California ISO | WESTERN ENERGY MARKETS

Memorandum

To: ISO Board of Governors and Western Energy Markets Governing Body

From: Eric Hildebrandt, Executive Director, Market Monitoring

Date: March 19, 2025

Re: **Department of Market Monitoring report**

This memorandum does not require ISO Board of Governors or WEM Governing Body action.

EXECUTIVE SUMMARY

This memo summarizes analysis by the Department of Market Monitoring (DMM) of demand response activity during the high load days of summer 2024 in the California ISO balancing area and the Western Energy Imbalance Market (WEIM).

- Demand response in the ISO balancing area accounted for about 2.6 percent (or 1,400 MW) of total system resource adequacy capacity in the summer of 2024, compared to about 3 to 4 percent of total system resource adequacy capacity in the previous five summers. This decrease is mainly due to a change in California Public Utilities Commission (CPUC) rules removing the planning reserve margin and transmission adders totaling over 11 percent, which were previously applied to demand response used to meet resource adequacy requirements.

- Utility demand response accounts for about 76 percent of demand response used to meet resource adequacy requirements. About 85 percent of this capacity was bid into the real-time market during the most critical hours of summer 2024. When dispatched, utility demand response reported curtailing about 81 percent of scheduled load reductions.

- Non-utility (or third party) demand response accounts for about 18 percent of demand response used as resource adequacy capacity. Reported load reductions for these non-utility resources averaged about 54 percent of scheduled reductions, when measured by capping reductions for each resource at the resource's scheduled level. During some hours, individual non-utility resources reported reductions well in excess of scheduled levels, causing aggregate load reductions from non-utility demand response to meet or exceed the aggregate schedules during some hours.

Demand response in other WEIM balancing areas is scheduled directly by each balancing area, and projected load reductions are represented as adjustments to the area's load forecast and schedules. This memo provides a summary of the magnitude of these potential load reductions in WEIM balancing areas during summer 2024**.**

DEMAND RESPONSE IN ISO

Background

As shown in Figure 1, there are four main categories of demand response resources in the California ISO area:

- **Reliability demand response.** These consist of large commercial and industrial loads, which are primarily called upon to curtail under emergency conditions after the ISO issues a system warning.[1] These resources are operated by the state's investor owned utilities under CPUC jurisdiction. This capacity is subtracted from the utility's resource adequacy requirement, and accounted for about 56 percent of demand response capacity used to meet these requirements in 2024.
- **Utility proxy demand response.** These represent aggregations of smaller loads that can be curtailed based on different bid prices in the day-ahead and real-time markets. These are also operated by the state's investor owned utilities under CPUC jurisdiction, and are subtracted from the utility's resource adequacy requirement. These resources account for about 21 percent of demand response capacity.
- **Supply plan (third party) demand response.** These resources are developed, bid, and scheduled by non-utility (or third party) providers under contract to supply resource adequacy capacity for utilities and other load serving entities. This capacity is often referred to as *supply plan* demand response since it is explicitly shown on monthly resource adequacy plans (rather than being subtracted from the load serving entities' resource adequacy requirements). These resources account for about 18 percent of demand response used to meet resource adequacy requirements.
- **Other demand response**. Non-CPUC jurisdictional load serving entities (such as municipal utilities) utilized demand response to meet about 75 MW of their resource adequacy requirements in summer 2024. Since this capacity is not bid or scheduled into the ISO market, DMM cannot assess the availability or performance of this demand response capacity. DMM understands that the ISO is working with local regulatory authorities to develop processes that would allow the ISO to call on these demand response programs when needed.

