joint IOU Reply to Responses to ALJ Hymes August 6, 2018 Ruling at 11, describing the concerns with the timeline of the DRAM RFO and the importance of the year-ahead RA showing.

System RA Versus Local and Flexible RA

The CPUC should consider shifting DRAM procurement focus from System RA to Local and Flexible capacity. The shift likely makes sense given signals from other CPUC procurement mechanisms, such as the recent Integrated Resource Plan modeling results.

PDR Versus RDRR Procurement for DRAM

The CPUC should consider limiting DRAM procurement to PDR for the near term. SCE and PG&E recommended requiring DRAM Sellers to submit Day-Ahead Market (DAM) economic bids in the CAISO market once a trigger is met; otherwise, DRAM Sellers should only be able to provide PDR in the CAISO market.[180] IOU RDRR undergo load impact reporting and cost-effectiveness analysis prior to the approval of the IOU portfolio. The IOU tariffs for RDRR dictate specific triggers that require bidding into the marketplace. Further, the IOU tariffs allow IOUs to dispatch RDRR when needed for distribution constraints or other IOU reliability needs. Absent similar triggers, load impact reporting, cost effectiveness analyses, or IOU dispatch rights, the CPUC could consider whether procurement of RDRR in DRAM should be deferred to some future date.

CAISO-Related Collaborative Process

This report noted a variety of issues involving DRP interactions with CAISO markets and systems. These issues include confusion around CAISO's compensation adjustments in the settlement process, data problems, settlement errors, system integration challenges, and RTM bidding. The resolution of these issues may also be an important factor in ensuring the success and growth of the DRAM program.

Staff suggests that a collaborative process with CAISO and stakeholders be pursued with CPUC support to systematically address and resolve these issues

11.7. Summary of Staff Recommendations

All Staff recommendations discussed in this section are summarized here for reference:

1. **DRAM Program Next Steps**:
   Adopt a revised DRAM based on the evaluation results, with critical and necessary changes incorporated in the revised design.
2. **DRAM Program and Oversight**:

[180] Joint IOU Response to ALJ Hymes August 6, 2018 Ruling at 13.

Authorize a 5 – 6 years DRAM extension, predicated on implementing the identified critical and necessary improvements in program design.

Create a process that allows for ongoing monitoring and additional improvements to the DRAM program design.

3. Improvements to the Solicitation Process

3.1. Market Share

Consider setting a limit on the allowed market share of any one provider within a single IOU territory.

3.2. Residential Set-Aside

Maintain a reduced residential set-aside that is limited to new market participants to encourage market diversity.

3.3. Market Dispatch

Allow a voluntary offer bid parameter indicating the minimum market dispatch activity level that the DRP is willing to commit to for the resource capacity it offers to a DRAM auction.

3.4. Bid Fees

Require bidders to deposit up-front bid fees to discourage bidders from declining offers after being shortlisted.

3.5. Price Cap "Screens"

3.5.1. Simple Average August Bid Price Cap

Eliminate the simple average August bid price cap to improve offer valuation.

3.5.2. Long-Run Avoided Cost Price Cap

Replace the price cap based on Long-Run Avoided Cost (LRAC) with an NMV cap based on an adjusted or "net" LRAC.

3.6. Qualitative Criteria

Include qualitative criteria promoting past performance, bidder viability, and market diversity. Remove criteria penalizing bidders for *suspected* violations without a transparent review process.

3.7. Information Disclosure

Require IOUs to publish summaries of awarded DRAM contracts and clearly report DRAM administrative costs.

4. Improvements for Performance and Accountability

4.1. Implementation Progress Milestones

Require implementation progress milestones from contract execution to year-ahead RA showing.

4.2. Qualifying Capacity in Supply Plans

Establish *ex-ante* standards for estimating the Qualifying Capacity of a DRAM resource applicable to Supply Plans

4.3. Dispatch Hours

Require DRAM resources to be dispatched at least 30 hours between May through October, during the hours most beneficial to the grid.

4.4. Demonstrated Capacity Invoicing

4.4.1. Dispatch Results on Invoices

Require Demonstrated Capacity to be invoiced based on dispatch results when available.

4.4.2. Must-Offer Obligation Based Invoices

Cap the demonstrated capacity on MOO-based invoices to an averaging function of available test/dispatch results.

4.5. Penalties and Incentives for Performance

4.5.1. Penalties

Shortfall in Qualifying Capacity: Establish penalties for non-performance when the Qualifying Capacity indicated on Supply Plans falls significantly below contracted capacity.

Shortfall in Demonstrated Capacity: Establish penalties for non-performance when the Demonstrated Capacity falls significantly below the Qualifying Capacity for the delivery month.

4.5.2. Incentives

Establish an incentive to encourage dispatch performance exceeding the Qualifying Capacity.

4.6. Performance Reports

Require DRPs to submit market performance data to the CPUC on a periodic basis.

5. Improvements to DRAM Pro Forma Contracts

5.1. Contract Reassignments

5.1.1. Partitioning Contracts

Allow DRAM Seller at risk of defaulting on its contract to partition the contract for reassignment.

5.1.2. Reassigning Contracts

Develop an improved process for reassigning contracts.

5.2. Guidelines for IOU Audits

Clarify guidelines related to IOU audits of Demonstrated Capacity invoices to ensure a level playing field.

5.3. Invoice Deadline

Add deadline for Seller submission of Demonstrated Capacity invoices.

5.4. Disputes & Payments

Clarify dispute resolution process and IOU's discretion to adjust invoices and withhold payment.

5.5. Revenue Quality Meter Data (RQMD)

Develop a remedy in the DRAM RFO Pro Forma contracts for IOU failure to deliver timely, complete, and correct Revenue Quality Meter Data (RQMD).

