ISO new england

memo

To: NEPOOL Markets and Reliability Committees

From: ISO New England, Inc.

Date: November 12, 2025

Subject: ADCR Seasonal Accreditation under CAR

Executive Summary

This memorandum discusses the ISO's proposed method for accrediting Active Demand Capacity Resources (ADCRs) under Capacity Auction Reforms (CAR). With CAR, ADCRs' accredited capacity will be their expected performance during the simulated hours where additional available capacity would mitigate or reduce load shed (the "Marginal Reliability Impact [MRI] Hours").[1] While the existing framework for ADCR qualification does not depend on ADCRs' demonstrated ability to reduce demand during stressed conditions, the proposed MRI framework for ADCRs will utilize both ADCRs' offered capability and actual performance for accreditation.

The key changes to the current design proposed under seasonal accreditation are grounded in the capacity market's three design objectives:

Reliability: to ensure that the capacity market is designed to satisfy the region's one-day-in-ten-year loss of load expectation (LOLE) resource adequacy standard.

Sustainability: to incent the investment needed to meet the reliability design objective over time as system and market conditions change.

Cost-effectiveness: to procure capacity to meet the reliability and sustainability design objectives while minimizing costs.

This memo considers how both the existing and proposed accreditation frameworks for ADCRs will help the capacity market achieve these design objectives. The memo reaches the following conclusions:

- By not accounting for expected performance during tight system conditions, the existing accreditation framework may not yield accreditation values for ADCRs that fully reflect their expected resource adequacy contributions. That is, ADCRs' expected resource adequacy contributions are not fully connected to their capacity market compensation, which may cause the capacity market to fall short of its design objectives.

- The proposed MRI accreditation framework improves upon the existing design by accrediting ADCRs based on their expected performance during the simulated hours when resource adequacy is at risk. That is; by utilizing historical offer and performance data in

[1] See the September memo on the MRI framework here.

capacity accreditation, the MRI framework will yield capacity market compensation for ADCRs that will better support the capacity market's design objectives.

The memo is organized as follows:

- Section 1 provides background information on ADCRs.
- Section 2 describes the current process for determining ADCRs' accredited capacity, known as their Qualified Capacity (QC), and outlines the associated opportunities for enhancement. Section 2 highlights that, historically, ADCRs have often been able to perform at only a fraction of their offered quantity when dispatched during tight system conditions where resource adequacy is at risk.
- Section 3 introduces the MRI accreditation framework for ADCRs and highlights its benefits. More specifically, this section walks through, in detail, how ADCRs will be modeled for the purposes of accreditation and how such modeling, in conjunction with the MRI framework, will yield accredited capacity values that better support the capacity market's design objectives.
- Section 4 describes the data that are used to develop ADCR profiles for accreditation.
- Section 5 explains the proposed accreditation method for recently commercial resources.
- Section 6 describes incentives under the MRI accreditation design for ADCRs.
- Section 7 concludes the main body of the memo with key takeaways.
- Appendix A1 discusses the dispatch frequency of DRRs.
- Appendix A2 describes the criteria used to select the Maximum Reduction sample.
- Appendix A3 explains the application of the Transmission & Distribution Loss factor.
- Appendix A4 discusses the MRI calculations for ADCRs.
- Appendix A5 illustrates how profiles are developed when DRA-to-DRR assignments change.
- Appendix A6 describes profile development for DRRs with missing data.

Section 1. Overview of ADCRs

Active Demand Capacity Resources (ADCRs) can receive capacity market compensation for their ability to reduce demand in real-time. There are two drivers of ADCR performance: load control and behind-the-meter generation.

The current summer season for ADCRs in the FCM runs from April to November with a winter season comprising December to March.[2] This differs from other resources, for which the summer season spans from June to September, while the winter season lasts from October to May. In the prompt, seasonal capacity market, all resources will be subject to the same seasonal definitions, with a summer season running May to October and a winter season running November to April.

ADCRs consist of one or more Demand Response Resources (DRRs), where a DRR is an entity that participates in the energy market. A DRR must have at least 100 kW of demand reduction to be active in the energy market and a minimum offer into the energy market of 100 kW. A participant can have one or more DRRs in a Dispatch Zone and the DRRs are aggregations of one or more Demand Response Assets (DRAs) in the same DRR Aggregation Zone. ADCRs participate in the capacity market and acquire Capacity Supply Obligations (CSOs) at the Dispatch Zone level and can be comprised of one or more DRRs.

A DRA is typically a single end-use customer whose performance is based on reducing consumption relative to a calculated baseline as metered at the Retail Delivery Point. The baseline is intended to reflect the load at the Retail Delivery Point that would have occurred had the DRA not been part of a DRR that was dispatched to perform. Three different customer baselines are calculated for each DRA: a weekday baseline, a Saturday baseline, and a baseline that represents a typical Sunday or a Demand Response Holiday load. The ISO receives near real-time telemetry of the Retail Delivery Point load (five-minute interval consumption within five minutes of the end of the interval). A single DRA that can provide 5 MW or more is modeled at a single node and is not allowed to aggregate with other DRAs (*i.e.*, is the only asset associated with a DRR).

DRRs submit demand reduction offers and are dispatched in the energy market just like other resources that are subject to real-time economic dispatch. While offers and dispatch instructions are based at the DRR level, individual performance is calculated at the DRA level and then aggregated to the DRR level. ADCR performance during a capacity scarcity interval is, in turn, based on the aggregated Actual Capacity Provided (ACP) of the DRRs assigned to the ADCR during the interval.

From Capacity Commitment Period (CCP) 2025/26 to CCP 2027/28, ADCRs accounted for less than 2.0% of total CSO in the FCM, with an average of 1.7% of total CSO. Table 1, derived from the 2025-2034 Forecast Report of Capacity, Energy, Loads, and Transmission (2025 CELT Report), displays the total overall summer and winter CSOs for each capacity resource type for the 2025/26 through 2027/28 CCPs.[3]

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[2] Under current rules, ADCRs' seasonal QC follows the seasonal definition specific to ADCRs. That is, ADCRs receive CSO (and resulting payments) based on their summer QC for the months April to November and based on their winter QC for the months December to March.

[3] Resources that include co-located generation are included in the generation totals based on their resource type. CSOs for CCPs 2025/26 are based on the third annual reconfiguration auction (ARA 3) results, while CSOs for CCPs 2026/27 and 2027/28 are the results of the seventeenth and eighteenth Forward Capacity Auctions (FCA17 and FCA18), respectively.

Table 1: ADCR CSO Percentages

Period	CCP 2025/26		CCP 2026/27		CCP 2027/28	
Season	Summer	Winter	Summer	Winter	Summer	Winter
ADCR	438	440	623	625	544	544
PDR[1]	2,569	2,442	2,317	2,099	2,070	1,955
Generation	26,961	27,251	27,864	28,163	28,478	29,315
Imports	1,235	1,235	567	567	465	154
Total CSO	**31,203**	**31,368**	**31,370**	**31,453**	**31,557**	**31,967**
% ADCR	**1.40%**	**1.40%**	**1.99%**	**1.99%**	**1.72%**	**1.70%**

[1] Passive demand capacity resources (On-Peak Resources and Seasonal Peak Resources)

Section 2. Existing Accreditation Process: Qualified Capacity

With the existing accreditation framework, seasonal QC for an ADCR is determined based on information submitted during the new capacity qualification process and is not updated to reflect the demonstrated capability of these resources in the subsequent auctions.[4] The existing accreditation process presents three opportunities for enhancement relating to the design objectives of CAR. Note that the three enhancements discussed here are analogous to those discussed in the September NEPOOL Markets Committee's (MC) memo on the MRI framework.[5]

Section 2.1. Enhancement 1: ADCRs' seasonal accredited capacity could be improved to better reflect their expected performance during simulated hours (i.e., MRI Hours) where resource adequacy is at risk

By accrediting ADCRs based on information submitted in the qualification process, ADCRs' QCs may not most accurately reflect their expected ability to perform during tight system conditions when resource adequacy is at risk. This presents an opportunity for enhancement to better align with the reliability design objective.

Consider Figure 1 below. Figure 1 is a box-and-whisker plot of ADCR performance, relative to dispatch, by season in CCP 14.

- Figure 1's x-axis lists the two seasons: summer and winter.
- Figure 1's y-axis shows the weighted performance rate of each ADCR. This was obtained by first calculating the average performance rate of each DRR that is assigned to an ADCR, where the ISO calculates the performance rate as the percent of dispatch that the DRR provided as energy. That is, the performance rate can range from 0% (reflecting a resource that did not provide any energy upon dispatch) to 100% (reflecting a resource that complied with all dispatch instructions throughout the observation period).[6] Then, a weighted average of these performance rates was computed, using each DRR's Maximum Capability (MCap) as the weight. The DRRs' performance rates were calculated using data from June 2023 to May 2024. Their MCaps were determined using data from June 2021 to May 2024.
- Each dot within each column represents the weighted performance rate for one resource in that column's season. Note that the dots are "jittered" (spaced out horizontally) to make an individual resource's weighted performance rate easier to see.

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[4] If a new capacity fails to demonstrate its commercial operation, it will be updated to reflect the quantity of capacity that has been demonstrated; however, once it has initially established commercial operation there is no subsequent validation within the qualification process to adjust the resource's QC to reflect reductions in capability for participation in the FCA.

[5] ISO New England, NEPOOL Markets Committee, "Marginal Reliability Impact (MRI) Framework for Accrediting Capacity Resources," September3, 2025.

[6] DRR's performance is evaluated against its baseline. If the telemetry reading exceeds the baseline, the performance is considered negative and recorded as 0% on the graph. If the DRR's performance exceeds the dispatch instruction, it is considered overperformance and recorded as 100%.