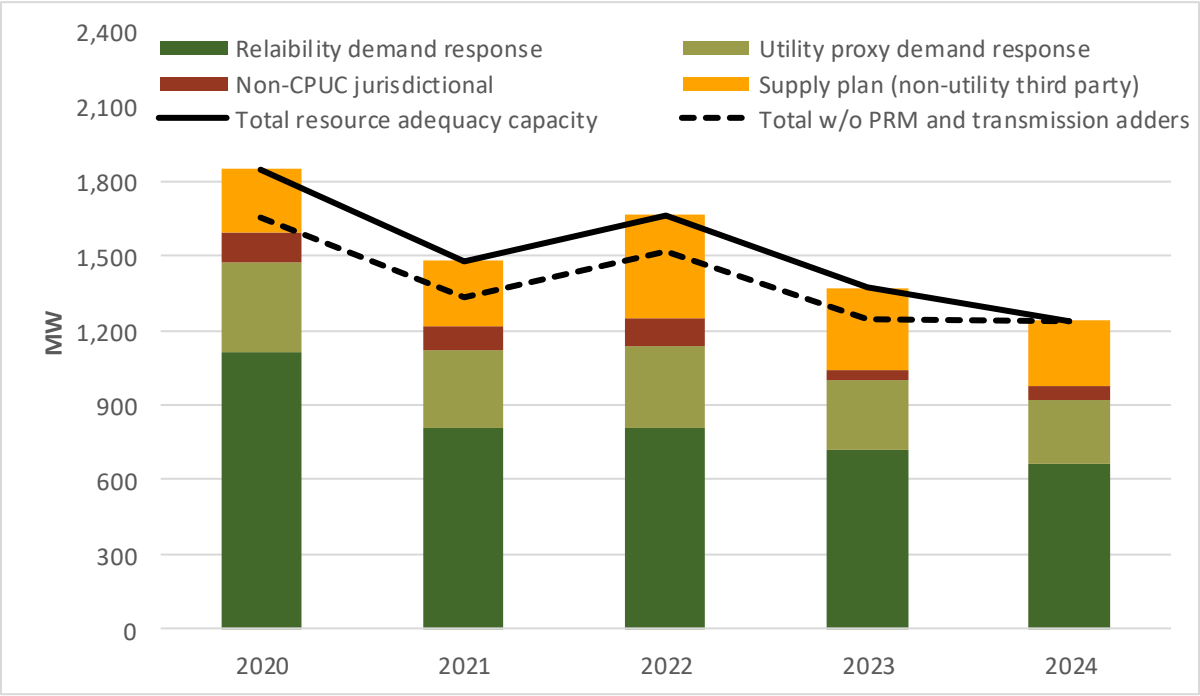
Demand response counted for roughly 2.6 percent of total system resource adequacy capacity (or about 1,410 MW) in September 2024, compared to about 3 to 4 percent of total system resource adequacy capacity in the previous four summers.

As shown in Figure 1, this decrease is mainly due to a change in CPUC rules removing the planning reserve margin and transmission adders totaling over 11 percent that were previously applied to the capacity of reliability demand response and proxy demand response resources used by investor owned utilities to meet resource adequacy requirements.

[1] Reliability demand response programs are primarily comprised of Base Interruptible Program customers, and agricultural and pumping loads.

This rule change addressed one of DMM's key prior recommendations for improving how demand response is used to meet resource adequacy requirements. The CPUC continues to allow an adder of about 6 percent for utility demand response capacity to account for distribution losses.

Figure 1. Demand response used to meet resource adequacy requirements



For each of the last five years, DMM has issued a report on demand response issues and performance.[2] DMM's analysis focuses on bids, schedules, and performance of demand response resources counted towards resource adequacy requirements during the peak net load hours (18 to 22) on the most critical high load days each summer.[3]

DMM measures the *availability* of these demand response resources used to meet resource adequacy requirements based on the portion of this capacity bid into the ISO's day-ahead and real-time markets. Demand response capacity run by investor-owned utilities under the jurisdiction of the CPUC are required by the CPUC to offer all available capacity into the ISO's day-ahead and real-time markets.

DMM measures the *performance* of demand response resources based on the load reductions that are reported by each resource when resources are actually dispatched in the ISO's real-time market. Performance is assessed based on the load reduction reported by scheduling coordinators, compared with the scheduled load reduction for each resource.

[2] https://www.caiso.com/documents/demand-response-issues-and-performance-2024-feb-20-2025.pdf

[3] In 2024, DMM assessed demand response during the 20 days in summer 2024, when the ISO issued a Restricted Maintenance Operations notice or an Energy Emergency Alert.[3] In this report, we refer to this sample of 20 days as *high load days*.

Load reductions reported by scheduling coordinators are based on a comparison of metered loads with a counterfactual baseline calculated based on measured loads in prior days and hours.

Reliability demand response

As shown in Figure 2, the volume of capacity from reliability demand response bid into the ISO's real-time market almost always exceeded the resource adequacy capacity of these resources by a significant margin during the highest load hours of 2024. Reliability demand response resources must bid at a price of at least 95 percent of the bid cap in the real-time market, and these resources are usually bid at or near the $1,000/MWh bid cap. This ensures that these loads are only curtailed after other types of demand response and most supply resources are dispatched.

As shown by the red line in Figure 2, reliability demand response resources were scheduled or dispatched in the real-time market during a limited number of hours on four days in the summer of 2024. As shown in Figure 3, when these resources were dispatched, the reported load reductions for these resources averaged about 83 percent of scheduled load reductions.

Utility proxy demand response

As shown in Figure 4, the volume of capacity from utility proxy demand resources bid into the ISO's day-ahead and real-time markets averaged about 44 percent of the resource adequacy capacity of these resources during the highest load hours of 2024. Because utility demand response is not shown on supply plans, utility proxy demand resources are not subject to charges under the ISO's resource adequacy availability incentive mechanism if they fail to bid their full resource adequacy capacity. This is likely to be a leading factor of why such a large portion of this capacity was not bid into the ISO market during peak hours on high load days in summer 2024.

Beginning in 2024, most proxy demand response resources contracted by load serving entities under the CPUC jurisdiction are subject to a bid cap of $949/MWh. This change was implemented by the CPUC in order to ensure that proxy demand response resources are dispatched prior to reliability demand response resources.