5.6. CPUC Registration Requirements

Condition IOU payment of invoices upon the Seller meeting CPUC registration requirements.

Appendix A: DRAM Criteria and Metrics

Criteria & Metrics		Assess by or Compare to:	Data Source	Bid or Customer Confidentiality Issues?
1. Were new, viable, third-party providers engaged?				
1.1	Number of participating third-party providers bidding into and winning bids; Number of DRPs registered with CPUC; Number of DRPs registered with CAISO	- Aggregators, DRPs, SCs; - New 3Ps; those previously operating in California[181]; DRPs that created products providing new customer experience; - DRAM I – III	IOUs / CAISO / IE report	N
1.2	Quantity (MW) and percentage of accepted bids compared to all bids	- New 3P, returning[182]; - MW, number, budget; - DRAM I – III	IOUs	N
What were the challenges to third-party engagement- general?				
1.3	Third-party perceptions of: 1) ease of participation; 2) fairness / transparency of bid selection process; 3) primary barriers to participation; 4) primary source of transaction costs; 5) market confidence; 6) understanding of CAISO products, performance requirements, and markets[183]	- Compare perceptions of winning and non-winning bidders; - DRAM I – III; - Changes over time	ED survey and/or interviews with aggregators, SCs, DRPs[184]; ED survey and/or interviews with DRPs who are a party to R.13-09-011 but that did not participate in DRAM (optional)	N
What were the challenges to third-party engagement- in the IOU auction process? (Were there barriers to participation?)				

[181] Will assess 3Ps previously participating in IOU DR programs such a Capacity Bidding, BIP, AMP, and AC cycling, as well as those operating in California but not with IOU programs.

[182] "New / returning" here may include: DRPs new to California and/or new to participating in DRAM for that year; and, returning to DRAM (Pilot II – III) and/or California.

[183] Suggested by OhmConnect and EDF.

[184] This is a qualitative metric. If interviewees wish to provide quantitative data in response to survey and/or interview questions, staffs will present this idea for discussion with parties prior to proceeding.

1.4	Number of potential third-party providers contacted by IOUs	- Aggregators; - DRAM I - III	- IOUs[185]	N
1.5	Number of potential third-party providers attending DRAM bidding conference(s)	- Aggregators, DRPs, SCs; - DRAM I - III	- IOUs	N
1.6	Number of questions at bidding conference by potential third-party providers, the topics, and average IOU response times	(optional, time permitting)	- IOUs	N
1.7	Number / percentage of potential third-party providers bidding into DRAM compared to attendees at conference	- (optional, time permitting) - New or returning aggregators	- IOUs	N
1.8	Number / percent of DRAM bidders with conformance check issues	- New or returning bidders	- IOUs	N
1.9	Number / percent of winning bidders unwilling to sign contracts and reasons[186]		- Interviews with bidders	Y
What were the challenges to third-party engagement – in the customer enrollment process? (Were there barriers to signing up customers?)				
1.10	Number and percent of DRPs or aggregators experiencing integration challenges with utility processes to enroll customers. Type of challenge and status (e.g., did the challenge get resolved over time?)	To include exploration of barriers due to lack of availability of needed customer data due to Green Button, MyConnect, and/or other issues	- Quantitative data when available; - ED interviews with aggregators, SCs, DRPs, IOUs	N
1.11	DRP, SC, and/or aggregator perceptions of differences between DRAM and IOU DR programs that could limit customer participation		- ED interviews with aggregators, SCs, DRPs, IOUs	N
What were the challenges to third party participation the CAISO bidding process (Were there barriers to making bids?)				
1.12	Number and percent of DRPs or SCs experiencing supply-side integration challenges with CAISO processes. Type of challenge and status (e.g., did the challenge get resolved over time?)		- Interviews with SCs, DRPs, aggregators; - Quantitative data when available	N
2. Were new customers engaged?				

[185] Still assessing viability of collecting data on this point.
[186] Suggested by a party.

2.1	Number and percentage of new customers; Number and percentage of customers in a new program[187]; Number and percentage of customers shifted from IOU DR programs to DRAM; Quantity (MW) and percentage capacity provided by shifted and new DRP customers	- As indicated by registrations; - By customer class[188]; - DRP; - PDR / RDRR; - By type of RA: System / Flexible / Local capacity; - Type of resource – DR / storage / EV; - By August; annual[189]	Sellers to provide customer service account information; IOUs to indicate if customers are new or have shifted from IOU DR programs; DRPs	N
2.2	Customer perception of differences between direct participation and IOU DR programs that could limit customer participation	See D.16-09-056, p. 67	ED review of DRP and IOU surveys; or, ED surveys or interviews (optional, time permitting)	N
2.3	Location of DRAM customers (number and percent)	- By county; - By sub-LAP; - By Local Capacity Area; - By LSE; - In disadvantaged communities?[190]	IOUs/ 3Ps: Geo-map or list by county of location of registrations	N

[187] A new program may include a third-party program that offers a significantly different customer experience. ED will explore this by asking DRPs to indicate how their DRAM program differs from other programs it may offer and from the IOU's DR programs.

[188] "By customer class," generally refers to res / non-res customers broadly speaking. The study will refer to specific customer classes as feasible and useful.

[189] These categories will be used for several metrics.