- Each column's box-and-whisker plot provides data on the distribution of weighted performance rates within that season:
    - The bottom of each box provides the 25th percentile weighted performance rate for that season.
    - The solid line running through the middle of each box provides the median weighted performance rate for that season.
    - The lines (or "whiskers") that extend from the boxes reflect all of the resources that are not between the 25th and 75th percentiles of that season that are not outliers.
    - The bold dot reflects the performance factors that are outliers for their season, where outliers are any observation that is outside of the range of 1.5 x (75th percentile – 25th percentile).

Figure 1: Box-and-Whisker Plot of ADCR Performance during CCP 14 (June 2023 – May 2024)

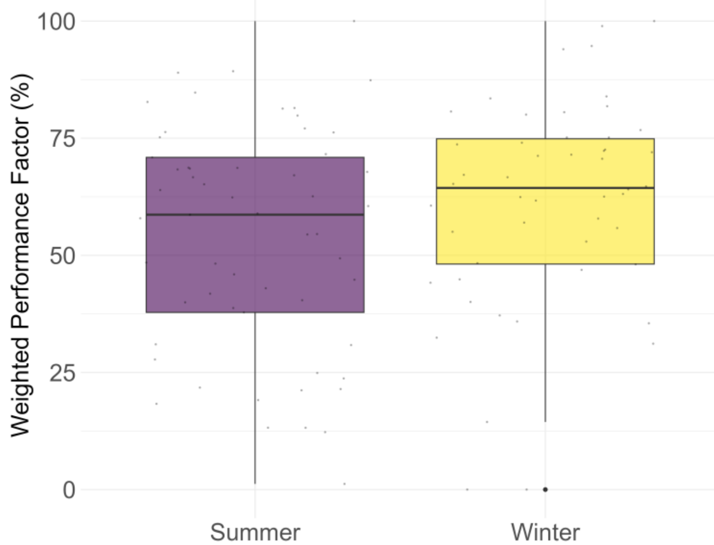
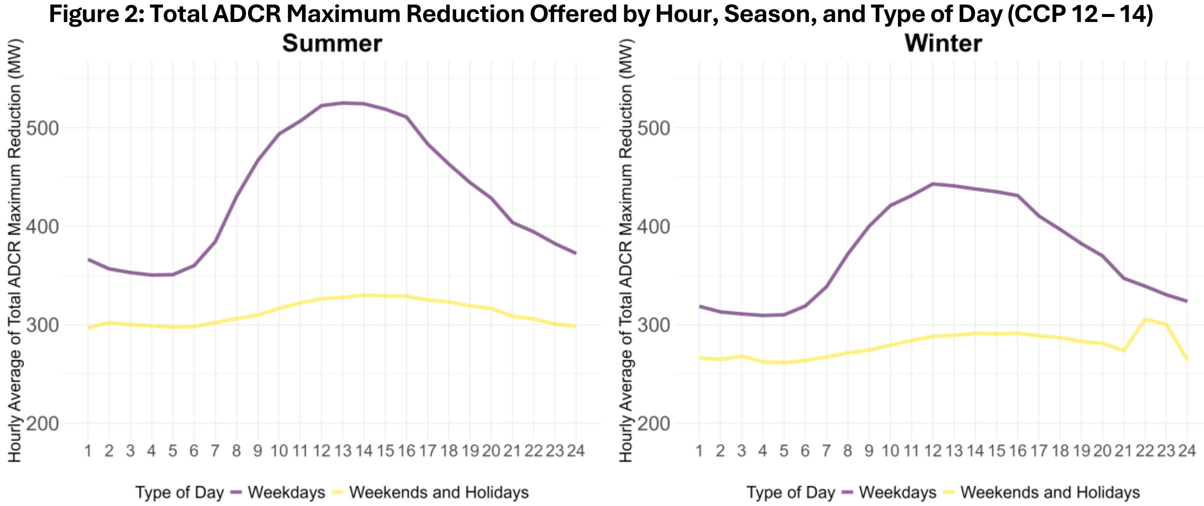


Figure 1 illustrates a considerable amount of heterogeneity in ADCR performance. Some ADCRs consist of DRRs that perform at 100% of their real-time dispatch, while others comprise DRRs that were unable to perform entirely. This suggests that the ADCRs' existing accredited capacity values, which do not account for resource performance, may not fully represent the expected resource adequacy contributions of these resources. Because the existing accreditation framework does not account for DRRs' performance, the capacity market may procure ADCRs that cannot perform during tight system conditions when resource adequacy is at risk, which is inconsistent with the reliability design objective.

Section 2.2. Enhancement 2: ADCRs' seasonal accredited capacity could be revised to better reflect ADCRs' capability as market and system conditions evolve to improve entry/exit signals

The hours during which resource adequacy is at risk are likely to shift as system and market conditions evolve. As noted in the memo on the MRI framework from the September MC, it is important for resources' accredited capacity values to change overtime to reflect their evolving contributions to resource adequacy. This is a particularly pertinent issue for ADCRs because their ability to contribute to resource adequacy can be significantly different within a day. Consider Figure 2 below, which displays the total average hourly Maximum Reduction, analogous to economic maximum limit for conventional generators, offered by season (summer vs. winter) and type of day (non-holiday weekdays vs. weekends and holidays).[7] Given the variability in ADCR capability throughout the day and between day types, their contribution to system reliability could change depending on which hours and days resource adequacy is at risk. However, the existing rules are not equipped to account for changing reliability contributions because Qualified Capacity values for ADCRs are largely static over time. As a result, the current accredited capacity framework for ADCRs may not provide the most accurate entry/exit signals, which would be inconsistent with the sustainability design objective as system and market conditions evolve.

Figure 2: Total ADCR Maximum Reduction Offered by Hour, Season, and Type of Day (CCP 12 – 14)



[7] The hourly averages of the total maximum offered reduction are calculated only for DRRs that are associated with ADCRs and exist throughout the entire observation period, which is from June 2021to May 2024.

Section 2.3. Enhancement 3: Capacity market compensation can be improved to better align with ADCRs' contributions to resource adequacy

Figure 1 demonstrated that there is substantial variation in the ability of ADCRs to perform and Enhancement 1 noted that this expected performance could be better reflected. In addition to impacting the market's ability to meet its reliability design objective, better accounting for non-performance in capacity market compensation can enhance the market's cost-effectiveness.

Table 2 shows a simple numerical example with two ADCRs, in which there are three hours that are important for resource adequacy (*i.e.*, MRI hours).

- ADCR1 has 20 MW of QC that was determined through information submitted in the qualification process and is able to perform at its full 20 MW during the hours that are important for resource adequacy. That is, their expected performance during the MRI hours is 20 MW.
- ADCR2 has 30 MW of QC but is only available, on average, at 15 MW in the hours that are important for resource adequacy.

Note that, if the existing capacity market procured ADCR1, it would procure 20 MW of accredited capacity that is expected to be available at 20 MW during the hours where resource adequacy is at risk. However, if the capacity market procured ADCR2, it would procure 30 MW of accredited capacity that is expected to be available at only 15 MW during the hours where resource adequacy is at risk. As a result, under current rules, if both ADCRs were to sell their full QC in the auction, ADCR1 would be paid less than ADCR2 because its QC is smaller even though ADCR1 is expected to provide a greater contribution to resource adequacy. This is not consistent with the cost-effectiveness design objective.

Table 2: Example of Two ADCRs and their Expected Performance

Hour	ADCR1	ADCR2
1	20 MW	0 MW
2	20 MW	15 MW
3	20 MW	30 MW
Expected Performance	20 MW	15 MW
QC	20 MW	30 MW

Section 3. MRI Accreditation Framework for ADCRs

This section discusses the proposed MRI approach to accreditation for ADCRs, where ADCRs will be accredited based on their expected performance during the MRI Hours. First, Section 3.1 walks through the proposed process for modeling ADCRs, providing a simple numerical example. Then, Section 3.2 describes how this proposed modeling framework correspond to Enhancements 1, 2, and 3 from Section 2.

The ISO proposes developing hourly profiles for ADCRs to estimate their capability during the MRI Hours. As mentioned in the September Markets Committee memo on the MRI framework, profile modeling allows resources' available capacity to vary hour by hour as a function of the resources' physical characteristics or historical performance. To elaborate, ADCR profiles will be developed using Maximum Reductions offered by DRRs—associated with each ADCR—in real time over the most recent three years for each relevant season. Note that Maximum Reduction offers were used partly because many DRRs are rarely dispatched in practice (see Appendix A1). These profiles, based on Maximum Reduction values, will be adjusted downward by a performance factor to correct for any overrepresentation of capability. The finalized profiles will be limited to the ADCR's seasonal MCap, which is discussed in more detail in Section 4 along with other input data used for developing ADCR profiles. The ISO does not propose to use an outage rate directly for ADCRs, as this will be captured in the profiles (*i.e.*, when an ADCR is on outage, its profiles should reflect this). The numerical example below walks through the steps taken for ADCR profile development.

Section 3.1. Example of Profile Development

DRRs submit offers including their Maximum Reduction value for use in the real-time energy market. Profiles are created for each DRR with adjustments made for potential non-performance, and values are limited to each DRR's MCap. These DRR-specific profiles are then aggregated to the ADCR level based upon the DRR-to-ADCR assignments, resulting in the total adjusted Maximum Reduction values for each ADCR representing the expected hourly performance of the associated DRRs. ADCR profile development involves six steps:

Step 1: Calculate DRR-specific performance factors
Compute DRR-specific performance factors for each season-year in the observation period based on observed performance relative to dispatch for each season-year within the observation period. That is, a performance factor will be calculated for each season in the lookback period. The detailed formula for the performance factor calculation can be found in Section A6.

Step 2: Adjust DRR Maximum Reductions by performance factors
Apply the performance factor from the corresponding season-year to the Maximum Reduction offered to account for any underperformance. Underperformance is determined based on DRRs that are not able to demonstrate the ability to operate at the level they offered. This could be observed through either economic dispatch or capability audits.

