



2025/2026 Base Residual Auction Results

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Markets & Reliability Committee
August 21, 2024

Presentation Sections:

1. Review of the 25/26 BRA results
2. Discussion of factors impacting the 25/26 BRA

If we run out of time today, we are happy to have other sessions to address any and all questions.

Key Market Rule Changes (CIFP)

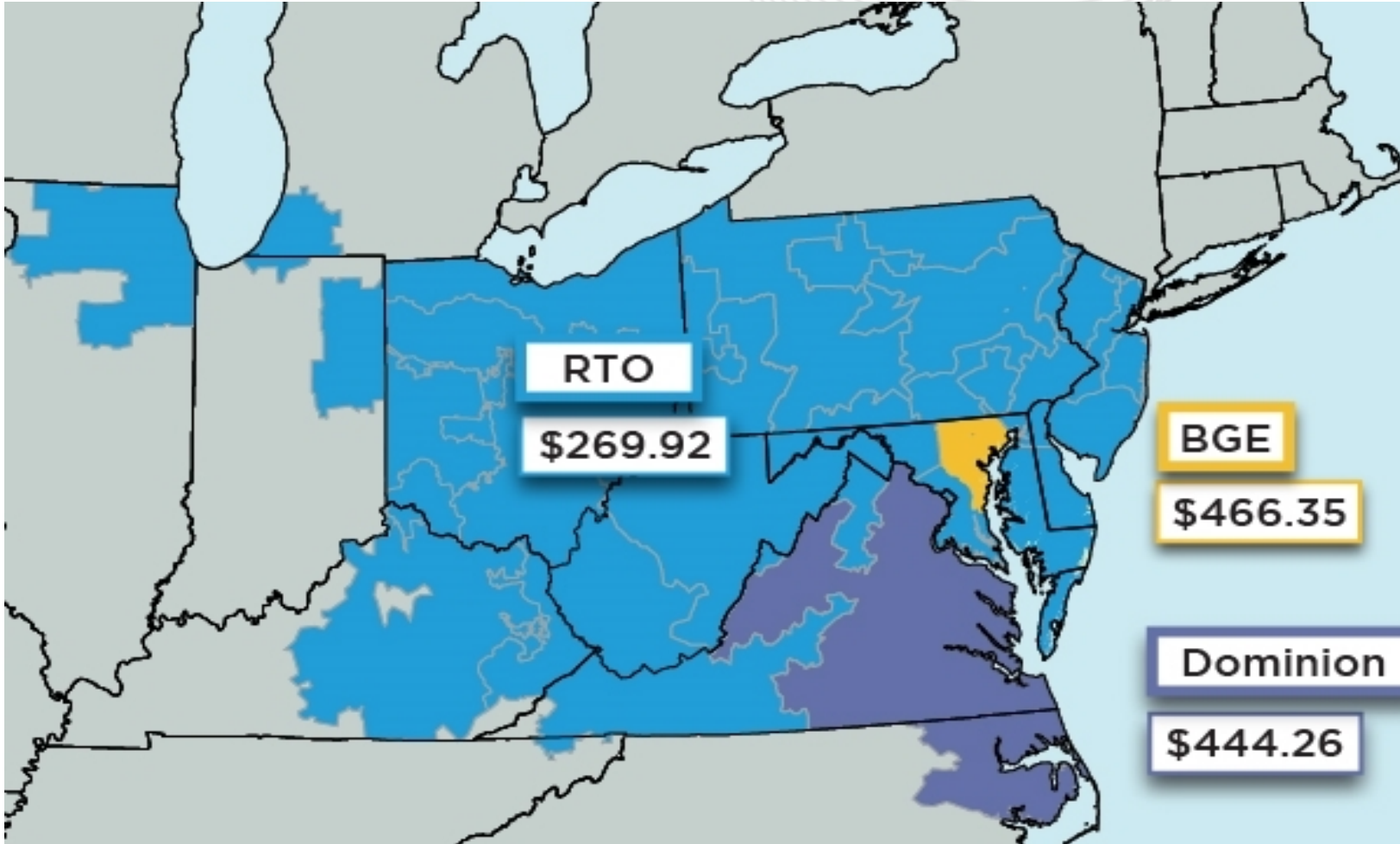
- ELCC marginal accreditation provides more accurate representation of reliability contribution for individual resources.
- Enhanced reliability risk modeling that better reflects impacts of extreme weather (impacting Forecast Pool Requirement)
- Requirement for all Capacity Market Sellers of any Planned Generation Capacity Resource to provide a binding notice of intent if such resource will be offered into in the relevant RPM Auction