[190] For disadvantaged communities, the study will follow the definition directed in SB350 and SB535, both of which require the California Environmental Protection Agency (CalEPA) to identify disadvantaged communities. To accomplish this, CalEPA has developed the California Communities Environmental Health Screening Tool (CalEnviroScreen), which identifies areas by census tract scored at or above the 75th percentile using a methodology that ranks communities burdened by environmental and socioeconomic issues. See http://www.calepa.ca.gov/EnvJustice/GHGInvest/ or http://www.energy.ca.gov/commission/diversity/definition.html for information. The study may also consider the definition adopted in AB 2672 (Perea). AB2672 created PUC Section 783.5 Purpose - increase affordable access to energy for specifically-defined disadvantaged communities in the San Joaquin Valley. A disadvantaged community must be located in one of the eight counties of Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare, and meet specific criteria:

- At least 25% of residential households with electrical service are enrolled in CARE program;
- Has a population greater than 100 persons within its geographic boundaries;
- Has geographic boundaries no farther than seven miles from the nearest natural gas pipeline.

2.4	Number and percent of DRPs with agreements that place financial risks on residential customers[191]		Interview / survey questions with DRPs	
2.5	Total and percentage of participating customers on CARE, ESA, in multifamily dwellings and/or in top 5% of electricity consumers (both residential and non-residential)	(optional, time permitting)	IOUs	N
2.6	Number / percent of registrations requested in non-winning bids [due to: 1) budget; 2) registration; or 3) "outlier" limitations]		IOUs	Y
2.A. High level characterization of new customers **[Optional, time permitting]**				
2.A.1	Percent of customers with automated response capabilities[192]		IOUs / sellers	N
2.A.2	Number and percent of DRAM customers on NEM, participating via storage-tied response systems, with onsite PV, or having used a utility EE incentive		Sellers / ED survey of participating customers with storage, if available	N
2.A.3	High, low and average participating non-res and res customer loads for August and peak days		DRPs / IOUs	N
3. Were bid (auction, capacity) prices competitive?				
3.1	High, low, and ranges of DRAM August capacity bid prices; High, low, and ranges of short-listed DRAM August capacity bid prices[193]; High, low, and ranges of non-short-listed bid August capacity prices	- PDR / RDRR; - By system, flexible, and local capacity; - by res / non-res products; - DRP; - New /returning 3P; - for August / by month / by year	IOUs / IE reports	Y

[191] If a DRP answers "yes," to the question, "does your customer contract place any financial risk on the customer?" Staff will obtain a copy of the DRP customer agreement to assess the nature of the financial risk.
[192] Suggested by the Joint DR Parties.
[193] We will apply a weighted approach to this question as applicable.

3.2	High, low, and ranges of short-listed DRAM August capacity prices[194]; High, low, and ranges of non-short-listed bid August capacity prices	As compared to the following benchmarks- (data from IOUs) - DR from IOU programs (all in costs); - Indicative short-run capacity costs; - Long-run avoided capacity (generation) cost; - Cost caps adopted in D.16-09-056 for possible DRAM program; - All RA[195]; - Supply-side DR bid / short listed in other RFOs (All Source, Preferred; Local Capacity)		Y
3.3	Correlation, if any, between bid price (range) and performance at CAISO	See above	IOUs / CAISO	Y
3.4	High, low and average scheduling coordinator costs per product	By res / non-res products	DRPs[196]	Y
4. Were bid offer prices competitive in the wholesale market? (Defined as wholesale energy bid prices in CAISO markets)				
4.1	Quantity (MW) and percent of DRAM PDR / RDRR resources bid into CAISO and quantity and percent scheduled[197]; As compared to quantity (MW) and percent of IOU PDR / RDRR resources bid into CAISO and quantity and percent scheduled		CAISO / DRPs	N
4.2	Quantity (MW) and percent of DR resources bid into CAISO at (or just above) the monthly NBT threshold[198]; Quantity (MW) and percent of DR resources bid into CAISO at the bid cap	For what hours? During these hours, what quantity of DR resources were scheduled?	CAISO / DRPs	Y

[194] We will apply a weighted approach to this question as applicable.
[195] Comparison will be applied, time permitting, attempting to match products (system, local), contract term, delivery months, and other parameters.
[196] Staff will coordinate with scheduling coordinators (SCs) for data collection as much as feasible.
[197] We will apply a weighted approach to this question as applicable.
[198] We will apply a weighted approach to this question as applicable.

	Frequency of triggering of Default Load Adjustment (DLA), and associated impact on LSE settlements[199]			
4.3	Total hours of dispatch and number of events per month of DRAM resources; Total MWh and average MW per event scheduled each month; Time of day of schedules (RA vs. Non-RA hours)	As compared to IOU supply-side DR resources	CAISO / IOUs	N
4.4	High, low, and range of August DR bid prices not dispatched as compared to high, low and range of price of dispatched resources[200]		CAISO / DRPs	Y
5. Did demand response providers aggregate the capacity they contracted, or replace it with demand response from another source in a timely manner? (Did DRPs meet their contractual obligations?)				
5.1	Quantity (MW) and percent of DRAM resources in August – September 60-day Supply Plans[201] as compared to contracted amounts[202]; Frequency of delayed provision of 60-day Supply Plans; *Apply metric only to sellers that did not re-assign or terminate contracts or invoke contract section 1.5(b)*	- By res / non-res products; - In aggregate across contract term; August; - By aggregator; - By new / returning third-party providers; - By PDR or RDRR resource; - By type of RA: System / Flexible / Local capacity; - DRAM I & II only	- IOUs / DRPs - Apply qualitative information from criterion 1 as explanatory "color" as appropriate	Y

[199] The DLA is triggered when a Real-Time Market price for the awarded hours are below the Net Benefits Test (NBT) threshold. A resource can be bid and awarded at a price above the NBT in the Day-Ahead Market (DAM) and still trigger the DLA based on the realized Real-Time Market prices.
[200] We will apply a weighted approach to this question as applicable.
[201] Also called "Market Notice to Buyer," as per the DRAM standard contract.
[202] DRAM DRP performance on this metric will not be compared to IOU DR programs because these are currently assigned Qualifying Capacity (QC) through Load Impact Protocols (LIPs) and the RA rulemaking. Once the QC is assigned, the resource is fully counted and reduces the RA requirements upfront, without the IOUs being required to show the resource in their Supply Plan.