Step 3: Limit the adjusted values from Step 2 to contemporaneous MCap
Limit the adjusted values from Step 2 to the DRR's MCap associated with the DRA-to-DRR assignment as of the day Maximum Reduction value was offered. This ensures hourly profiles do not exceed demonstrated capability.

Step 4: Scale values from Step 3 to MCap at the time of accreditation
Scale the values from Step 3 by the MCap ratio of the DRR's MCap at the time of accreditation to its MCap associated with the DRR as of the day the Maximum Reduction value was offered. This scaling factor accounts for the variability in Maximum Reduction caused by changes in DRA-to-DRR assignments over time.

Step 5: Calculate hourly average adjusted Maximum Reductions for each DRR
Calculate the hourly average of the final adjusted Maximum Reduction values across all days in the observation period.

Step 6: Aggregate DRR profiles for each ADCR
Sum the hourly average adjusted Maximum Reduction values for all DRRs assigned to the ADCR at the time of accreditation to produce the finalized hourly profiles.[8]

The two examples below illustrate how ADCR profiles are developed. In the first example, a single DRR makes up the entire ADCR, with an observation period of two days, each consisting of three hours. The second example builds on the first by adding another DRR to the same ADCR, demonstrating how profiles are calculated when multiple DRRs constitute an ADCR. In practice, the observation period will include either ten or five days depending on the type of day, as explained in Appendix A2, and will cover all 24 hours. These examples also assume that the DRR's MCap does not change over the sample period, which means the scaling factor in Step 4 equals one.[9]

Section 3.1.1 Example 1: A single DRR is assigned to a single ADCR.

- The observation period in this example consists of two days, each spanning three hours.
- The DRR submits its Maximum Reduction values.
- The DRR is dispatched for 4 MW during Hour 2 of Day 1 and dispatched again during Hour 3 of Day 2 for 6 MW. The DRR performs at 4 MW during the first dispatch and at 5 MW during the second.

[8] Appendix A3 discusses the application of avoided peak T&D loss factor.
[9] Appendix A4 provides an example where the DRR's MCap changes from year to year.

Table 3: Maximum Reduction, Dispatch, and Performance of DRR in Example 1

Day	Hour	Max Reduction Offered	Dispatch	Performance	Day	Hour	Max Reduction Offered	Dispatch	Performance
1	1	3 MW	-	-	2	1	4 MW	-	-
1	2	4 MW	4 MW	4 MW	2	2	5 MW	-	-
1	3	4 MW	-	-	2	3	6 MW	6 MW	5 MW

Step 1 calculates the DRR's performance factor by dividing the sum of actual performances by the sum of instructed dispatch amounts for each interval the DRR was dispatched, where each actual performance has a lower bound of zero and an upper bound of the dispatch instruction. In this example, the performance factor is calculated as: (4+5)/(4+6)=90%.

Step 2 applies the 90% performance factor to the Maximum Reduction values in each hour to adjust for any underperformance, as shown in Table 4.

Table 4: Performance-Adjusted Maximum Reduction in Example 1

Day	Hour	Performance-Adjusted Maximum Reduction	Day	Hour	Performance-Adjusted Maximum Reduction
1	1	3x90%=2.7 MW	2	1	4x90%=3.6 MW
1	2	4x90%=3.6 MW	2	2	5x90%=4.5 MW
1	3	4x90%=3.6 MW	2	3	6x90%=5.4 MW

Step 3 compares the performance-adjusted average Maximum Reductions from Step 2 to the DRR's MCap, as shown in Table 5. In this example, the maximum demonstrated value in the observation period, serving as the MCap, is 5 MW. In practice, an ADCR's MCap will be their maximum demonstrated capability over the last three seasons.

- If the adjusted average Maximum Reduction is less than or equal to the MCap, no further adjustment is needed.
- If it is greater than the MCap, the final adjusted Maximum Reduction will be limited to the DRR's MCap. This ensures that no resource is modeled beyond its maximum demonstrated capability.

The performance-adjusted Maximum Reduction values do not exceed the DRR's MCap during all hours except Hour 3 of Day 2. As a result, the final adjusted Maximum Reduction values are simply equal to the performance-adjusted values for these hours. However, during Hour 3 of Day 2, the DRR's MCap is less than the performance-adjusted Maximum Reduction. Therefore, the final adjusted Maximum Reduction for Hour 3 of Day 2 is limited to the DRR's MCap.

Table 5: Final Adjusted Maximum Reduction in Example 1

Day	Hour	Performance -Adjusted Maximum Reduction	MCap	Final Adjusted Max Reduction	Day	Hour	Performance-Adjusted Maximum Reduction	MCap	Final Adjusted Max Reduction
1	1	2.7 MW	5.0 MW	2.7 MW	2	1	3.6 MW	5.0 MW	3.6 MW
1	2	3.6 MW	5.0 MW	3.6 MW	2	2	4.5 MW	5.0 MW	4.5 MW
1	3	3.6 MW	5.0 MW	3.6 MW	2	3	5.4 MW	5.0 MW	5.0 MW

Step 4 is not detailed in this example because the scaling factor is equal to one, due to the static MCap. As a result, it does not impact the final adjusted Maximum Reduction values.

Step 5 averages the final adjusted Maximum Reduction values for each hour across all days in the sample, as shown in Table 6.

Table 6: Hourly Average of Final Adjusted Max Reduction of DRR in Example 1

Hour	Average Max Reduction Offered
1	(2.7+3.6)/2 = 3.15 MW
2	(3.6+4.5)/2 = 4.05 MW
3	(3.6+5.0)/2 = 4.30 MW

Step 6 determines the final aggregated ADCR profiles. Since the ADCR consists of only one DRR in this example, its hourly profiles are equal to the DRR's hourly averages of the final adjusted Maximum Reduction values.

Section 3.1.2. Example 2: Two DRRs constitute a single ADCR.

- DRR A and DRR B are two different DRRs that are the only DRRs assigned to the same ADCR.
- The observation period in the example consists of two days, each spanning three hours.
- DRR A and DRR B submit their Maximum Reduction values.
- DRR A is dispatched for 4 MW during Hour 2 of Day 1 and again for 6 MW during Hour 3 of Day 2. It performs at 4 MW during the first dispatch and at 5 MW during the second. DRR B is dispatched for 4 MW during both Hour 2 of Day 1 and Hour 3 of Day 2, and it performs at 4 MW during both dispatch hours.

Table 7: Maximum Reduction, Dispatch, and Performance of DRRs in Example 2

DRR	Day	Hour	Max Reduction Offered	Dispatch	Performance	Day	Hour	Max Reduction Offered	Dispatch	Performance
A	1	1	3 MW	-	-	2	1	4 MW	-	-
A	1	2	4 MW	4 MW	4 MW	2	2	5 MW	-	-
A	1	3	4 MW	-	-	2	3	6 MW	6 MW	5 MW
B	1	1	4 MW	-	-	2	1	4 MW	-	-
B	1	2	4 MW	4 MW	4 MW	2	2	4 MW	-	-
B	1	3	4 MW	-	-	2	3	4 MW	4 MW	4 MW

Step 1 calculates the performance factor of each DRR. The performance factor for DRR A is the same as in Example 1: (4+5)/(4+6)=90%. DRR B's performance factor is: (4+4)/(4+4)=100%.

Step 2 applies these performance factors to the Maximum Reduction values for each hour to adjust for any underperformance, as shown in Table 8.

Table 8: Performance-Adjusted Maximum Reduction in Example 2

DRR	Day	Hour	Performance-Adjusted Maximum Reduction	Day	Hour	Performance-Adjusted Maximum Reduction
A	1	1	3x90%=2.7 MW	2	1	4x90%=3.6 MW
A	1	2	4x90%=3.6 MW	2	2	5x90%=4.5 MW
A	1	3	4x90%=3.6 MW	2	3	6x90%=5.4 MW
B	1	1	4x100%=4.0 MW	2	1	4x100%=4.0 MW
B	1	2	4x100%=4.0 MW	2	2	4x100%=4.0 MW
B	1	3	4x100%=4.0 MW	2	3	4x100%=4.0 MW

Step 3 compares the adjusted average Maximum Reduction values from Step 2 to the revelant DRR's MCap, as shown in Table 9. In this example, DRR A has a maximum demonstrated value of 5 MW and DRR B has a maximum demonstrated value of 4 MW. Accordingly, the MCap value is 5 MW for DRR A and 4 MW for DRR B.

- If the adjusted average Maximum Reduction value is less than or equal to the MCap, no further adjustment is needed.
- If it is greater than the MCap, the final adjusted Maximum Reduction value will be limited to the DRR's MCap. This ensures that no resource is modeled beyond its demonstrated capability.

The performance-adjusted Maximum Reduction values do not exceed the DRR's MCap during all hours except Hour 3 of Day 2. As a result, the final adjusted Maximum Reduction values are simply equal to the performance-adjusted values for these hours. However, during Hour 3 of Day 2, the DRR's MCap is less than the performance-adjusted Maximum Reduction value. Therefore, the final adjusted Maximum Reduction value for Hour 3 of Day 2 is limited to the DRR's MCap. For DRR B, its performance-adjusted Maximum Reduction values never exceed its MCap. Thus, DRR B's final values are equal to its performance-adjusted values for all hours.