As shown by the red line in Figure 4, about 23 percent of utility proxy demand capacity bid into the ISO market during the highest load hours of summer 2024 was dispatched. As shown in Figure 5, reported load reductions for utility proxy demand resources averaged about 91 percent of scheduled load reductions when these resources were dispatched.

Figure 2. Real-time energy market bids and resource adequacy capacity from utility reliability demand response resources

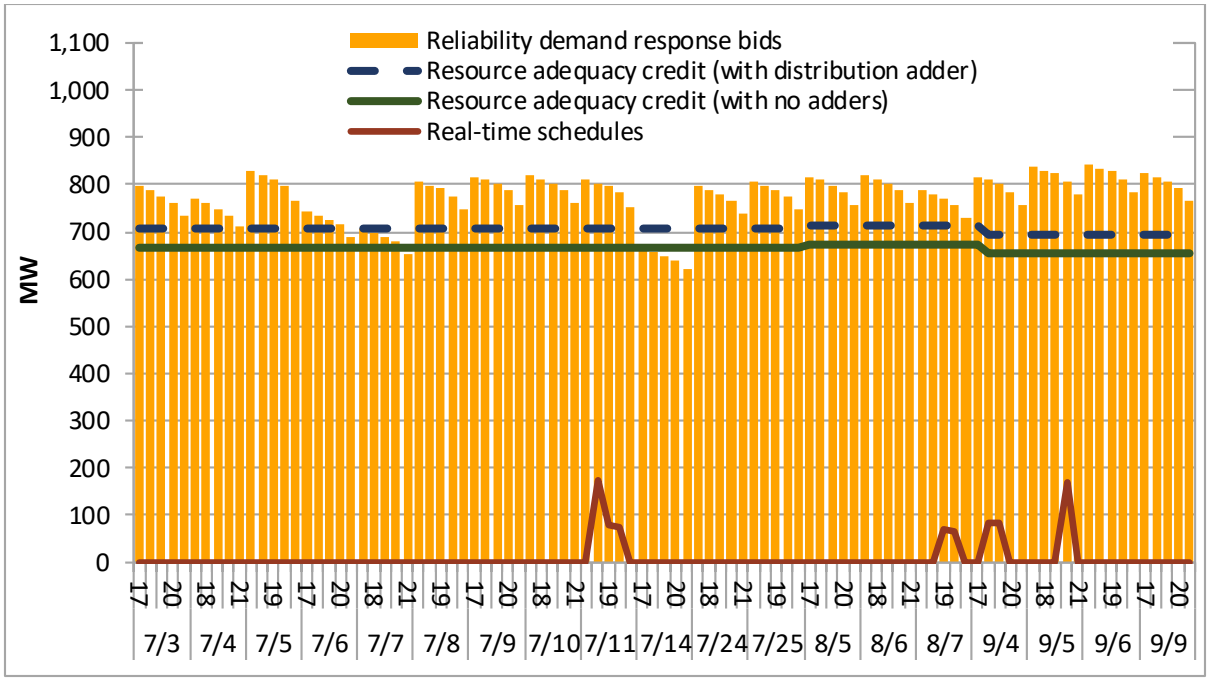


Figure 3. Reported performance of utility reliability demand response resources

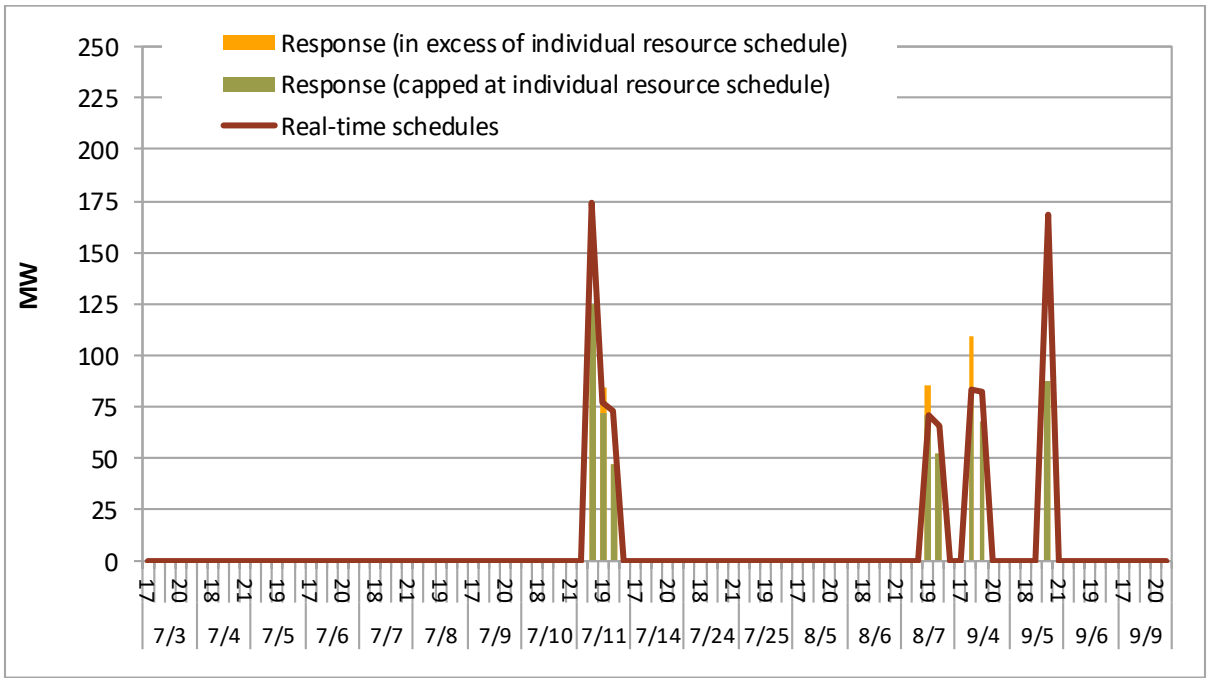


Figure 4. Real-time energy market bids and resource adequacy capacity from utility proxy demand resources

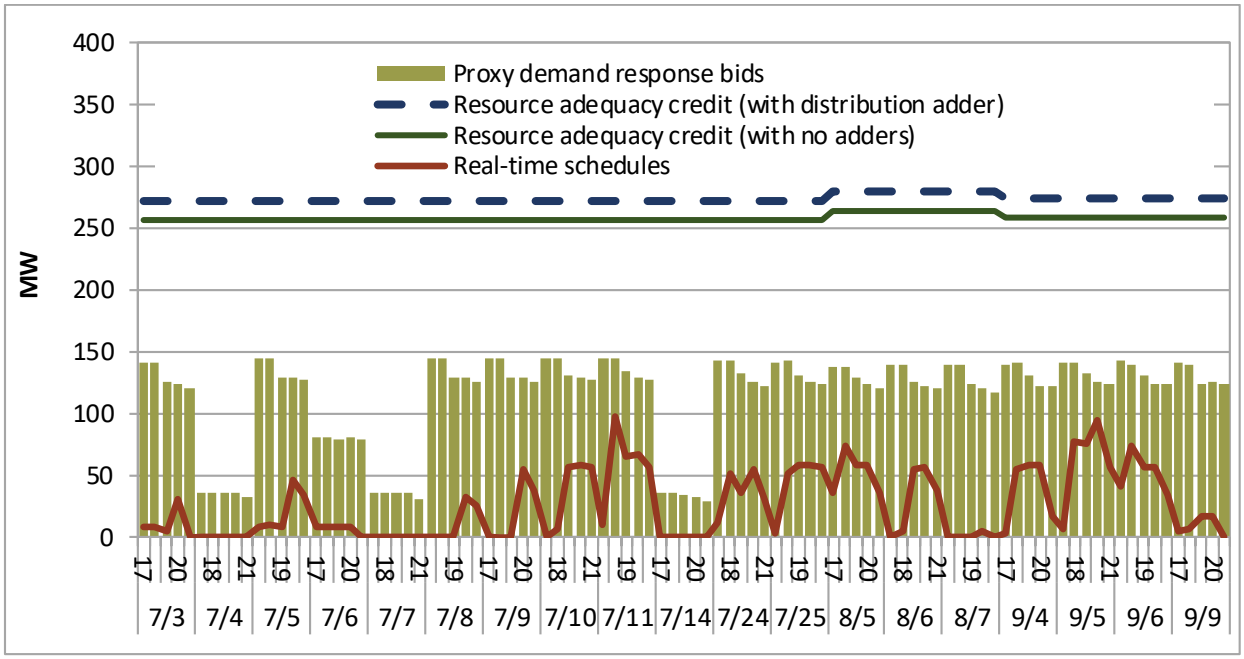
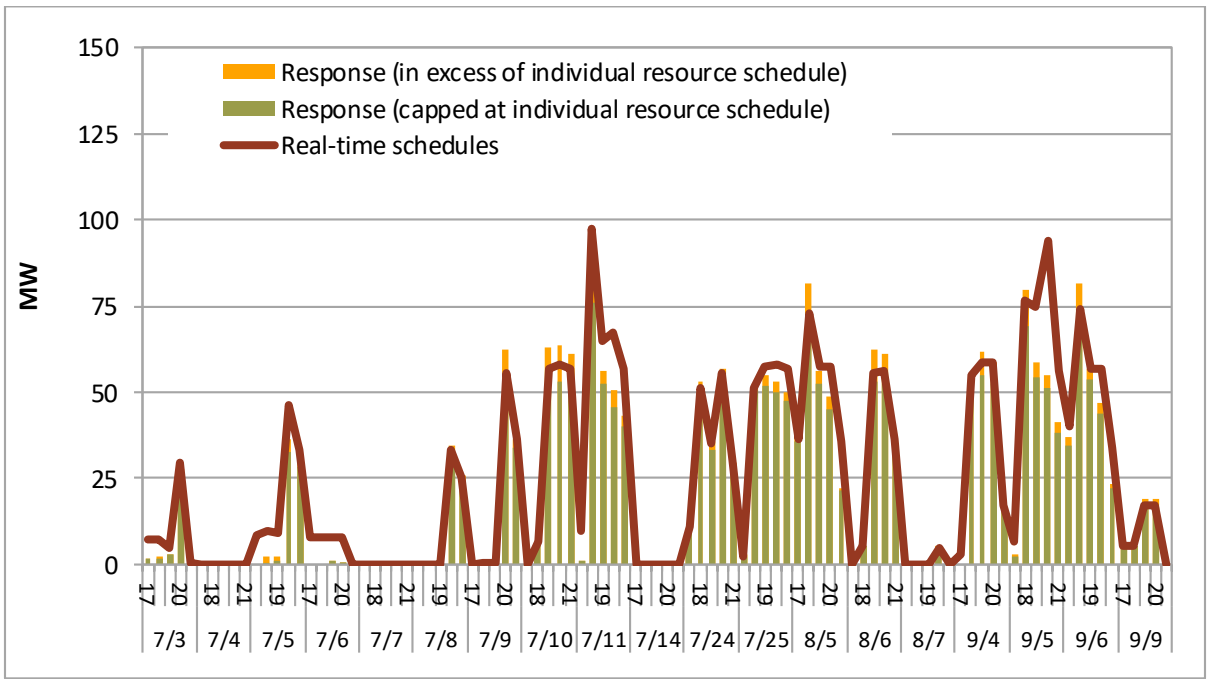