Planning Parameters

- Net Cone for RTO decreased from \$293/MW-day to \$229/MW-day.
- Point A on the RTO VRR curve changed from $1.5 * \text{Net CONE}$ to Gross CONE.
- 3,243 MW increase in forecasted peak load
- IRM increase from 14.7% to 17.8%

Dominion in RPM Auction and Not FRR

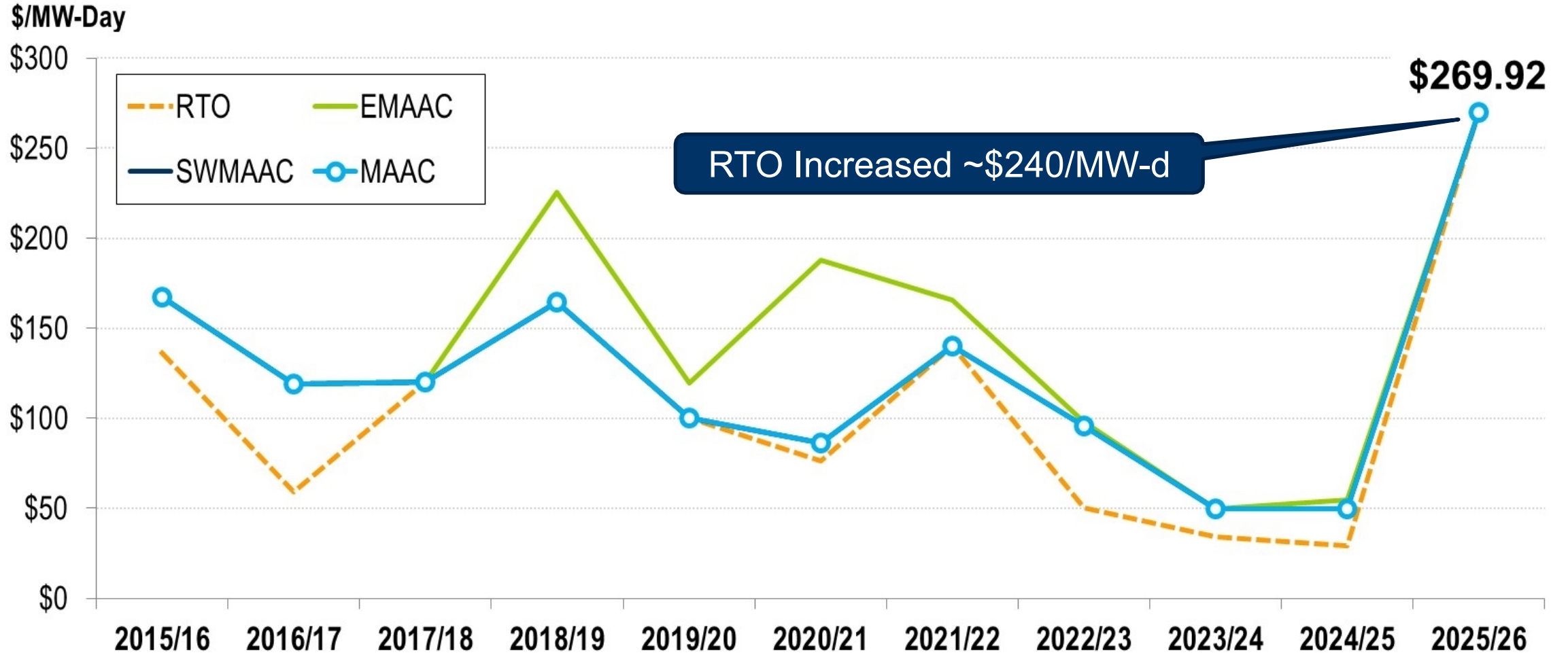
- The 25/26 BRA cleared enough capacity to meet the RTO reliability requirement but the reserve margin is lower than prior years and there is minimal uncleared capacity that was offered in the auction.
- Dominion and BGE cleared short of their reliability requirements due to load growth and retirements. Prices in these LDAs are at the price caps.
- The auction cleared a diverse mix of resources, including 48% natural gas, 21% nuclear, 18% coal, 1% solar, 1% wind, 4% hydro and 5% demand response on a UCAP basis.
- Auction results send a clear investment signal across the RTO.