Table 9: Final Adjusted Maximum Reduction in Example 2

DRR	Day	Hour	Performance-Adjusted Maximum Reduction	MCap	Final Adjusted Max Reduction	Day	Hour	Performance-Adjusted Maximum Reduction	MCap	Final Adjusted Max Reduction
A	1	1	2.7 MW	5.0 MW	2.7 MW	2	1	3.6 MW	5.0 MW	3.6 MW
A	1	2	3.6 MW	5.0 MW	3.6 MW	2	2	4.5 MW	5.0 MW	4.5 MW
A	1	3	3.6 MW	5.0 MW	3.6 MW	2	3	5.4 MW	5.0 MW	5.0 MW
B	1	1	4.0 MW	4.0 MW	4.0 MW	2	1	4.0 MW	4.0 MW	4.0 MW
B	1	2	4.0 MW	4.0 MW	4.0 MW	2	2	4.0 MW	4.0 MW	4.0 MW
B	1	3	4.0 MW	4.0 MW	4.0 MW	2	3	4.0 MW	4.0 MW	4.0 MW

Step 4 is not detailed in this example because the scaling factor is equal to one for both DRRs, due to their static MCaps. As a result, the scaling factors do not impact the final adjusted Maximum Reduction values.

Step 5 averages the final adjusted Maximum Reduction values by DRR for each hour across all days in the sample, as shown in Table 6.

Table 10: Hourly Average of Final Adjusted Max Reduction of DRR in Example 2

DRR	Hour	Average Max Reduction Offered
A	1	(2.7+3.6)/2 = 3.15 MW
A	2	(3.6+4.5)/2 = 4.05 MW
A	3	(3.6+5.0)/2 = 4.30 MW
B	1	(4.0+4.0)/2 = 4.00 MW
B	2	(4.0+4.0)/2 = 4.00 MW
B	3	(4.0+4.0)/2 = 4.00 MW

Step 6 adds the final adjusted Maximum Reduction values of DRR A and DRR B for each hour to generate the ADCR's final hourly profiles as shown in Table 11.

Table 11: Hourly Average of Final Adjusted Max Reduction of DRR in Example 1

Hour	ADCR Hourly Profile
1	3.15+4.00 = 7.15 MW
2	4.05+4.00 = 8.05 MW
3	4.30+4.00 = 8.30 MW

Section 3.2.1. Feature 1: Modeling ADCRs based on their expected performance during the MRI hours helps ensure that the capacity market procures resources that can perform during hours when resource adequacy is at risk

Enhancement 1 above notes that under existing rules, the QC for ADCRs may not reflect their expected performance during hours when resource adequacy is at risk. Directly accrediting ADCRs based on their expected performance during the MRI Hours will help the capacity market procure ADCRs that can contribute to reliability during tight system conditions.

To support this, finalized ADCR profiles will be developed by adjusting the hourly Maximum Reduction values of DRRs, assigned to the ADCR, for non-performance. These profiles will then serve as representations of ADCRs' hourly expected performance, which are in turn used to compute ADCRs' expected performance during the MRI Hours. As explained in the memo on the MRI framework from the September Markets Committee, a resource's performance during such hours will determine its accreditation value, representing the maximum amount of capacity it can sell.

Section 3.2.2. Feature 2: The MRI framework allows ADCRs' accredited capacity to shift over time and reflect changing system and market conditions as well as changes to the ADCRs themselves

Enhancement 2 above notes that QC may not reflect ADCRs' capability as market and system conditions evolve. That is, the existing rules may fail to send ADCRs appropriate market signals for entry and exit. Under the MRI framework, the MRI Hours can change for each seasonal accreditation period to reflect the changes in the system and market conditions.

The MRI framework will improve the entry and exit signals for ADCRs as the system and market conditions evolve providing information to the market on the types of demand reduction capabilities that are least and most valuable to mitigate resource adequacy risk. First, the ISO can calculate the expected performance of ADCRs for the changing MRI Hours for each new accreditation period (*i.e.*, season). With hourly profiles reflecting ADCRs' expected hourly capabilities, the MRI framework enables us to flexibly calculate the expected performance of ADCRs for any set of hours that are determined to be MRI Hours. Second, the MRI framework can account for any changes that ADCRs may undergo, including changes in the underlying technologies or capabilities of DRAs that constitute ADCRs. The hourly profiles will also be able to capture the changes in the ADCRs' expected hourly performance, which will then be used as inputs for calculating their expected performance during the MRI Hours.

Section 3.2.3. Feature 3: ADCRs with greater expected contributions to reliability will receive more compensation than those with smaller resource adequacy contributions

Enhancement 3 above notes that capacity market compensation may not accurately reflect ADCRs' contributions to resource adequacy under current rules. Seasonal accreditation of ADCRs under the MRI framework will provide more compensation to ADCRs with greater expected contributions to resource adequacy.

The MRI framework will better link ADCRs' capacity market compensation to their expected resource adequacy contributions by i) ensuring that ADCRs cannot sell capacity in excess of their demonstrated capability, and ii) adjusting for profiles down to reflect Maximum Reduction offers that overrepresented actual demonstrated capability. Consider Table 10 below, which is an extension of Table 2 from Section 2.3 above. Table 10 is identical to Table 2, except for the addition of Row 6 (MRI Capacity), which includes the accredited capacity for ADCR1 and ADCR2 using the MRI framework.

Table 10: Example of Two ADCRs and their Expected Performance Extended

Hour	ADCR1	ADCR2
1	20 MW	0 MW
2	20 MW	15 MW
3	20 MW	30 MW
Expected Performance	20 MW	15 MW
QC	20 MW	30 MW
MRI Capacity	20 MW	15 MW

Under the existing framework, ADCR2 is accredited at its maximum capability of 30 MW, even though its ability to provide energy varies by hour. On average, ADCR2 can provide 15 MW across the three MRI Hours in the example. In other words, while 30 MW of ADCR2's capacity is purchased under the existing framework, ADCR2 can only provide 15 MW of energy per hour on average.

The MRI framework improves upon this by accrediting resources based on their expected performance during the MRI Hours. Under this approach, ADCR1 is accredited at 20 MW and ADCR2 is accredited at 15 MW, better aligning accredited capacity with each resource's expected contribution to resource adequacy.

Section 4. Input Data for ADCR Profile Development

Section 4.1. Maximum Reduction Offered

The ISO proposes developing hourly profiles by season and day type–one set of profiles for weekdays and another set for weekends and holidays combined—based on historical Maximum Reductions offered in the energy market from highest load days. DRRs submit Maximum Reduction, analogous to economic maximum limit for conventional generators, in real time in the energy market. These values will be drawn from the ten non-holiday weekdays and five weekend-days and holidays with the highest system load within the relevant season, based on data from the most recent three years. A detailed explanation of the lookback period and the rationale for selecting the number of days is provided in Appendix A2.

Section 4.2. Maximum Capability (MCap)

The MCap of a resource is its maximum demonstrated output during the most recent three years of the relevant season. For ADCRs, the MCap is calculated before accreditation, for each new season, by aggregating the maximum demonstrated output of each DRA assigned to the ADCR through DRRs.[10] This method is robust to changes in the ADCR composition, because the demonstrated maximum output values are available at the DRA level. By basing the MCap on the "current" composition of DRAs at the time of accreditation, the calculation reflects any DRAs that have retired or newly joined a DRR comprising the ADCR ahead of the qualification process for the period.

Section 4. 3. Dispatch and Performance Data

Dispatch and performance data, available at the DRR level, are used to calculate the DRR-specific performance factor for each season-year in the observation period for profile development of DRRs associated with an ADCR. DRRs are dispatched based on economic merit in the energy market, and both dispatch and performance data are collected for every hour of dispatch. Performance is assessed using real-time telemetry data, by comparing actual consumption against the DRR's baseline energy usage.

Unlike MCaps, which are robust to changes in ADCR composition, dispatch and performance data cannot be disaggregated to the asset level because the performance rate of each DRA cannot be inferred. For instance, consider a DRR, composed of DRA A and DRA B, that offers 5 MW for a given hour. This offer is observed at the DRR level, and the ISO cannot determine how much of the 5 MW comes from each DRA. It could all come from DRA A, all from DRA B, or be split between them in any combination that amounts to 5 MW. That is, although telemetry data are available at the DRA level, providing the numerator of the performance rate, the ISO does not observe the denominator, since market participants allocate their offer quantities at the DRR level, not at the DRA level. For this reason, the ISO proposes calculating a separate performance factor for each season-year in the observation period used for profile development.

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[10] See the presentation on Maximum Capability in Capacity Auction Reforms from the October Markets Committee for additional details.

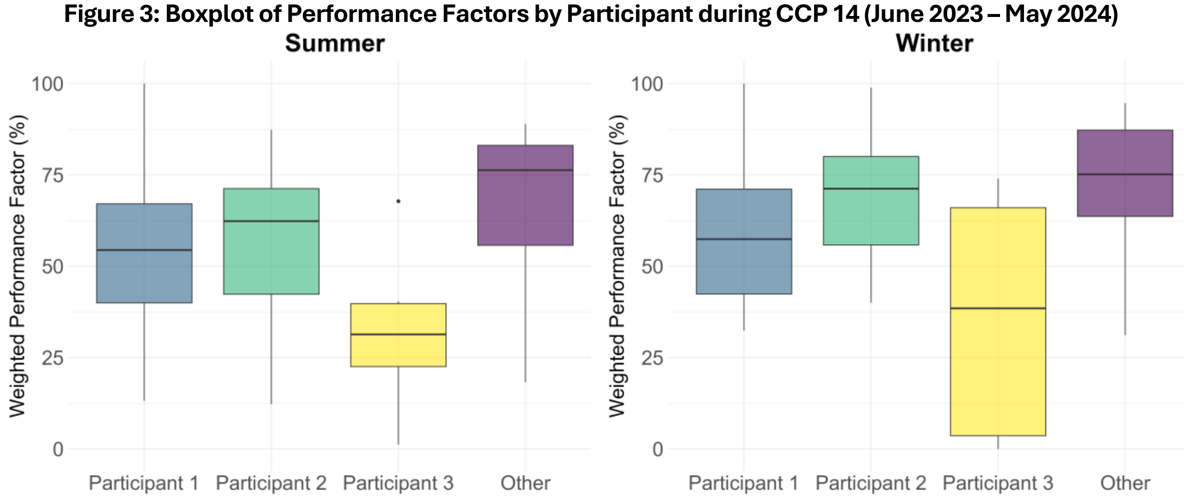
Section 5. Recently Commercial Resources

This section discusses the treatment of recently commercial DRRs that lack Maximum Reduction data from the selected highest load days from the prior three like seasons. In the prompt, seasonal capacity market, all resources must be commercial to participate. However, recently commercial resources may not have sufficient historical Maximum Reduction or performance data from the relevant prior seasons. These rules only apply to cases where a new DRR is registered with the ISO and does not apply to cases where DRAs are being added to an existing DRR that has offer data for the prior three seasons. When a new DRA is added, the profile for the DRR is extended to the new DRA through scaling, or Step 4 in the profile development process from Section 3.1.