Figure 5. Reported performance of utility proxy demand resources



Non-utility proxy demand response

Figure 6 shows the volume of bids in the day-ahead and real-time markets for non-utility demand response capacity shown on supply plans to meet resource adequacy requirements.[4] In the day-ahead market, bids from supply plan demand response resources averaged 86 percent of resource adequacy capacity during high load days this summer.[5] Only about 62 percent of this capacity was offered in the real-time market.

The limited availability of supply plan demand response capacity in real-time can primarily be attributed to demand response programs with start-up times of more than 255 minutes. When these long start resources are not scheduled in the day-ahead market, they are not subject to the resource adequacy availability incentive mechanism if they are not offered in the real-time market. About 58 percent of supply plan demand resource adequacy capacity qualify as long-start resources with start-up times of more than 255 minutes.

The aggregated self-reported response of third party demand response resources can be measured in two ways. First, aggregated performance can be measured with the response of each individual resource capped at the scheduled load reduction for each resource. Aggregated performance can also be measured without capping the response of each individual resource based on schedules. These two measures can vary significantly when the reported load reductions are well below schedules for some resources, while reductions for other resources are well above scheduled levels.

Figure 7 shows self-reported response measured in these two ways. The green bars show performance with reductions capped at individual resources' scheduled level, while the yellow bars show the aggregate performance including reductions for individual resources in excess of schedules. When reported demand reductions are capped at the scheduled reductions for individual resources, aggregate reductions averaged 54 percent of total scheduled reductions during high load days this summer (green bars). When adding in load curtailments in excess of individual resource schedules, aggregate performance of supply plan demand response resources averaged 113 percent (yellow bars).

[4] Bids for each resource in Figure 6 are capped at the resource adequacy capacity registered for each individual resource.

[5] This is a decrease from summer 2023, when bid-in capacity in the day-ahead market averaged 96 percent of resource adequacy values. High load days in summer 2024 included a holiday and weekends, which reduced bidding requirements.

Figure 6. Energy market bids and resource adequacy capacity from supply plan demand response (from non-utility third parties)