- RTO price of \$269.92/MW-day for 2025/2026 compared to \$29/MW-day for 2024/2025
- 18.5% reserve margin with 17.8% IRM, compared to 20.5% reserve margin and 14.7% IRM in 2024/2025



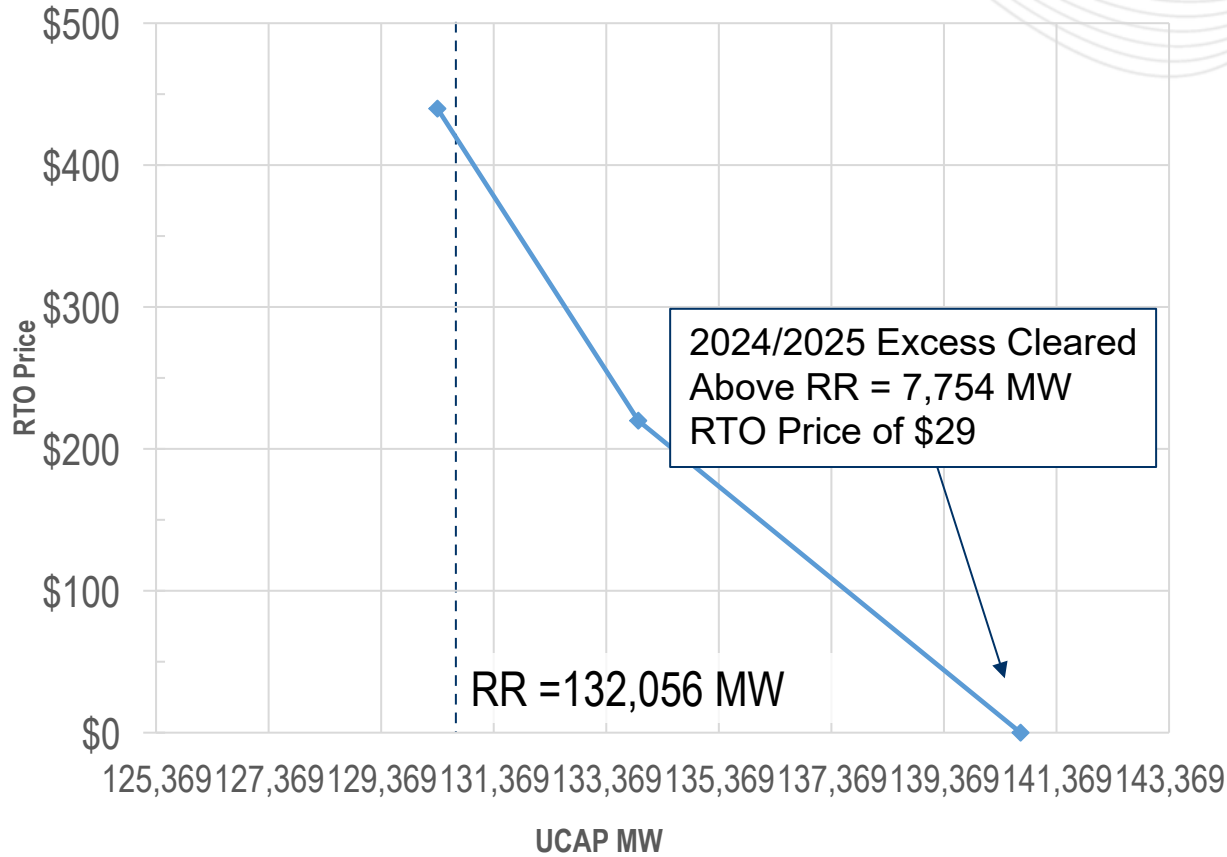
Reserve Requirement Met; Significant Price Increase