Recall that the historical sample used to develop DRR profiles, which are later aggregated to form ADCR profiles, consists of highest-load days from the most recent three years. If a resource has been commercial for less than three years, it may lack data for some of the selected days. In such cases, the ISO proposes using participant-specific values for days when a resource's data are unavailable, and the resource's actual data for days when they were commercial. An example of this approach is provided in Appendix A5.

The remainder of this section explains the rationale behind a participant-specific value. Lead Market Participants can employ similar asset management strategies across their portfolios, resulting in comparable performance levels amongst their assets. Figure 3 displays the participant-specific performance factors calculated using dispatch and performance data from June 2023 to May 2024. The figure shows that ADCR performance factors can vary significantly by Lead Market Participant. Therefore, the ISO proposes accrediting recently commercial resources using participant-specific values.

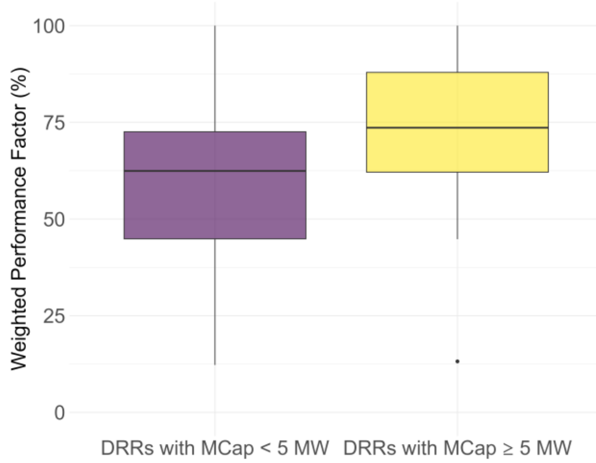
Figure 3: Boxplot of Performance Factors by Participant during CCP 14 (June 2023 – May 2024)



If the Lead Market Participant managing the recently commercial resource does not manage any other ADCRs with historical data, the ISO proposes accrediting the recently commercial resource using the class average of all existing ADCRs.

However, the ISO proposes that large single resources—defined as 5 MW or larger—be treated separately. Currently, around 190 MW of DRRs (based on Maximum Interruptible Capacity) fall into this category. The ISO recommends establishing two separate class averages for DRRs that are assigned to ADCRS: one for large single resources (≥ 5MW) and another for all other resources. As illustrated in Figure 4, large single DRRs tend to perform considerably better than aggregations of smaller DRRs.

Figure 4: Boxplot of Performance Factors by MCap Threshold during CCP 14 (June 2023 – May 2024)



Section 6. Incentives under the MRI Accreditation Design for ADCRs

This section builds on the examples from Section 3 to demonstrate the robustness of the ADCR accreditation design. Specifically, it shows how applying the performance factor and limiting profiles by the resource's MCap incentivizes DRRs to align their energy market Maximum Reduction offers with their expected capabilities. Examples 3 and 4 are variations of Examples 1 and 2, respectively. Any figure that differs from its counterpart example from Section 3 is highlighted in red.

Section 6.1. Example 3: A single DRR is assigned to a single ADCR (Variation of Example 1 from Section 3.1).

- The observation period in this example consists of two days, each spanning three hours.
- The DRR submits its Maximum Reduction values.
- Unlike in Example 1, where the DRR did not get a performance factor of 100%, assume it now offers Maximum Reduction values that are equal to their actual performance.

Table 12: Maximum Reduction, Dispatch, and Performance of DRR in Example 3

Day	Hour	Max Reduction Offered	Dispatch	Performance	Day	Hour	Max Reduction Offered	Dispatch	Performance
1	1	3 MW	-	-	2	1	4 MW	-	-
1	2	4 MW	4 MW	4 MW	2	2	5 MW	-	-
1	3	4 MW	-	-	2	3	5 MW	5 MW	5 MW

Step 1 calculates the DRR's performance factor by dividing the sum of actual performances by the sum of instructed dispatch amounts for each interval the DRR was dispatched, where each actual performance has a lower bound of zero and an upper bound of the dispatch instruction. In this example, the performance factor is calculated as: (4+5)/(4+5)=100%.

Step 2 applies the 100% performance factor to the Maximum Reduction values for each hour to adjust for any underperformance, as shown in Table 13.

Table 13: Performance-Adjusted Maximum Reduction in Example 3

Day	Hour	Performance-Adjusted Maximum Reduction	Day	Hour	Performance-Adjusted Maximum Reduction
1	1	3x100%=3 MW	2	1	4x100%=4 MW
1	2	4x100%=4 MW	2	2	5x100%=5 MW
1	3	4x100%=4 MW	2	3	5x100%=5 MW

Step 3 compares the adjusted average Maximum Reduction values from Step 2 to the DRR's MCap, as shown in Table 14. In this example, the maximum demonstrated value in the observation period, serving as the MCap, is still 5 MW. (In practice, an ADCR's MCap will be their maximum demonstrated capability over the last three seasons.)

- If the adjusted average Maximum Reduction value is less than or equal to the MCap, no further adjustment is needed.
- If it is greater than the MCap, the final adjusted Maximum Reduction value will be limited to the DRR's MCap. This ensures that no resource is modeled beyond its demonstrated capability.

Since none of the performance-adjusted Maximum Reduction values in Table 14 exceed the MCap, the final adjusted Maximum Reductions are identical to the performance-adjusted values.

Table 14: Final Adjusted Maximum Reduction in Example 3

Day	Hour	Performance -Adjusted Maximum Reduction	MCap	Final Adjusted Max Reduction	Day	Hour	Performance-Adjusted Maximum Reduction	MCap	Final Adjusted Max Reduction
1	1	3 MW	5 MW	3 MW	2	1	4 MW	5 MW	4 MW
1	2	4 MW	5 MW	4 MW	2	2	5 MW	5 MW	5 MW
1	3	4 MW	5 MW	4 MW	2	3	5 MW	5MW	5 MW

Step 4 is not detailed in this example because the scaling factor is equal to one, due to the static MCap, and therefore it does not change the final adjusted Maximum Reduction values.

Step 5 averages the final adjusted Maximum Reduction values across all days in the sample, for each hour, as shown in Table 6.

Table 15: Hourly Average of Final Adjusted Max Reduction of DRR in Example 1

Hour	Average Max Reduction Offered
1	(3+4)/2 = 3.5 MW
2	(4+5)/2 = 4.5 MW
3	(5+5)/2 = 4.5 MW

Step 6 finalizes the ADCR profiles. Since the ADCR only consists of one DRR in this example, its hourly profiles equal the DRR's hourly average of final adjusted Maximum Reduction values. **These profiles are strictly higher than those in Example 1 (where the DRR had a higher Maximum Reduction offered for Hour 3 on Day 2, but did not meet this value in performance) for all hours.**

Section 6. 2. Example 2: Two DRRs constitute a single ADCR (Variation of Example 2 in Section 3.2).

- DRR A and DRR B are two different DRRs that are the only DRRs assigned to the same ADCR.
- The observation period in the example consists of two days, each spanning three hours.
- DRR A and DRR B submit their Maximum Reduction values.

- DRR A is the same DRR as that in Example 3. Unlike in Example 2, DRR A now offers Maximum Reduction values that are equal to their actual performance and gets a performance factor of 100%. DRR B is the same as in Example 2.

Table 16: Maximum Reduction, Dispatch, and Performance of DRRs in Example 4

DRR	Day	Hour	Max Reduction Offered	Dispatch	Performance	Day	Hour	Max Reduction Offered	Dispatch	Performance
A	1	1	3 MW	-	-	2	1	4 MW	-	-
A	1	2	4 MW	4 MW	4 MW	2	2	5 MW	-	-
A	1	3	4 MW	-	-	2	3	5 MW	5 MW	5 MW
B	1	1	4 MW	-	-	2	1	4 MW	-	-
B	1	2	4 MW	4 MW	4 MW	2	2	4 MW	-	-
B	1	3	4 MW	-	-	2	3	4 MW	4 MW	4 MW

Step 1 calculates the performance factor of each DRR. The performance factor for DRR A is the same as in Example 3: (4+5)/(4+5)=100%. DRR B's performance factor is: (4+4)/(4+4)=100%.

Step 2 applies the performance factors to the Maximum Reduction values in each hour to adjust for any underperformance, as shown in Table 8.

Table 17: Performance-Adjusted Maximum Reduction in Example 4

DRR	Day	Hour	Performance-Adjusted Maximum Reduction	Day	Hour	Performance-Adjusted Maximum Reduction
A	1	1	3x100%=3 MW	2	1	4x100%=4 MW
A	1	2	4x100%=4 MW	2	2	4x100%=5 MW
A	1	3	4x100%=4 MW	2	3	5x100%=5 MW
B	1	1	4x100%=4 MW	2	1	4x100%=4 MW
B	1	2	4x100%=4 MW	2	2	4x100%=4 MW
B	1	3	4x100%=4 MW	2	3	4x100%=4 MW

Step 3 compares the adjusted average Maximum Reduction values from Step 2 to the DRR's MCap, as shown in Table 17. In this example, DRR A has a maximum demonstrated value of 5 MW and DRR B has a maximum demonstrated value of 4 MW, resulting in MCaps of 5 MW and 4 MW, respectively.