5.2	Total and percentage of bidders found to have engaged in non-competitive behavior		ED staff / IE reports	Y
5.3	Number, percentage, and value of contracts terminated and reasons; Number, percentage, and value of contracts that could have been terminated under the terms of the contract, but were not; Value of any assessed fees on 3Ps		- ED interviews with DRPs, IOUs; - Quantitative data when available	Y
5.4	Number and percentage of capacity payments withheld, reasons, and MW/value affected		- IOUs / DRPs; - ED interviews	Y
5.5	Number, percentage, and value of contract reassignments and qualitative assessment of reason(s)			Y
5.6	Number and percent of contracts for which seller provided capacity from non-residential meters, when contracted for residential; MW impacted; Number / percent of non-residential contracts that include residential customers		- DRPs / SCs (IOUs)	Y
5.7	Quantity (MW) and percentage of DR resources using each of the three contractually-approved methods of receiving capacity payments[203]		- DRPs	Y
5.8	Quantity and percent of contracted capacity for which CAISO registrations occurred after SCs' Supply Plans provided to CAISO (at 45 days+)		- CAISO / DRPs	N
6. Were resources reliable when dispatched, i.e. did customers perform appropriately?				

[203] See Exhibit C1- Notice of Demonstrated Capacity in the pro forma contracts: The three are: (1) Capacity Test- Maximum hourly load reduction during capacity test conducted by seller's SC during Showing Month; (2) Must-Offer Obligation (MOO)- Average capacity amount seller bid into CAISO during Showing Month; (3) Dispatch Results- Maximum hourly load reduction resulting from Dispatch during Showing Month. See also Section 3.3(b) of the 2016 pro forma contract, and D.14-06-050, Appendix B.

6.1	Number and percent of sellers meeting / not meeting their MOO obligation of bidding into CAISO market[204]; Number and percent of sellers meeting / not meeting their MOO obligation of responding when dispatched in the CAISO market[205]; Number and percent of sellers that failed to test and/or dispatch resources in CAISO markets in compliance with agreements; Amount (MW) and percent difference between contracted capacity and the MOO and/or test or dispatch quantities in CAISO markets	- Compare to IOU supply-side DR resource performance as feasible	- CAISO / DRPs / SCs (IOUs); - Qualitative assessment of reasons for any differences	N
6.2	How often and how much energy DRAM PDR / RDRR resources over-delivered (positive UIE quantity) or under-delivered (negative UIE quantity) when dispatched[206]; Compare to IOU PDR / RDRR resources	- RDRR / PDR resources; - DRAM and IOU DR; - Annually, peak days, August	CAISO	Y
6.3	Load impacts of DRAM resources during CAISO dispatch events (optional)[207]	- RDRR / PDR resources; - DRAM and IOU DR; - Annually, peak days, August; - Within locally constrained areas?	CAISO; DRPs	N

[204] We will apply a weighted approach to this question as applicable.
[205] Meeting CAISO's Must-Offer Obligation (MOO) is a RA resource requirement.
[206] UIE is Uninstructed Imbalance Energy. We will apply a weighted approach to this question as applicable.
[207] As of the study launch (April 2017), CAISO was assessing settlement data for accuracy of baseline and other information. In addition, DRAM was not subject to Load Impact Protocols (LIPs) during the DRAM I – II pilot. Therefore, Staff will continue to assess the viability of various analytical approaches to assess this metric and will undertake it only if a useful approach is identified that will add significant analytical value to the study.

6.4	Response time and quantity (MW) of response to dispatch[208]	- RDRR / PDR resources; - DRAM and IOU DR; - Annually, peak days, August	CAISO	Y

[208] Currently the subject of a joint CPUC – CAISO staff study as part of the Fast DR discussion. If more study is needed, Staff will assess what is the preferred data source for this: response time as registered with the CAISO in the Resources Data Template (RDT), or response time as measured during dispatched and/or tests.

Appendix B: Acronym/Abbreviation Glossary

Acronym	Full Title
3P	Third Party
AAH	Availability Assessment Hours
AB	Assembly Bill
ADS	Automated Dispatch System
AL	Advice Letter (CPUC)
ALJ	Administrative Law Judge (CPUC)
AMI	Advanced Metering Infrastructure
AMP	Aggregator Managed Portfolio
AMS	Advanced Microgrid Solutions
API	Application Programming Interface
BIP	Base Interruptible Program
BPM	Business Practice Manual (CAISO)
BTM	Behind-the-meter (storage)
BUG	Back-Up Generator
CAISO	California Independent System Operator
Cal Advocates	Public Advocates Office (CPUC)
CalEnviroScreen	California Communities Environmental Health Screening Tool
CalEPA	California Environmental Protection Agency
CARE	California Alternate Rates for Energy Program
CBP	Capacity Bidding Program
CCA	Community Choice Aggregator
CCGT	Combined-Cycle Gas Turbine
CES	Customized Energy Solutions
CESA	California Energy Storage Alliance
CIDI	Customer Inquiry, Dispute & Information (CAISO)
CISR	Customer Information Standardized Request form
CLECA	California Large Energy Consumers Association
CPUC	California Public Utilities Commission
D	Decision (CPUC)
DA	Day Ahead (CAISO)
DACs	Disadvantaged Communities
DAM	Day-Ahead Market (CAISO)
DLA	Default Load Adjustment
DR	Demand Response
DRAM	Demand Response Auction Mechanism
DRP	Demand Response Provider
DRRS	Demand Response Registration System (CAISO)
DRS	Demand Response System (CAISO)
E3	Energy and Environmental Economics, Inc.
ED	Energy Division (CPUC)
EDF	Environmental Defense Fund
EE	Energy Efficiency
ERCOT	Electric Reliability Council of Texas
ESA	Energy Savings Assistance Program
ESDER	Energy Storage and Distributed Energy Resources
EV	Electric Vehicle