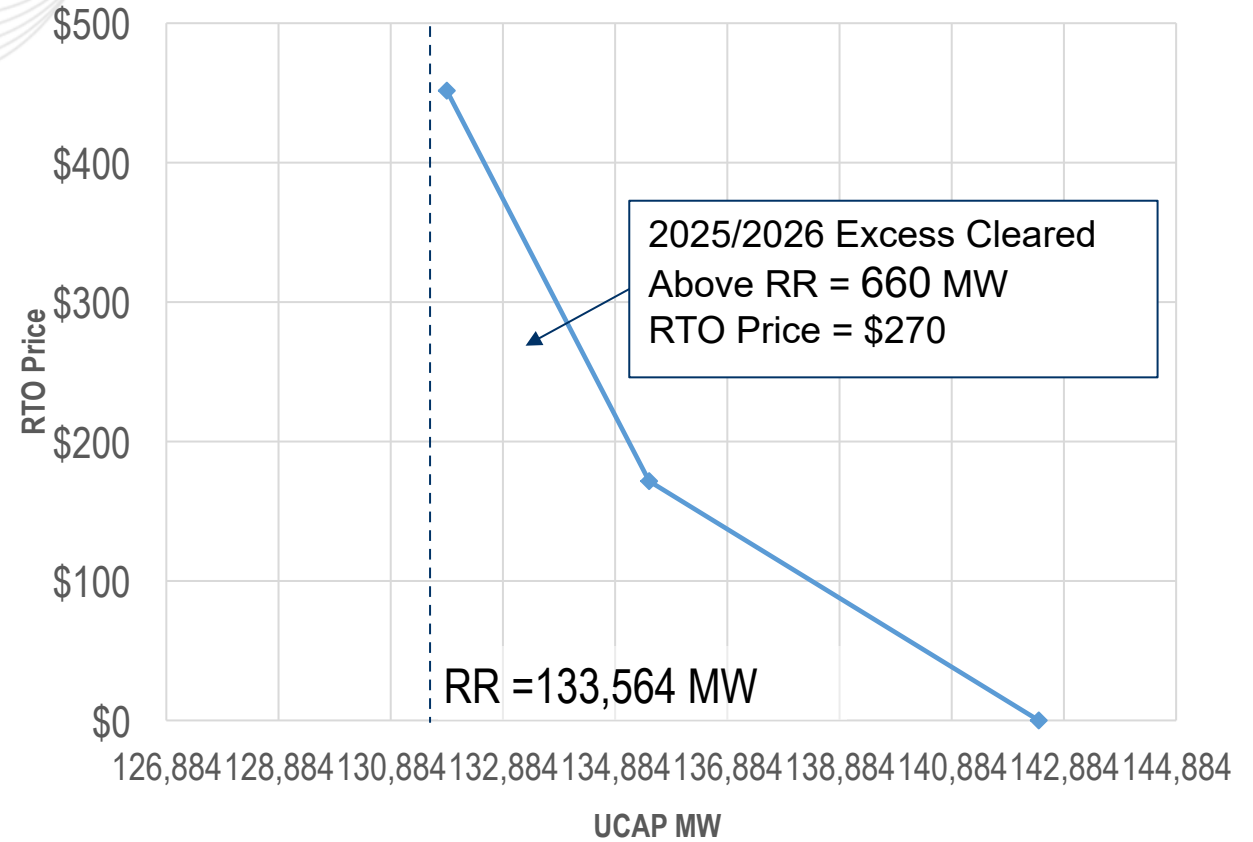


Market Clearing Results (2025/2026 vs. 2024/2025)

2024/2025 RTO PRICE VS. UCAP MW



2025/2026 RTO PRICE VS. UCAP MW



Price impacts larger as the excess above Reliability Requirement reduces and shifts on VRR curve to next segment (steeper).