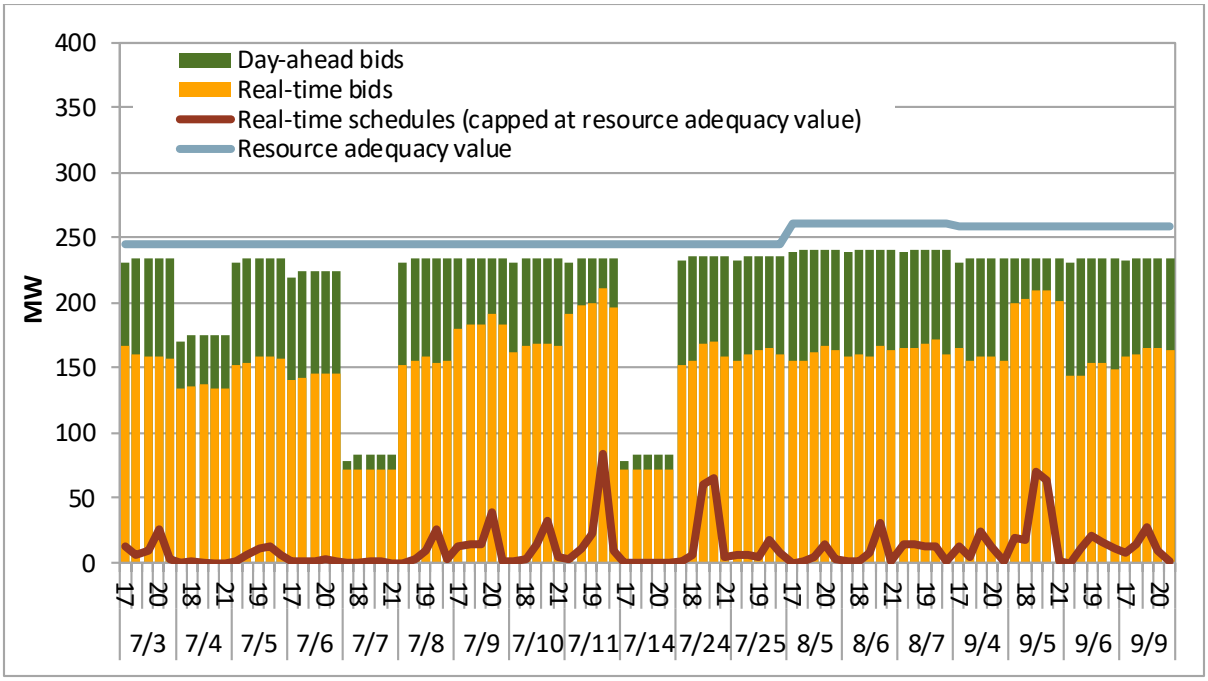
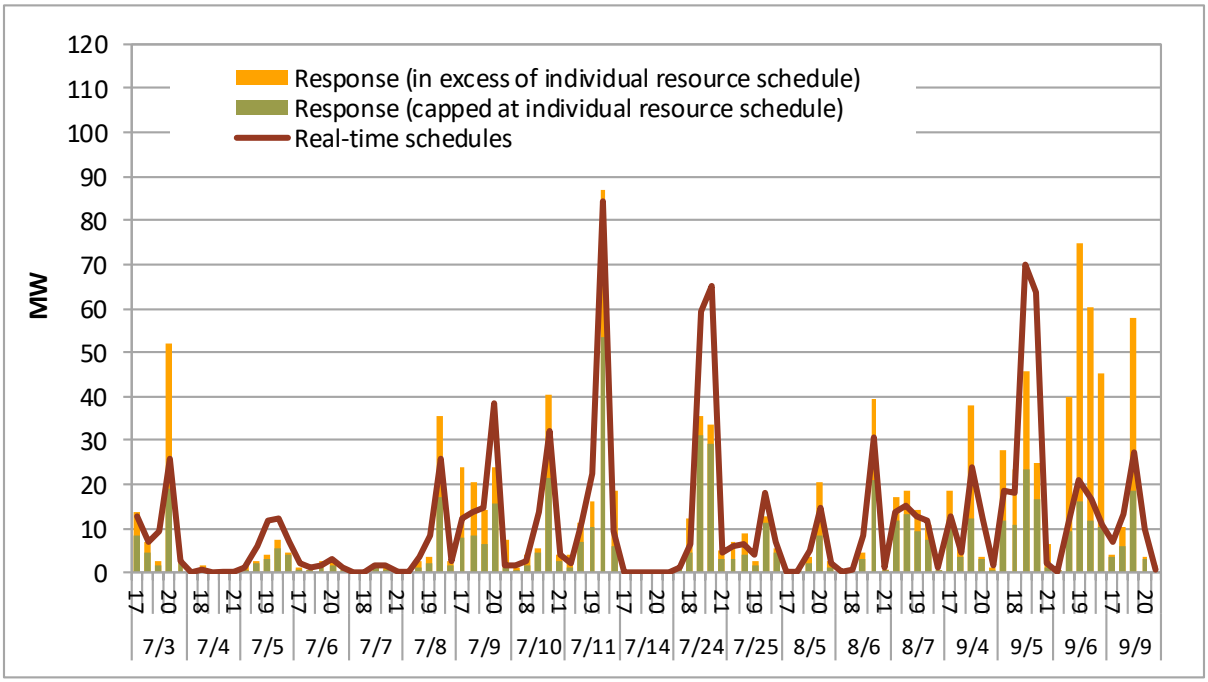


Figure 7. Reported performance of supply plan demand response (non-utility third parties)



While some difference can be expected between these two measures of overall demand response performance, the large difference between these measures in summer 2024 raises some concern over the performance of non-utility demand response and the way this performance is measured. To the extent some resources underperform while others over perform during the same time interval, aggregate performance may still be close to total scheduled levels.

However, as shown in Figure 6, the aggregate performance of these demand response resources tended to vary significantly from scheduled load reductions during many high load hours. While supply plan demand response tends to bid in close to their resource adequacy values, their performance compared to their schedules suggests that the actual availability or performance of this capacity may be inaccurate during high load days.