Fast DR	Fast Demand Response
FERC	Federal Energy Regulatory Commission
Flex	Flexible Resource Adequacy
GCN	Green Charge Networks, LLC
IE	Independent Evaluator
IFOM	In-front-of-the-meter (storage)
IOU	Investor-Owned Utility
IRP	Integrated Resource Planning
ISO	Independent System Operator
Joint DR Parties	Joint Demand Response Parties
kW	Kilowatt
kWh	Kilowatt hour
LAP	Load Aggregation Point
LBNL	Lawrence Berkeley National Laboratory
LCA	Local Capacity Area
LCR	Local Capacity Requirement
LIP	Load Impact Protocol(s)
LMP	Locational Marginal Price (CAISO)
LPA	Load Point Adjustment
LRAC	Long-Run Avoided Cost (of Generation)
LSE	Load-Serving Entity
Local RA	Local Resource Adequacy
MF	Multi-Family
MGO	Meter Generator Output model (CAISO)
MOO	Must-Offer Obligation (CAISO)
MW	Megawatt
MWh	Megawatt hour
NBT	Net Benefits Test
NEM	Net Energy Metering
Net CONE	Net Cost of New Entry
NGR	Non-Generator Resource
NMV	Net Market Value
NQC	Net Qualifying Capacity
Non-Res	Non-Residential
OP	Ordering Paragraph (CPUC)
ORA	Office of Ratepayer Advocates (CPUC); renamed as Public Advocates Office
PD	Proposed Decision (CPUC)
PDR	Proxy Demand Resource
PG&E	Pacific Gas & Electric Company
PJM	Pennsylvania–New Jersey–Maryland Interconnection
PRG	Procurement Review Group
PV	Photovoltaic
QC	Qualifying Capacity
RA	Resource Adequacy
RAAIM	Resource Adequacy Availability Incentive Mechanism
R	Resolution (CPUC)
Research Plan	Research Plan for the Demand Response Auction Mechanism (DRAM) I, II, & III Pilots (2015–2017) [CPUC]
ROC	Rules of Conduct (CAISO)
RDRR	Reliability Demand Response Resource

RDT	Resources Data Template
Res	Residential
RFO	Request for Offers
RQMD	Revenue Quality Meter Data
RT	Real Time (CAISO)
RTM	Real-Time Market (CAISO)
RUC	Residual Unit Commitment (CAISO)
SAID	Service Agreement Identification
SB	Senate Bill
SC	Scheduling Coordinator
SCE	Southern California Edison
SDG&E	San Diego Gas & Electric Company
SDP	Summer Discount Plan (SCE)
SGIP	Self-Generation Incentive Program
SQMD	Settlement Quality Meter Data
SSWG	Supply-Side Working Group (CPUC)
System RA	System Resource Adequacy
TDSP	Transmission/Distribution Service Providers
TOU	Time-of-Use rate
TURN	The Utility Reform Network
UIE	Uninstructed Imbalance Energy (CAISO)
WG	Working Group

Appendix C: Partial History of DRAM Policy Rules

Following the 2008 Federal Energy Regulatory Commission (FERC) requirement that demand response be allowed to bid into the CAISO market, the CPUC began to collaborate with CAISO to broaden opportunities for DR in California. The below table outlines this history.

Purpose	Details	Document Number	Date
Settlement Agreement on Reliability Cap	-CAISO agreed to create a RDRR product compatible with IOU DR programs -Set reliability product cap of 2% of the recorded all-time coincident CAISO peak, starting 2014 -Authorized annual test event -Authorized RDRR dispatch, via Automated Dispatch System (ADS) to SC, upon a CAISO "warning" stage, not changeable until 2015	D.10-06-034	June 24, 2010
Established Rule 24 and 32	-Established policies to facilitate third-party direct participation of DR in CAISO	D.12-11-025	Nov. 12, 2012
Bi-furcation of supply-side and load-modifying DR	-Launched operational bifurcation in 2017 -Defined load-modifying and supply-side resources	D.14-03-026	April 4, 2014
Authorized DRAM 2016 and 2017 pilots	-Directed pay-as-bid auction -Set 22 MW procurement target, for system RA only -Ordered WG to develop set-aside proposal based on location, customer class, attribute, or end use	D.14-12-024	Dec. 4, 2014
IOU requirements to facilitate DRPs' ability to bid PDRs	-Directed "Initial Implementation Step," of 3P DR direct participation -Customer targets were: PG&E–10,000; SDG&E–7,000; SCE–14,000 -Authorized $7.4 million budget total	D.15-03-042	March 27, 2015
Initial requirements (for 2016) to comply with RA rules	-Waived RA penalties on DRAM pilot -Required IOUs to allow NEM customers to participate in DRAM -Directed DRAM II starting in January 2017 -Approved expansion from system RA to local and flexible RA products -Exempted DRAM 2016 from using Load Impact Protocols (LIPs) adopted in D.14-06-050	D.15-06-063 (R.14-10-010, RA)	June 30, 2015
Approval of DRAM I implementation proposal	-Deliveries to start in June 2016 -Back-Up Generators (BUGs) excluded via attestations -Approved waiver from RA penalties for pilot period -Approved second year of DRAM pilot, requiring focus on local and flexible capacity, including RDRR products -Encouraged procurement beyond 22 MW minimum, up to Rule 24/32 limits or budget cap -Required IOUs to include in Advice Letters (ALs): short run capacity costs; long-run avoided capacity costs; benchmark calculations; all bids received -Approved 20% residential set-aside (capacity); must be comprised of 90% residential accounts, with rest from small commercial -Required IOUs to notify ED of outliers -Required scoring matrix with "all criteria that will be used in scoring DRAM bids" to be included in bid documents	Resolutions E-4728 and E-4737	July 23, 2015 August 2015