- If the adjusted average Maximum Reduction value is less than or equal to the MCap, no further adjustment is needed.
- If it is greater than the MCap, the final adjusted Maximum Reduction value will be limited to the DRR's MCap. This ensures that no resource is modeled beyond its demonstrated capability.

In this example, none of the performance-adjusted Maximum Reduction values exceed their respective MCaps, so no additional adjustment is required.

Table 17: Final Adjusted Max Reduction of DRRs in Example 4

DRR	Day	Hour	Performance-Adjusted Maximum Reduction	MCap	Final Adjusted Max Reduction	Day	Hour	Performance-Adjusted Maximum Reduction	MCap	Final Adjusted Max Reduction
A	1	1	3 MW	5 MW	3 MW	2	1	4 MW	5 MW	4 MW
A	1	2	4 MW	5 MW	4 MW	2	2	5 MW	5 MW	5 MW
A	1	3	4 MW	5 MW	4 MW	2	3	5 MW	5 MW	5 MW
B	1	1	4 MW	4 MW	4 MW	2	1	4 MW	4 MW	4 MW
B	1	2	4 MW	4 MW	4 MW	2	2	4 MW	4 MW	4 MW
B	1	3	4 MW	4 MW	4 MW	2	3	4 MW	4 MW	4 MW

Step 4 is not detailed in this example because the scaling factor is equal to one for both DRRs, due to their static MCaps, and therefore it does not change the final adjusted Maximum Reduction values.

Step 5 averages the final adjusted Maximum Reduction values by DRR for each hour across all days in the sample, as shown in Table 18.

Table 18: Hourly Average of Final Adjusted Max Reduction of DRR in Example 4

DRR	Hour	Average Max Reduction Offered
A	1	(3+4)/2 = 3.5 MW
A	2	(4+5)/2 = 4.5 MW
A	3	(4+5)/2 = 4.5 MW
B	1	(4.0+4.0)/2 = 4.0 MW
B	2	(4.0+4.0)/2 = 4.0 MW
B	3	(4.0+4.0)/2 = 4.0 MW

Step 6 adds the final adjusted Maximum Reduction values of DRR A and DRR B for each hour to generate the ADCR's hourly profiles as shown in Table 10. **These profiles are strictly higher than those in Example 2 (where DRA A had a higher Maximum Reduction offered for Hour 3 on Day 2, but did not meet this value in performance) for all hours.**

Table 19: Hourly Average of Final Adjusted Max Reduction of DRR in Example 4

Hour	ADCR Hourly Profile
1	3.5+4.0 = 7.5 MW
2	4.5+4.0 = 8.5 MW
3	4.5+4.0 = 8.5 MW

The examples above illustrate how the performance factor and limiting profiles to a DRR's MCap disincentivize DRRs from overrepresenting their capabilities. DRRs are also disincentivized from underrepresenting their offers for two reasons. First, since dispatch can occur up to the maximum offered reduction, DRRs have an incentive to submit their full expected capability to maximize energy market profits. Second, offers submitted on high peak days are likely to inform the construction of hourly profiles. Thus, the capacity accreditation method, combined with energy market clearing, encourages DRRs to submit offers that accurately reflect their expected capability.

Section 7. Key Takeaways

- The proposed modeling and accreditation framework for ADCRs will improve upon the existing rules by incorporating resources' performance, size (MCap), and historically offered Maximum Reductions into their capacity market compensation. This will help the capacity market to achieve its design objectives of Reliability, Sustainability, and Cost-Effectiveness.

- In general:

  - ADCRs composed of DRRs with better performance factors will receive more accredited capacity, all else equal.

  - Larger ADCRs will receive more accredited capacity, all else equal.

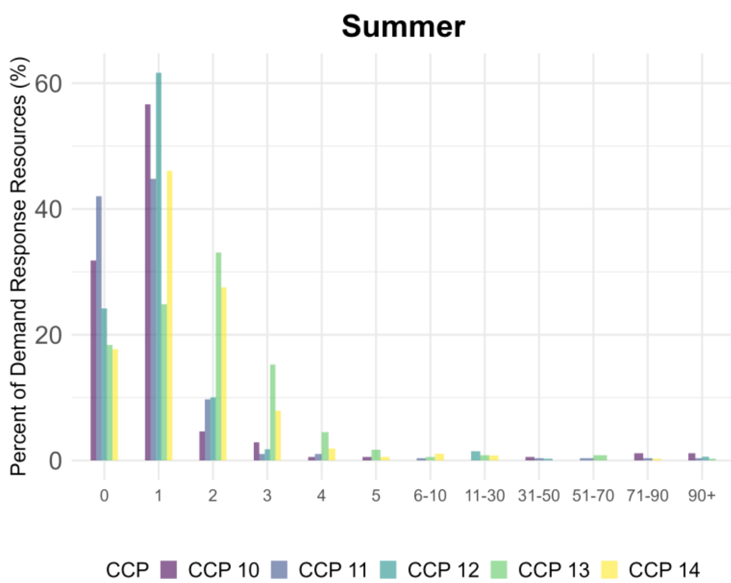
  - ADCRs that have a greater offered capability per MW of MCap will receive more accredited capacity, all else equal.

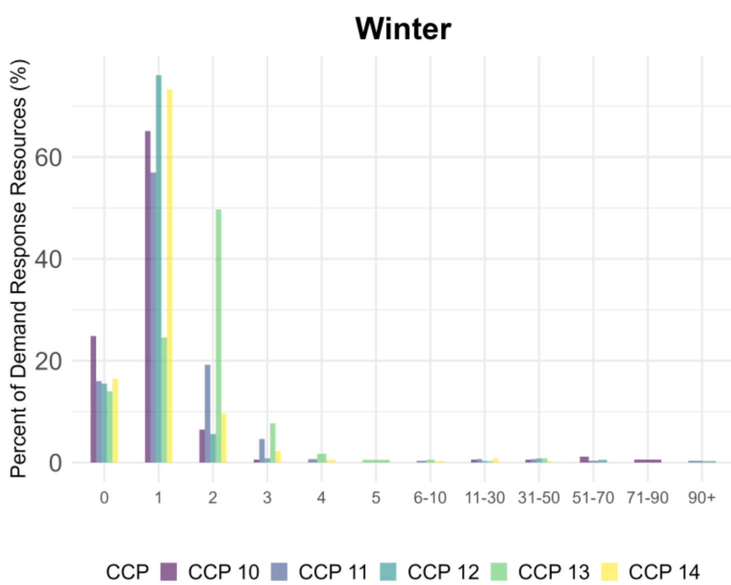
Appendix

Section A1. DRR Dispatch

Figure A1 illustrates the number of days each DRR associated with an ADCR was dispatched during a given CCP by season. It shows that the plurality of the DRRs is dispatched only once per season. These one-time dispatches likely result from an audit request. In fact, 61% of days DRRs were dispatched in the sample period were days when they were audited.

Figure A1: DRR dispatch frequency





Section A2. Sample Selection Criteria

The ISO considered three options for selecting the sample of historical days that will be used to construct the hourly profiles.

Option 1: Rely on Maximum Reductions offered from a select number of days with the highest daily loads in our sample.

Starting from the 2025/2026 Delivery Year, PJM will accredit the FSL (Firm Service Level) resources, or demand resources that reduce their load to a pre-determined level upon notification, in a similar manner. The accreditation of FSL resources will be based on days with *the five* highest non-holiday weekday daily peaks in the summer and the PJM defined *five* coincident peak days from December through February of the previous year respectively.[11]

Option 2: Include days that meet some temperature threshold.

Option 2, considered under RCA, requires identifying a temperature threshold that would serve as a criterion for deciding which historical days will be included in the sample used to construct the hourly profiles. Historical days that satisfy the temperature threshold would indicate days with a higher likelihood of having MRI hours.

Option 3: Include days on which the load level aligned with when loss of load was observed in GE-MARS.

Option 3 is a balance between options 1 and 2. Instead of determining a temperature cutoff, option 3 suggests using historical days that had a daily peak load that falls within a set range of load that leads to scarcity events (or loss-of-load events) in the RAA modeling process.

Recommendation

Option 1 follows objective criteria and is easy to implement. However, peak loads can fluctuate from year to year as the weather shifts. Option 2 is easy to implement once the temperature threshold has been determined. However, as weather can vary considerably from year to year, a predetermined range of temperature may not yield enough data points in years with mild weather. Option 3 requires changing the load cutoff every year according to the RAA modeling process. Moreover, similar to option 2, if the range of load is too tight, there may not be enough observations in the sample.

The ISO recommends option 1 due to its objective criteria and ease of implementation. However, option 1 requires choosing the number of days with high peak loads that will be most representative of resource's expected capability during MRI Hours. The decision rests on the tradeoff between having more observations in the sample to increase the accuracy of the expected ADCR performance estimates and excluding days that are unrepresentative of ADCR performance on days that are likely to have MRI Hours.

[11] The details can be found in section 4.3.7 of PJM Manual 18.
https://www.pjm.com/-/media/DotCom/documents/manuals/m18.ashx

The ISO examined how the variance of Maximum Reduction evolves as the number of highest-load days included in the sample are increased. Increasing the sample size can improve accuracy but can also result in including days that have very different underlying traits from the first few days that were included in the sample. The variance is expected to increase initially as the number of days included in the sample increases as different maximum offers are added to the sample. Then, the variance is expected to stabilize or even decrease as the maximum offer of the additional day is similar to those that were previously added in the sample.