Delivery Year	Auction Results				
	Resource Clearing Price	Cleared UCAP (MW)	RPM Reserve Margin	Total Reserve Margin ¹	Total Cost to Load (\$ billion)
2015/16 ²	\$136.00	164,561.2	19.7%	19.3%	\$9.7
2016/17 ³	\$59.37	169,159.7	20.7%	20.3%	\$5.5
2017/18	\$120.00	167,003.7	20.1%	19.7%	\$7.5
2018/19	\$164.77	166,836.9	20.2%	19.8%	\$10.9
2019/20	\$100.00	167,305.9	22.9%	22.4%	\$7.0
2020/21 ⁴	\$76.53	165,109.2	23.9%	23.3%	\$7.0
2021/22	\$140.00	163,627.3	22.0%	21.5%	\$9.3
2022/23	\$50.00	144,477.3	21.1%	19.9%	\$3.9
2023/24	\$34.13	144,870.6	21.6%	20.3%	\$2.2
2024/25	\$28.92	147,478.9	21.7%	20.4%	\$2.2
2025/26 ⁵	\$269.92	135,684.0	18.6%	18.5%	\$14.7

¹ Reserve Margin includes FRR+RPM (Total ICAP/Total Peak-1); ² 2015/2016 BRA includes a significant portion of AEP and DEOK zone load previously under the FRR Alternative; ³ 2016/2017 BRA includes EKPC zone;

⁴ Beginning 2020/2021 Cleared UCAP (MW) includes Annual and matched Seasonal Capacity Performance sell offers; ⁵ DOM zone included in RPM

2025/2026 cleared 660 MWs above Reliability Requirement with only 21 MWs of annual uncleared capacity.



ICAP Offered and Cleared (incl. FRR): 2024/2025 vs. 2025/2026

ICAP MW

Resource Type	2024/2025		2025/2026		Difference	
	Offered	Cleared	Offered	Cleared	Offered	Cleared
Coal	38,958	34,721	35,868	35,867	(3,089)	1,146
Distillate Oil (No.2)	3,129	2,983	2,748	2,747	(380)	(236)
Gas	88,189	85,716	87,116	87,110	(1,073)	1,394
Nuclear	32,256	32,048	32,180	32,180	(76)	132
Oil	3,305	2,861	775	775	(2,530)	(2,086)
Solar	5,067	5,067	5,890	5,886	823	818
Water	6,735	6,735	7,391	7,390	655	655
Wind	802	802	1,308	1,308	506	506
Battery/Hybrid	46	46	30	30	(16)	(16)
Other	1,281	1,281	1,213	1,213	(68)	(68)
Demand Response	9,306	7,152	8,216	8,187	(1,090)	1,035
Aggregate Resource	503	503	251	251	(252)	(252)
Total (without EE)	189,577	179,916	182,986	182,943	(6,591)	3,027

Note: "Offered" includes annual resources only and those with FRR commitments

- Supply demand balance has tightened since the 24/25 BRA.
 - Reduction in supply offers in the auction.
 - Increased projected summer peak load.
 - Increase in IRM.
 - FERC-approved CIFP changes.
- Annual UCAP offered in the auction (cleared and uncleared) in excess of the reliability requirement has gone from over 16 GW to less than 1 GW.
- CIFP changes complicate direct comparisons to prior years. The analysis provided tries to separate the impact of those changes from others.
- Doing this requires assumptions. All values should be considered estimates only.