Approved DRAM II implementation proposal	-Continued BUGs ban -Allowed use of contract capacity to establish "Qualifying Capacity" for RA purposes, as per D.14-06-050 -Exempted use of LIPs for DRAM resources for which historical data is not available -Authorized $13.5 million budget and retains 22 MW procurement floor -Encouraged IOUs to procure up to budget limits or available Rule 24/32 registrations, whichever comes first -Allowed seller exemption from contract obligations if buyer has not yet enabled real time or ancillary services functionalities -Carried over directions from DRAM 2016, unless indicated	Resolution E-4754	Jan. 28, 2016
Directed DRAM III parameters	-Authorized WG (which proposed 2-year contracts) -Authorized $27 million budget -Directed IOUs to ensure "bids fit portfolio needs and offer best value to ratepayers"	D.16-06-029	June 9, 2016
Approved SDG&E and PG&E DRAM II initial procurement; ordered these IOUs to procure more capacity	-Ordered SDG&E/PG&E to procure up to their budget caps or to a price outlier -Required ED to approve designation of bid as "outlier"	Resolutions E-4802 and E-4803; SCE-Disposition letter	Sept. 29, 2016
Authorized intermediate implementation step for Rule 24/32 customer registrations	-Authorized "click through" electronic signature process for verifying customer identity and authorization to release data	D.16-06-008	June 9, 2016
Directed DRAM I–III Evaluation Study parameters	-Adopted six criteria for DRAM evaluation -Directed Resolution, workshop, and AL process based on Evaluation -Adopted eight parameters for possible permanent DRAM -Stated IOUs will continue to administer auctions and cannot bid into DRAM -Indicated DRAM as primary mechanism for DR RA from 3Ps	D.16-09-056	Sept. 29, 2016
Approval with modifications of IOUs' DRAM III implementation proposal	-Adopted IOUs' DRAM pilot, with auction in 2017 for deliveries in 2018–2019 -Permitted Flexible Capacity Category 1 product offers -Required differentiation between PDR and RDRR -Required bidding scheduling coordinator costs as part of product capacity costs -Permitted sellers to offer deliveries of up to two years -Approved $27M non-binding cost estimate	Resolution E-4817	Jan. 19, 2017
Directed DRAM IV parameters	-Directed additional DRAM auction in 2018 for deliveries in 2019 -Instructed IOUs to use final approved 2017 DRAM guidelines (except with contract terms limited to a single year of delivery) -Authorized $13.5 million budget -Sought to test relative viability of the procurement guidelines for a permanent DRAM adopted in D.16-09-056 -Required offering contracts to all complying bids up to simple average August capacity bidding price or budget cap, whichever comes first -Directed IOUs to appropriately prioritize bids for local RA	D.17-10-017	Oct. 26, 2017

Appendix D: Energy Division Guidance on DRAM IV

State of California

Memorandum

Date: January 5, 2018

To: IOU Demand Response Auction Mechanism (DRAM) Managers and Staff

From: Edward Randolph

Ed Randolph, Energy Division Director, Public Utilities Commission—San Francisco -

Subject: Demand Response Auction Mechanism (DRAM) 2018 Auction for delivery in 2019

Commission staff has worked since the adoption of Decision (D.) 17-10-017 to consult with IOU Demand Response Auction Mechanism (DRAM) staff and provide verbal guidance on the DRAM 2018 selection criteria as required by that decision. D.17-10-017 at Ordering Paragraph 10 requires the IOUs to work with Energy Division to use capacity values in bid selection criteria that appropriately prioritize bids for local resource adequacy. The decision further directs the IOUs to "consult with Energy Division staff on any questions that arise in the course of applying these bid selection criteria" (page 54). This memo documents Energy Division's additional guidance in this area (See Appendix A for a full summary of decision text).

The IOUs should follow this guidance:

1. **Jointly Apply Requirement to Offer Contracts to all Complying Bids up to the Simple Average August Capacity Bidding Price to All Products (System RA, Local RA, Flexible RA**).

   Undertaking this would be accomplished in the following way:

- Calculate the average August price separately for Local RA ("AvL"), System RA ("AvS"), and Flexible RA ("AvF"), following the method outlined in D.16-09-056.[209]

- Develop net market value (NMV) rankings using the method further described in #3 below;

- Go down through NMV ranking list and determine if each bid is for local, system and/or flexible RA;

- Apply the appropriate average price (AvL, AvS, AvF) to determine whether the bid will be accepted:

    - IF Local RA bid, THEN check if August bid price <= AvL
    - IF System RA bid, THEN check if August bid price <= AvS
    - IF Flexible RA bid, THEN check if August bid price <= AvF;

- Keep going through the NMV ranking until no more bids satisfy all of the following criteria:
    - Not above long term avoided cost of generation in the most recent avoided cost calculator update, pursuant to D.16-06-007[210]
    - Below total budget authorization for each IOU.