Including more versus fewer years in the sample period faces a similar tradeoff. On one hand, additional years of data help reduce the impact of outlier days by expanding the sample size. On the other hand, going back too many years may introduce outdated information, both in terms of the ADCR composition and the nature of load. To address this, the ISO analyzed how the variance of Maximum Reduction evolves as the number of highest load days that are included in the sample increases, across different lengths of observation period that ranges from two to five of the most recent years. Based on this analysis, the ISO concluded that selecting the 10 non-holiday weekdays and 5 weekend-days and holidays with the highest load in the most recent three years balances the tradeoff the best.

The ISO also considered an alternative approach of developing three sets of profiles for each season and day type, each based on one year within the three-year sample. In this method, the 10 highest load non-holiday weekdays and 5 highest load weekends and holidays from each year would form separate samples, resulting in three profile sets per season. GE-MARS would then randomly select from one of these sets. The advantage of doing this is that the three profile sets will reflect performance under different load levels and weather conditions. However, the Maximum Reduction data from three years ago alone may not accurately reflect the current composition of ADCR. As a result, the ISO determined that using the 10 highest load non-holiday weekdays and 5 highest load weekend-days and holidays from the combined most recent three-year period is most appropriate for the sample range for Maximum Reduction values that will be used for ADCR profile construction.

Section A3. Applying Transmission & Distribution Loss Factor

This appendix explains how average avoided peak transmission and distribution (T&D) losses are applied when accrediting ADCRs. First, the profiles developed following the steps outlined in Section 3 are used to determine the rMRI, or the resource's MRI relative to a perfect capacity resource, of an ADCR. Then, the rMRI value is multiplied by the resource's MCap to obtain the MRIC (Marginal Reliability Impact Capacity).[12] For ADCRs, their MCap will be adjusted upward for this process to account for average avoided peak distribution and transmission losses (8%) in the capacity market, reflecting the benefit to the system of the avoided losses associated with not needing to transmit power over the transmission and distribution network to serve load. These adjustments are only applicable to demand reduction and are not applied to any incremental net supply that may result from reducing load at a facility that includes generating capability. However, because the ISO cannot determine the proportion of a DRR offer that corresponds to demand reduction versus net supply until dispatch—this distinction is made using telemetry data after dispatch—the 8% factor is applied to the full MCap.

[12] See material from October 2025 Markets Committee for more detail on MCap and MRIC.

Section A4. Calculation of MRI Values for ADCRs

Under the MRI accreditation framework, a resource's MRI Capacity can be thought of as their expected performance during the simulated MRI Hours where resource adequacy is at risk. In practice, the ISO will calculate MRI Capacity values for most resources in a multi-step process:

Step 1: The ISO will estimate how a small increase in a resource's Maximum Capability would impact expected unserved energy (EUE) as measured by GE-MARS. We call this a resource's MRI value.

Step 2: The ISO will estimate how a small increase in "perfect capacity" would impact EUE in GE-MARS, where perfect capacity is defined as capacity that is available in every hour.

Step 3: The ISO multiplies the ratio of the resource's MRI value to perfect capacity's MRI value, or the rMRI, with the resource's Maximum Capability. For a given resource i, its MRI Capacity is calculated as follows:

$$MRI\ Capacity_i = \frac{MRI_i}{MRI_{PC}} \times MC_i$$

Note that for ADCRs, MC_i would be adjusted for the 8% avoided transmission and distribution loss factor (i.e., $MC_i \times 1.08$) as explained in Section A3.

Consider this three-step process in the context of Example 1 above. In Step 1, the ADCR's Maximum Capability is increased by 1 MW times the relative hourly profile, calculated by dividing the ADCR's hourly profile by its MCap. As shown in Table A1, this small increase in the ADCR's Maximum Capability reduces unserved energy by 0.63 MWh in Hour 1 and by 0.81 MWh in Hour 2 and has no impact on unserved energy in Hour 3. As a result, $MRI_{ADCR\ i} = \frac{(0.63+0.81)MWh}{MW} = \frac{1.44\ MWh}{MW}$.

Table A1: MRI Calculation for ADCR from Example 1

Hour	ADCR	Other Capacity	Total Capacity	Load	Unserved Energy
1	3.15 MW x 1.08 + 1 MW x (3.15/5.00)	996.60 MW	1,000 MW + 0.63 MW	1,100 MW	100 MWh – 0.63 MWh
2	4.05 MW x 1.08 + 1 MW x (4.05/5.00)	995.63 MW	1,000 MW + 0.81 MW	1,200 MW	200 MWh – 0.81 MWh
3	4.30 MW x 1.08 + 1 MW x (4.30/5.00)	985.36 MW	990 MW + 0.86 MW	950 MW	0 MWh

In Step 2, perfect capacity's MRI is calculated by adding 1 MW of perfect capacity to each hour as shown in Table A2.

Table A2: MRI Calculation for Perfect Capacity

Hour	ADCR	Perfect Capacity	Other Capacity	Total Capacity	Load	Unserved Energy
1	3.15 MW x 1.08	+ 1 MW	996.85 MW	1,000 MW + 1 MW	1,100 MW	100 MWh – 1 MWh
2	4.05 MW x 1.08	+ 1 MW	995.95 MW	1,000 MW + 1 MW	1,200 MW	200 MWh – 1 MWh
3	4.30 MW x 1.08	+ 1 MW	985.70 MW	990 MW + 1 MW	950 MW	0 MWh

Table A2 shows that a small increase in perfect capacity decreases EUE by 2 MWh. As a result, $MRI_{PC} = \frac{2\ MWh}{MW}$.

Finally, in Step 3, we multiply the resource's MCap by the transmission & distribution loss factor and by the ratio of the resource's MRI value to Perfect Capacity's MRI Value:

$$MRI\ Capacity_{ADCR\ i} = \frac{1.44 \frac{MWh}{MW}}{2 \frac{MWh}{MW}} \times 5\ MW \times 1.08 \approx 3.89\ MW.$$

As a result, the MRI Capacity for the ADCR in Example 1, calculated using this three-step process, matches its expected performance during the MRI Hours (Hours 1 and 2).

Section A5. DRA-to-DRR Assignment Changes

The example below in Table A3 makes the following assumptions:

- The DRR's MCap changes only due to changes in the composition, or DRA-to-DRR-to-ADCR assignments, and not due to capability changes of the remaining DRAs. That is, the DRAs that remain assigned to the given DRR are able to demonstrate constant MCaps.[13]
- The DRR's MCap decreases from 10 MW to 6 MW from Year 0 to Year 1, reflecting the disengagement of a DRA with an MCap of 4 MW. In Year 2, a DRA with an MCap of 2 MW is assigned to the DRR, increasing its MCap from 6 MW to 8 MW. In Year 3, another DRA with an MCap of 4 MW is assigned, further increasing the DRR's MCap to 12 MW.
- Days 1 to 10 represent the 10 highest load weekdays from the relevant season across the most recent three years.
- Information not needed to show changes in MCap or profile development is marked with a gray dash, while missing information due to non-dispatch is marked with a black dash.

Table A3: Example DRR that experiences DRA composition changes

Year	Day	Hour	Max Reduction Offered	Dispatch	Performance	MCap	Performance Factor
0	0	1	-	-	-	10 MW	-
1	1	1	6 MW	6 MW	6 MW	6 MW	(6+4)/(6+4) =100%
1	2	1	6 MW	-	-		
1	3	1	6 MW	-	-		
1	4	1	6 MW	-	-		
1	1	2	4 MW	4 MW	4 MW		
1	2	2	5 MW	-	-		
1	3	2	6 MW	-	-		
1	4	2	6 MW	-	-		
2	5	1	8 MW	8 MW	8 MW	8 MW	(8+4)/(8+8) =75%
2	6	1	8 MW	-	-		
2	7	1	8 MW	-	-		
2	5	2	8 MW	8 MW	4 MW		
2	6	2	8 MW	-	-		
2	7	2	4 MW	-	-		
3	8	1	12 MW	12 MW	12 MW	12 MW	(12+4)/(12+8) = 80%
3	9	1	10 MW	-	-		
3	10	1	10 MW	-	-		
3	8	2	8 MW	8 MW	4 MW		
3	9	2	6 MW	-	-		
3	10	2	4 MW	-	-		

[13] The example treats MCap in Year 0 as a given value. However, in practice, the MCap of a DRR in a given year is calculated as the sum of the maximum demonstrated values during the relevant season over the most recent three years, across all DRAs that make up the DRR.

Step 1 calculates the DRR's performance factor by dividing the sum of actual performances by the sum of instructed dispatch for each interval (hours in this example. Each actual performance is capped between zero and the dispatch instruction. These values are then average across all hours. The resulting performance factors are 100%, 75%, and 80% for Years 1, 2, and 3 respectively.

Step 2 applies the performance factor from each season-year to the Maximum Reduction values from the corresponding season-year to adjust for any underperformance, as shown in Table A4.

Step 3 compares the performance-adjusted values from Step 2 to the DRR's MCap as of the day Maximum Reductions were offered. Because the DRR's composition can change, its MCap may also vary. In this example, none of the values exceed the DRR's MCap in the corresponding season-year, so the final adjusted Maximum Reductions match the performance-adjusted values.