Tightening of Supply-Demand Balance

Parameter	2024/2025	2025/2026 (Pre-CIFP Rules)	2025/2026 (CIFP Rules)
Peak Load	150,640.3 MW	153,883.0 MW	153,883.0 MW
IRM	14.7%	17.7%	17.8%
Pool-wide EFORd	5.02%	5.09%	-
Pool-wide AUCAP	-	-	79.7%
RTO Reliability Requirement (no EE addback)	164,107.6 MW	171,902.7 MW	144,450.0 MW
FRR-Adjusted Reliability Requirement (no EE addback)	132,055.7 MW	158,946.0 MW	133,563.6 MW
ICAP Offered (no FRR or EE)*	154,329 MW	169,435 MW	169,435 MW
UCAP Offered (no FRR or no EE)*	148,096 MW	162,142 MW	134,078 MW
Excess UCAP*	16,040 MW	3,196 MW	514 MW

* Reflects annual offered capacity

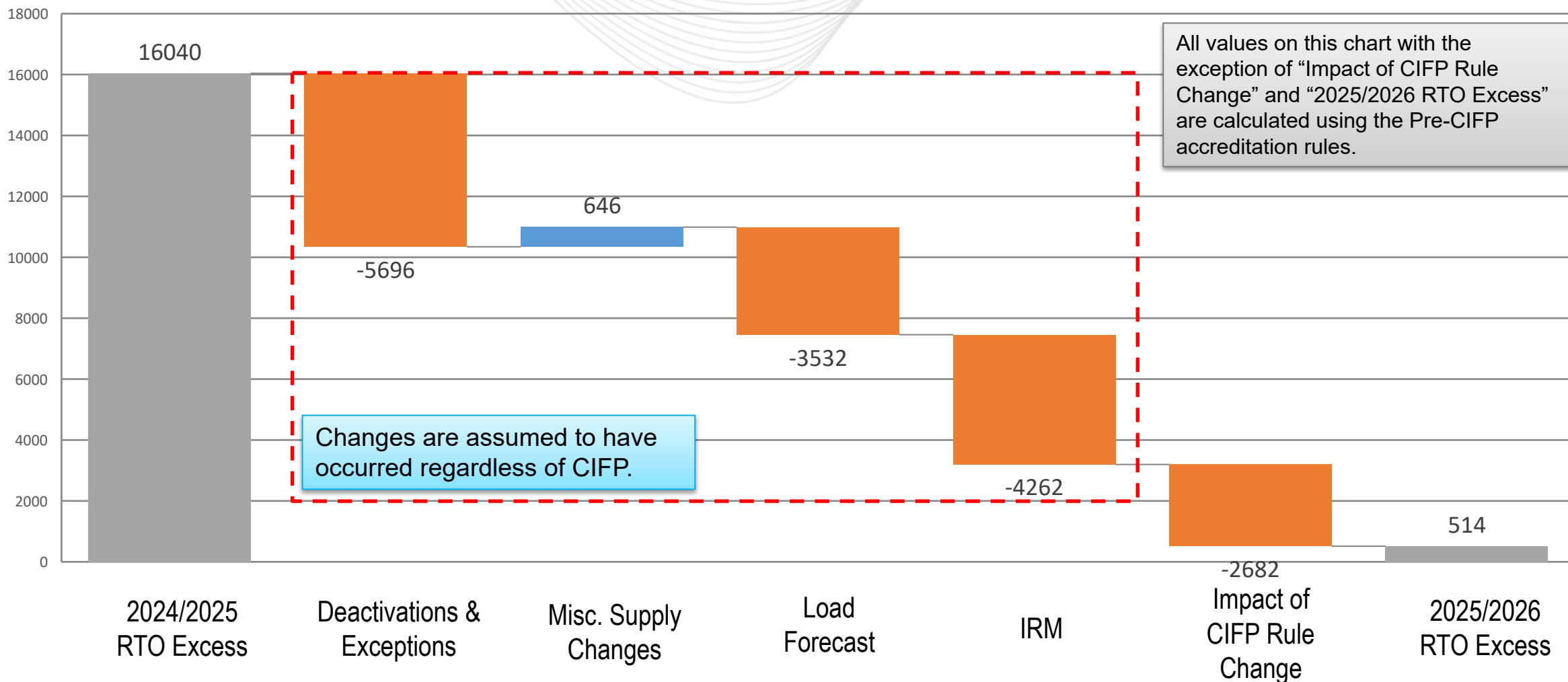
Difference in Excess UCAP in 25/26 Cases= 3,196 MW – 514 MW = 2,682 MW