2. **Limit Gaming by Employing the Method adopted in D.16-09-056.** "The Utilities shall not award contracts to bids in which non-August capacity prices are outliers, e.g., a bid is below average in August but exceptionally high in March. The Utilities shall make such exceptions in consultation with its Procurement Review Group and the Energy Division."[211]

3. **Ensure that the Net Market Valuation (NMV) Reflects Different Values for System, Local and Flexible Capacity**. If the IOU values system and local RA differently, this will be reflected in the NMV valuation, which is derived by determining net benefits and subtracting net costs. Commission staff request that the IOUs <u>not</u> use valuation criteria that are the same for system and local RA, such as "Net CONE" (Net Cost of New Entry) prices.

4. Appropriately Value Local RA:

[209] (1) Exclude the top ten percent of August bids offered [in each category: system, local and flexible]; then, (2) total all remaining August bid prices, and (3) divide by the number of bids in (2).
[210] D.16-09-056 at p. 74.
[211] D.16-09-056 at p. 74.

a. **Ensure that Local RA Values are Determined Using a Multi-year Approach.** Identifying and enrolling customers in DRAM takes time, and Commission staff urge the IOUs to take the "long view" so that resource constraints materializing in 2020 or 2022 may be addressed through DR. To accomplish this, Commission staff urge the IOUs to review and update the local RA values they employ in their NMV equations to take full account of:

   i. Where and when Once-Through-Cooling plants are retiring

   ii. CPUC authorized new generation that may not materialize.

   iii. Where there may be embedded assumptions about DR that are not being met.

   iv. The California Independent System Operator's (CAISO) *2022 Long Term Capacity Technical Report*, out to 2022.

b. **Value DR in Constrained Sub-Areas.** The CAISO's *2022 Long Term Capacity Technical Report* projected that several sub-areas would be deficient in resources by 2018, including the Sierra and Stockton sub-areas in PG&E territory. By 2022, the same report predicts constraints in the Greater Bay. We encourage PG&E to test methods to value DR bids in these sub-areas more highly than bids outside the sub-areas but still in the same local area.

c. **Consider Valuing Local RA with a 20 Minute Response Time Higher than Local or System RA without this Capability**. Resolution E-4754 rejected requiring a 20-minute response time in the DRAM pro forma contracts, but Commission staff assert that the IOUs are permitted, if they wish, to consider resource response times in their DRAM 2018 selection criteria, consistent with D.17-10-017. If they wish, the IOUs could value local RA bids able to meet a 20-minute response time higher than other local bids or system RA bids. <u>However, all bids designating themselves as "local" should be counted as such by each IOU</u>, to reflect the CAISO's approach, agreed on in discussions with the CPUC and IOU Resource Adequacy teams, to recognize all local resources in 2018, regardless of their ability to meet a 20-minute dispatch.

5. **Clear RFO Selection Criteria**. Commission staff believe that the above additional guidance must be clearly and consistently reflected in each IOU's RFO materials. Commission staff request that the IOUs develop <u>standardized RFO language</u> on the points outlined below. Further, we request <u>three business days</u> to informally review all IOUs DRAM 2018 RFO materials prior to their release. In addition to the points above, please ensure that the RFO materials clearly indicate the qualitative criteria

approved in Resolution E-4817 and state that no additional qualitative criteria will be applied.

Appendix A: Summary of D.17-10-017 on DRAM 2018 Additional Auction

D.17-10-017 Ordering Paragraphs (OPs):

1. Directs Pacific Gas & Electric Company, San Diego Gas & Electric Company and Southern California Edison Company to conduct an additional demand response auction in 2018 for deliveries in 2019 in accordance with the procurement budget, guidelines and all other parameters it adopts (OP 7);
2. Authorizes a total budget of $13.5 million, $6 million each for PG&E and SCE and $1.5 million for SDG&E (OP 8);
3. Requires the IOUs to utilize the final approved 2017 demand response auction mechanism guidelines for the additional demand response auction in 2018 for 2019 deliveries, except that contract terms shall be limited to one year of delivery for 2019 (OP 10);
4. Requires the IOUs to offer contracts to all complying bids up to the simple average August capacity bidding price or the budget cap, whichever comes first (OP 10);
5. **Directs the IOUs to work with Energy Division staff** to ensure they use capacity values in bid selection criteria that appropriately prioritize bids for local resource adequacy (OP 10); and,
6. Requires the IOUs to launch the additional 2018 auction no later than February 1, 2018 and shall submit their advice letters for approval of the auction results no later than May 1, 2018.

D.17-10-017 provides further nuance to this guidance by stating that the IOUs shall:

1. Prioritize bids for local resource adequacy capacity contracts, where appropriate, over bids for system resource adequacy;
2. Accomplish this by **"work[ing] with Energy Division staff** to ensure that the capacity values utilized in the **bid selection criteria appropriately reflect the value differentials between local and system resource adequacy capacity, or a similar approach"** (D.17-10-017, p. 52).
3. Indicate to demand response providers the relative value of local or flexible resource adequacy relative to system resource adequacy, to the extent possible within limitations imposed by Commission directions that recognize utility-specific confidential valuation information.
4. **Consult with Energy Division staff on any questions that arise in the course of applying these bid selection criteria"** (D.17-10-017, p. 54).

Appendix E: Further Energy Division Guidance on DRAM IV Auction

Email dated January 18, 2018, 12:50 PM

To: Gene Lee (SCE), Evan Bierman (SDG&E), Gigio Sakota (SCE), Dana Ostedfeld (PG&E), and others.

Gene and all,

Thank you for arranging for the call yesterday. We have this feedback and additional clarification on the guidance given previously based on the points you raised. If the commentary below suggests we misunderstood some part of the call, we would appreciate receiving any clarifications via email. Also, with this, we anticipate receiving draft 2018 DRAM RFO materials for review as early as Friday.