Step 4 calculates the scaling factor for each MCap associated with the DRR as of the day the Maximum Reduction values were offered, relative to the DRR's MCap at the time of accreditation (12 MW in this example). The resulting scaling factors are:

- Year 1: 12/6=200%
- Year 2: 12/8=150%
- Year 3: 12/12=100%

Table A4: Maximum Reduction after Adjustment and Scaling

Year	Day	Hour	Performance-Adjusted Maximum Reduction	MCap	Final Adjusted Max Reduction	Scaling Factor	Scaled Max Reduction
1	1	1	6x100%=6.0 MW	6 MW	6.0 MW	12/6 = 200%	6.0x200%=12.0 MW
1	2	1	6x100%=6.0 MW		6.0 MW		6.0x200%=12.0 MW
1	3	1	6x100%=6.0 MW		6.0 MW		6.0x200%=12.0 MW
1	4	1	6x100%=6.0 MW		6.0 MW		6.0x200%=12.0 MW
1	1	2	4x100%=4.0 MW		4.0 MW		4.0x200%=8.0 MW
1	2	2	5x100%=5.0 MW		5.0 MW		5.0x200%=10.0 MW
1	3	2	6x100%=6.0 MW		6.0 MW		6.0x200%=12.0 MW
1	4	2	6x100%=6.0 MW		6.0 MW		6.0x200%=12.0 MW
2	5	1	8x75%=6.0 MW	8 MW	6.0 MW	12/8 = 150%	6.0x150%=9.0 MW
2	6	1	8x75%=6.0 MW		6.0 MW		6.0x150%=9.0 MW
2	7	1	8x75%=6.0 MW		6.0 MW		6.0x150%=9.0 MW
2	5	2	8x75%=6.0 MW		6.0 MW		6.0x150%=9.0 MW
2	6	2	8x75%=6.0 MW		6.0 MW		6.0x150%=9.0 MW
2	7	2	4x75%=3.0 MW		3.0 MW		3.0x150%=4.5 MW
3	8	1	12x80%=9.6 MW	12 MW	9.6 MW	12/12= 100%	9.6x100%=9.6 MW
3	9	1	10x80%=8.0 MW		8.0 MW		8.0x100%=8.0 MW
3	10	1	10x80%=8.0 MW		8.0 MW		8.0x100%=8.0 MW
3	8	2	8x80%=6.4 MW		6.4 MW		6.4x100%=6.4 MW
3	9	2	6x80%=4.8 MW		4.8 MW		4.8x100%=4.8 MW
3	10	2	4x80%=3.2 MW		3.2 MW		3.2x100%=3.2 MW

Step 5 averages the scaled Maximum Reduction values for each hour across all 10 days in the sample, as shown in Table A5.

Table A5: Hourly Average of Scaled Maximum Reduction

Hour	Average Scaled Max Reduction Offered
1	(12.0+12.0+12.0+12.0+9.0+9.0+9.0+9.6+8.0+8.0)/10.0 = 10.06 MW
2	(8.0+10.0+12.0+12.0+9.0+9.0+4.5+6.4+4.8+3.2)/10.0 = 7.89 MW

Step 6 adds the hourly profiles of DRRs that are assigned to the same ADCR to generate the ADCR's finalized hourly profiles.

The DRR's hourly profiles can be summed up as the following:

$$DRR\ Profile_h = \frac{1}{|D_{type}|} \times \sum_d \left[max\left(MCap_d, Max\ Reduction\ Offered_{dh} \times Performance\ Factor_{t_d}\right) \times \frac{MCap_{t_a}}{MCap_d} \right]$$

- h: Hour
- d: Days identified as highest load days in the relevant season across the three most recent years
- t_d: Season-year of day d
- $type$: Day type (weekdays vs. weekends and holidays)
- $|D_{type}|$: Number of days in the set of highest load days (five or ten days depending on the day type)
- D_{type}: Set of days included in the period of highest load days for the specified day type
- $MCap_d$: MCap of the DRR as of day d
- $MCap_{t_a}$: MCap of the DRR as of t_a, or at the time of accreditation

The following is how the performance factor is calculated for DRR i in season s of year y:

$$Performance\ Factor_{isy} = \frac{\Sigma_{t \in T_{sy}} \max(0, min(performance_{it}, dispatch_{it}))}{\Sigma_{t \in T_{sy}} dispatch_{it}}$$

T_{sy}: Set of 5-minute intervals in season s of year y
$performance_{it}$: Total load reduction and net supply provided by DRR i during interval t
$dispatch_{it}$: ISO's dispatch instruction for DRR i during interval t(including both economic dispatch and capability audits)

Section A6. Profile Development for DRRs with Missing Data

For DRRs that do not have Maximum Reduction and performance data across all of the highest load days in the three-year lookback period, the ISO proposes replacing any missing data with participant-level profile data, scaled by the ratio of the participant's aggregate MCap (from DRRs with complete set of offer data) to the DRR's MCap, as illustrated in Table A6.

In this example, the DRR has data available only for the last four days in the sample of 10 highest-load weekdays. As a result, missing values are replaced with participant-level data. To do this, the ISO first aggregates the hourly profiles of other DRRs owned by the same participant that have complete Maximum Reduction and performance data for the period, which results in 60 MW for Hour 1 and 40 MW for Hour 2. Then, the ISO scales these values by the ratio of the DRR's MCap to the participant's aggregate MCap, which is equal to 10/80=12.5%.

Table A6: Treatment of Missing Data

Year	Day	Hour	Data Availability	Scaled Max Reduction	Participant Aggregate Profile	Participant Aggregate MCap	DRR's MCap	Scaled Max Reduction (Missing Data Filled)
1	1	1	Missing	-	60 MW	80 MW	10 MW	60x(10/80)= 7.5 MW
1	2	1	Missing	-				60x(10/80)= 7.5 MW
1	3	1	Missing	-				60x(10/80)= 7.5 MW
1	4	1	Missing	-				60x(10/80)= 7.5 MW
2	5	1	Missing	-				60x(10/80)= 7.5 MW
2	6	1	Missing	-				60x(10/80)= 7.5 MW
2	7	1	Available	9.0 MW				9.0 MW
3	8	1	Available	9.0 MW				9.0 MW
3	9	1	Available	7.5 MW				7.5 MW
3	10	1	Available	7.5 MW				7.5 MW
1	1	2	Missing	-	40 MW			40x(10/80)= 5.0 MW
1	2	2	Missing	-				40x(10/80)= 5.0 MW
1	3	2	Missing	-				40x(10/80)= 5.0 MW
1	4	2	Missing	-				40x(10/80)= 5.0 MW
2	5	2	Missing	-				40x(10/80)= 5.0 MW
2	6	2	Missing	-				40x(10/80)= 5.0 MW
2	7	2	Available	4.5 MW				4.5 MW
3	8	2	Available	6.0 MW				6.0 MW
3	9	2	Available	4.5 MW				4.5 MW
3	10	2	Available	3.5 MW				3.5 MW

Once the missing data have been replaced with the scaled participant-level profiles, the ISO can perform Step 5 from Section 3 to obtain the hourly average values of scaled Maximum Reduction, as shown in Table A7.

Table A7: Hourly Average of Scaled Maximum Reduction

Hour	Average Scaled Max Reduction Offered
1	(7.5+7.5+7.5+7.5+7.5+7.5+9.0+9.0+7.5+7.5)/10.0 = 7.8 MW
2	(5.0+5.0+5.0+5.0+5.0+5.0+4.5+6.0+4.5+3.0)/10.0 = 4.8 MW

Profile development when missing data are replaced with participant-level data can be summarized in a formula as the following:

$$Profile_{hi} = \frac{|D_{missing}|}{|D_{type}|} \times \left(\sum_{j} Profile_{hj} \times \frac{MCap_{it_a}}{\sum_j MCap_{jt_a}} \right) + \frac{1}{|D_{type}|} \times \sum_{d \notin D_{missing}} Final\ Adjusted\ Max\ Reduction_{dhi}$$

- h: Hour
- i: DRR with missing data for which the hourly profile is being developed
- j: DRRs with complete data managed by the same participant as DRR i
- d: Days identified as highest load days in the relevant season across the three most recent years
- $MCap_{it_a}$: MCap of the DRR i as of t_a, or at the time of accreditation
- $MCap_{jt_a}$: MCap of the DRR j as of t_a, or at the time of accreditation
- $type$: Day type (weekdays vs. weekends and holidays)
- $|D_{type}|$: Number of days in the set of highest load days (five or ten days depending on the day type)
- D_{type}: Set of days included in the period of highest load days for the specified day type
- $|D_{missing}|$: Number of days in the period for which offer data are missing (*i.e.*, DRR was not in operation).
- $D_{missing}$: Set of days where DRR i was not in operation and does not have any offer data.

Section A6. Comparison of ADCR Accreditation under CAR to RCA

The proposed accreditation approach under CAR builds on the accreditation approach that was proposed under Resource Capacity Accreditation (RCA) and presented to stakeholders at the Reliability Committee in January 2024.[14] Several key elements from the RCA proposal have been retained in the CAR proposal, including the use of hourly profiles—developed from DRRs' energy market offers—to capture the variability in ADCR capability throughout the day and between seasons, and the application of a performance factor to the Maximum Reduction offered to account for non-performance.

Key improvements in the CAR proposal include:

1. Limiting profiles to the resource's MCap to ensure that an ADCR's modeled capability does not exceed their actual demonstrated capability. This will help to ensure that the capacity market procures resources that are capable of performing during tight system conditions, helping the market to achieve the Reliability design objective.
2. Using high load days for sample selection instead of defining a temperature threshold: this approach ensures a robust dataset by drawing from the highest peak load days, which is more reliable than temperature-based selection given the possibility of mild seasons in the three most recent years.
3. Using performance data from the relevant season of the most recent year when computing the performance factor to ensure robustness against changes in DRA-to-DRR-to-ADCR assignment. Each Maximum Reduction value is adjusted for non-performance using performance data that are most relevant to the DRR at the time it submitted the Maximum Reduction value.
4. Applying participant-specific averages for recently commercial DRR that lack sufficient historical Maximum Reduction and performance data to create profiles. Given the observed variability in ADCR performance by Lead Market Participant, this improvement is likely to provide capacity market compensation that better reflects new ADCRs' expected resource adequacy contributions.

[14] https://www.iso-ne.com/static-assets/documents/100007/a02_a_rca_raa_adcrs_colocated_ders.pdf