PJM believes that the CIFP rules resulted in tightening of the supply/demand balance in the auction. We can calculate a number (2,682 MW) to associate with that, however, the quantity and allocation of risk between supply and demand changed with the CIFP rule changes. This makes adding and subtracting Pre- and Post-CIFP values challenging to interpret.



Waterfall Chart of Reduction in Excess Capacity (UCAP) from 24/25 to 25/26

■ Increase ■ Decrease ■ Total



Changes are assumed to have occurred regardless of CIFP.

All values on this chart with the exception of "Impact of CIFP Rule Change" and "2025/26 RTO Excess" are calculated using the Pre-CIFP accreditation rules.

*Annual resources only; CIFP impact represents net impact of reduced supply (due to lower pool-wide average accreditation) and reduced demand (due to lower Forecast Pool Requirement).

(1) Deactivations and Must-Offer Exceptions

- There were approximately 5,700 MW UCAP* of reduced supply available in 25/26 due to retirements and must-offer exceptions.
 - ~2,150 MW UCAP* of retirements not requiring a must-offer exception.
 - ~3,550 MW UCAP* of must-offer exceptions granted for either planned retirements or removal of capacity statuses.
- Information regarding must-offer exceptions that were granted for this auction are posted, by zone, [here](#) on pjm.com.

*UCAP values are Pre-CIFP

- Miscellaneous Changes in Supply includes offer MW level changes from the 24/25 to 25/26 auction.
- Those generally fall into the categories provided in the table below.

Category	MW (UCAP)
Reduction in Offered DR	- 1,187
Increase in Supply Offered by Intermittent Resources	+ 1,079
Net Increase in Offered Quantities by Other Resources	+ 754
Total Increase	+ 646

Pre-CIFP:

$$\text{Forecast Pool Reserve} = (1 - \text{Pool-wide EFORd}) * (1 + \text{IRM})$$

Post-CIFP:

$$\text{Forecast Pool Reserve} = (\text{Pool-wide Average AUCAP Factor}) * (1 + \text{IRM})$$

All the time:

$$\text{Reliability Requirement} = \text{Peak Load} * \text{FPR}$$

Swapping in and out the relevant accreditation factors and IRMs yields the results on the following slides.

- The peak load forecast used to calculate the reliability requirement for the RTO increased by about 3,200 MW since the 24/25 BRA.
- As detailed in the [2024 LAS Report](#), this peak load increase is generally attributable to data centers, industrial growth and electrification.

Pre-CIFP view:

Using the FPR from the 24/25 BRA, the **peak load forecast increase would have resulted in an increase in the Reliability Requirement of 3,533 MW.**

2024/25 BRA: 150,640 x 1.0894 = 164,107 MW

2025/26 BRA: 153,883 x 1.0894 = 167,640 MW

$$\begin{aligned} \text{FPR 24/25} &= (1 - \text{EFORd}) * (1 + \text{IRM}) \\ \text{FPR 24/25} &= (1 - .0502) * (1 + .147) = 1.0894 \end{aligned}$$

(4) Increase in Installed Reserve Margin

- The IRM increased from 14.7% in 24/25 to 17.8% in 25/26. Absent the CIFP changes, the IRM would have been 17.7%. This analysis is detailed in the [2023 RRS Study](#).
- The most significant contributor of the increase from 14.7% to 17.7% (roughly 2 of 3%) is increased load uncertainty under extreme conditions.