1. Calculation of NMV that prioritizes Flex RA: What we understood from the call is that SCE has not identified any RA need for local or flexible products for 2019. As a result, although the NMV equation includes values for these product, since there is no need the incremental value will be "0" and thus, for SCE, such products won't be valued higher than system RA. Please clarify if we misunderstood.

2. Calculation of Flex RA average August Price: SCE requested clarification from Division staff on how to calculate this, given that several interpretations are possible. After conferring, Energy Division staff believe that the most sensible way to calculate this for the 2018 auction is to produce one average August price for all Flex RA products, regardless of if they are paired with system or local RA and regardless of whether they are Flex 1-3. While this will have some downsides as we discussed (namely, tilting procurement towards the more inexpensively priced products regardless of category or location), the flip side is that it will result in a larger pool of such products and likely a higher average August price. Since a primary reason that the Commission directed that the 2018 auction use the average August price as a procurement cap was to test this approach prior to its inclusion in any "permanent" DRAM, we recommend that IOUs document the time associated with implementing the approach, and its limitations, for later consideration by the Commission.

3. Potential impacts of calculating average August price without any MW normalizations (e.g. accounting for offer size): If we understood correctly, the rationale for SCE's suggestion to consider this approach was that sophisticated bidders could bid a high number of very small "trash" bids with very high or low costs per MW in an attempt to skew the average August price, either up or

down. As Energy Division staff conferred after the call we surmised that if this were to occur, high cost bids of this type should be most common and could be excluded using the "outlier" clause already provided for. Low bids of this type seem much less likely to occur, perhaps only as an attempt by the most sophisticated bidders to drive down the average August price and in this way to exclude competitors from being below the August average. In any case, if this were to occur, such bids also could be excluded as "outliers" (in consultation with Energy Division and the PRG) based on the wording in D.16-09-056. Therefore, Energy Division staff recommends that IOU staff use a simple average August price, rather than applying a MW normalization.

4. Procuring for specific constrained sub areas within local areas (and how to verify this is the product that is delivered); and, Procuring for 20 minute response time Local RA (and how to verify this is the product that is delivered); We concur with the IOUs that altering DRAM pro forma contract language at this point to accommodate such approaches is inadvisable and would result in delay. Therefore, we reinforce that this was optional guidance- we encouraged their consideration but they appear to be prohibitively difficult at this time and with this vehicle.

Appendix F: Attachment A to SDG&E Response to ALJ Hymes August 6, 2018 Ruling*

Example of Evaluating Offers Using Net Market Value ("NMV") vs. Cost ($)

When procuring resources, the question to answer is whether certain resources are more valuable or less valuable to customers than other resources. This comparison is better done in terms of relative benefits by using a NMV metric rather than absolute price. For example, say we are evaluating two DRAM bids (c/d & e/f). The IOU has determined the Resource Adequacy ("RA") benefits are described as in (a). The Long Run Avoided Cost ("LRAC") is in row (b). The evaluation of the bids are generally as follows:

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	DRAM RA Benefits	$1	$2	$3	$4	$5	$6	$7	$8	$9	$10	$11	$12
b	LRAC	$9.43	$9.43	$9.43	$9.43	$9.43	$9.43	$9.43	$9.43	$9.43	$9.43	$9.43	$9.43
c	Bid # 1 Price	$9	$9	$9	$9	$9	$9	$9	$9	$9	$9	$9	$9
d	Bid # 1 Volume	150	150	150	150	150	150	50	50	50	50	50	50
e	Bid # 2 Price	$18	$18	$18	$18	$18	$18	$2	$2	$2	$2	$2	$2
f	Bid # 2 Volume	50	50	50	50	50	50	150	150	150	150	150	150
g = (a * d - c * d)	Monthly Market Value Bid #1	($1,200)	($1,050)	($900)	($750)	($600)	($450)	($100)	($50)	$0	$50	$100	$150
h = (a * e - c * f)	Monthly Market Value Bid #2	($850)	($800)	($750)	($700)	($650)	($600)	$750	$900	$1,050	$1,200	$1,350	$1,500
i = (a-b)	Monthly Market Value LRAC	($8)	($7)	($6)	($5)	($4)	($3)	($2)	($1)	($0)	$1	$2	$3

j = sum[a]	Total DRAM RA Benefits	$78.00	$/kW-year
k = sum[b]	Total LRAC	$113.20	$/kW-year
l = sum[c * d] / m	Weighted average Annual	$108.00	$/kW-year
m = average[d]	Average Bid #1 Volume	100	kW-year
n = sum[e * f] / o	Weighted average Annual	$114.24	$/kW-year
o = average[f]	Average Bid #2 Volume	100	kW-year
p = sum[g] / m	Bid #1 NMV	($48.00)	$/kW-year
q = sum[h] / o	Bid #2 NMV	($34.08)	$/kW-year
r = sum[i]	LRAC NMV	($35.20)	$/kW-year

If one were to compare Bid #1 and Bid #2 to the LRAC based solely on price, it would be determined that Bid #1 is cheaper than the benchmark (k vs. l) and should be given an offer, while Bid #2 is higher (k vs. n) and should not be given an offer. Comparison of the NMVs gives a completely different assessment of the offers, showing that Bid #2 has a larger NMV (i.e. more benefits than costs) and should be given an offer (r vs. q), while Bid #1 has a lower NMV and should not be given an offer (r vs. p). By translating the LRAC into an NMV, and then comparing bids in terms of NMV instead of cost, the full value of the resources can be assessed.

***Note that the formula for the Monthly Market Value Bid #2 should be: h = (a*f - e*f).**