DEMAND RESPONSE IN WEIM

Background

Resources in other WEIM balancing areas have the option to participate in the real-time market in the same manner as demand response resources in the ISO area (i.e., as reliability demand response or proxy demand resources). However, other WEIM balancing areas have chosen to account for demand response by directly incorporating projected load reductions from demand response through two other features incorporated in the WEIM. The following sections cover the two ways in which WEIM balancing areas can directly incorporate demand response into the real-time market.

Load adjustments

WEIM entities can directly incorporate expected load reductions from demand response through special load adjustments.[6] As described in DMM's report on the resource sufficiency evaluation for Q3 2024, these adjustments are incorporated in the load used in both the capacity and flexibility tests.[7] A negative adjustment reflects a lower load forecast as a result of a demand response program. This will decrease the requirement for the upward capacity and flexibility tests, but will increase the requirement for the downward tests. A positive adjustment can reflect additional demand because of expected pre-cooling or post-demand-response event increases (sometimes referred to as *snapback*).

Figures 8 and 9 show hourly demand-response-based load adjustments for all WEIM balancing areas during the peak net load hours on the 14 days during summer 2024 when one or more entities used these adjustments. This feature was used by six balancing areas during this period.

[6] *Energy Imbalance Market BPM*, Section 11.3.2, Accounting for non-participating demand response scheduling in the resource sufficiency evaluation.

[7] See pp 44-45 in: https://www.caiso.com/documents/q3-2024-metrics-report-on-resource-sufficiency-evaluation-in-weim-nov-14-2024.pdf

Figure 8. Demand-response-based load adjustments (July 2024)

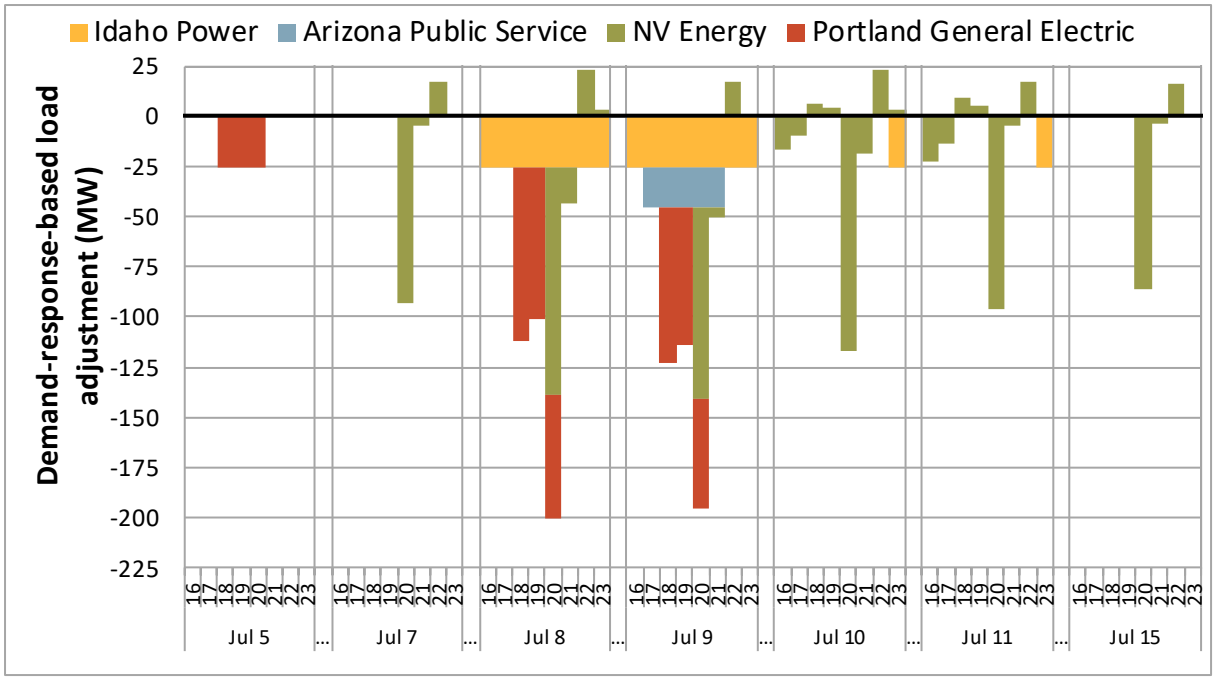


Figure 9. Demand-response-based load adjustments (August–September 2024)

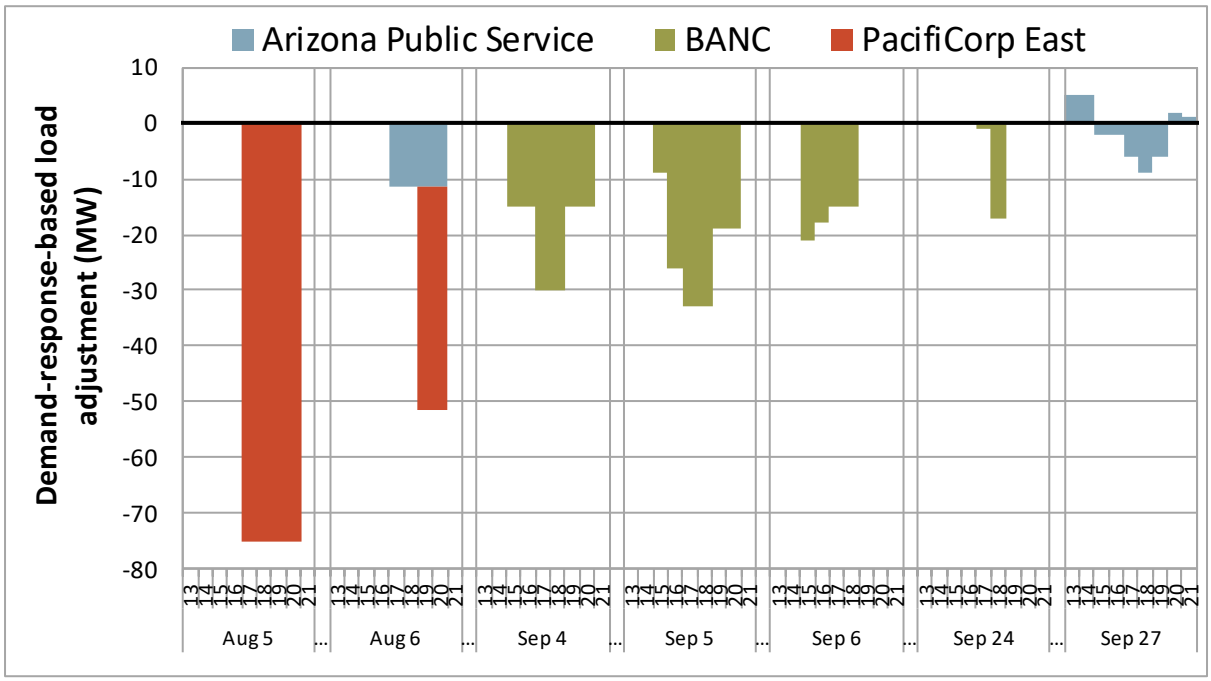


Table 2 summarizes the use of these adjustments by different balancing areas during the third quarter of 2024. During the quarter, these adjustments did not have any impact on any balancing area passing or failing the resource sufficiency evaluation.

Table 2. Demand response-based load adjustments by WEIM area
July–September 2024

	Negative demand-response-based load adjustment					
			Average adjustment		Lowest adjustment	
Balancing area	Total hours	Percent of hours	MW	% load	MW	% load
Arizona Public Service	16	.7%	-11	.1%	-20	.3%
BANC	18	.8%	-19	.5%	-33	.9%
Idaho Power	80	3.6%	-25	.8%	-25	1.0%
NV Energy	16	.7%	-45	.5%	-117	1.3%
PacifiCorp East	6	.3%	-63	.7%	-75	.9%
Portland General Electric	9	.4%	-56	1.3%	-87	2.0%

Dispatchable demand resources

In the ISO's balancing authority area, expected load reductions from demand response participating as reliability demand response or proxy demand response are modeled as positive generation when dispatched. In the WEIM, there are instead *dispatchable demand response* resources that are modeled differently. These resources are modeled as negative generation schedules generally reflecting large industrial and pump loads that can be reduced or curtailed.

Dispatchable demand response loads can participate in the WEIM by submitting bid prices at which these loads could be dispatched for curtailment. However, participation in the WEIM in this manner by dispatchable demand response resources has been extremely limited. Instead, WEIM entities usually only submit base schedules for these resources which already incorporate any expected load reduction from demand response. DMM does not have information on any such schedule adjustments due to demand response.
Table 3 summarizes the range and average of base schedules submitted for dispatchable demand response loads for each balancing authority area during the summer months of 2024. The range (or the difference between the minimum and maximum load scheduled for each balancing authority area) is provided as a potential measure of the maximum potential demand response from these resources. Table 3 also shows the average base schedules for all dispatchable demand response loads within each balancing authority area as a percentage of average total load for that balancing authority area.

Table 3. Dispatchable demand response loads by WEIM area
July–September 2024

BAA	Base schedule (MW)			Range (MW)	Avg MW as % of avg BAA load
	Min	Avg	Max	Min <--> Max	
Avista	-266	-212	-129	137	17%
BANC	-175	-137	-85	90	6%
BPA	-193	-64	-4	189	1%
El Paso Electric	-45	-14	0	45	1%
LADWP	-263	-56	0	263	2%
PacifiCorp East	-298	-232	-95	203	4%
PSC of New Mexico	-105	-73	-26	79	4%
Seattle City Light	-65	-27	0	65	3%
Tucson Electric	-380	-315	-187	193	18%
Tacoma Power	-19	-17	-3	15	4%
WALC	-426	-225	-98	328	23%