Pre-CIFP view:

$$\begin{aligned} \text{FPR 25/26 (Pre-CIFP)} &= (1 - \text{EFORd}) * (1 + \text{IRM}) \\ \text{FPR 25/26 (Pre-CIFP)} &= (1 - .0509) * (1 + .177) = 1.1171 \end{aligned}$$

A 3% increase in IRM and a slight increase in EFORd would result in an increase in the Reliability Requirement of 4,263 MW.

$$\begin{aligned} &25/26 \text{ Peak Load} \times (\text{FPR 25/26 (Pre-CIFP)} - \text{FPR 24/25}) = \text{IRM and EFORd Impact} \\ &153,883 \times (1.1171 - 1.0894) = \mathbf{4,263 \text{ MW UCAP}} \end{aligned}$$



Increase in Capacity Demand: (3) Peak Load Increase + (4) IRM Increase

Parameter	2024/2025	2025/2026 (Pre-CIFP Rules)
Peak Load	150,640.3 MW	153,883.0 MW
IRM	14.7%	17.7%
Pool-wide EFORd	5.02%	5.09%
Forecast Pool Reserve	1.0894	1.1171
RTO Reliability Requirement	164,107.6 MW	171,902.7 MW

- The sum of the impacts just calculated are 7,796 MW. This is the increase in the RTO reliability requirement that would occur regardless of the CIFP changes.
- This table shows that calculation in a single step and side-by-side with 24/25. The result is the same except for rounding.
- Increases in peak load and IRM have a significant effect on capacity demand for the RTO. This is the most direct comparison back to 24/25.

Reliability Requirement Increase w/o CIFP = 171,902.1 MW – 164,107.6 MW = **7,794.5 MW**

- Enhanced Resource Adequacy Risk Modeling
- Marginal Accreditation
- Notice of Intent to Offer for Planned Resources
- Winter Deliverability Changes for Solar
- Increased Testing Requirements
- Stop-Loss Reduction
- Fixed Resource Requirement (FRR) Option Transition and Changes to Deficiency and Insufficiency Charges



(5) CIFP Rules Changes: CIFP Risk Modeling and Accreditation Changes

- The CIFP risk modeling changes did several key things:
 - Represent resource adequacy risk in every hour of the year.
 - Change the accounting of risk to better align with causes. The yellow rows at right were previously included in the FPR but are now part of accreditation.
 - More completely model the effects of correlated outages on resource adequacy risk.

Takeaway: CIFP changes model more risk to resource adequacy than the prior model and shift some supply-side risks previously accounted for in capacity demand to accreditation (supply).

Risk Accounting Pre- and Post-CIFP

Risk	Source	Pre-CIFP Accounting	Post-CIFP Accounting
Load Uncertainty	Demand	Demand-side (FPR)	Demand-side (FPR)
Random Thermal Forced Outages	Supply (thermals)	Accreditation (EFORd)	Accreditation (ELCC)
Variable Resource Risks	Supply (e.g. wind/solar)	Accreditation (ELCC)	Accreditation (ELCC)
Limited Duration Resource Risks	Supply (e.g. battery)	Accreditation (ELCC)	Accreditation (ELCC)
Normal Variability in Random Thermal Forced Outages	Supply (thermals)	Demand-side (FPR)	Accreditation (ELCC)
Thermal Planned & Maint. Outages	Supply (thermals)	Demand-side (FPR)	Accreditation (ELCC)
Thermal Winter Correlated Outages	Supply (thermals)	Demand-side (FPR)	Accreditation (ELCC)
Ambient De-rates (Summer)	Supply (thermals)	Demand-side (FPR)	Accreditation (ELCC)

ELCC Education: <https://pjm.com/-/media/committees-groups/committees/pc/2024/20240216-special/elcc-education.ashx>

- The next set of slides, as well as simulations at the end of the deck, show different ways to calculate impact of the CIFP changes in ways that may be intuitive.
- One of the ways uses direct calculations made between values using the Pre- and Post-CIFP rules.
- This direct of a comparison is challenging to interpret because the underlying risk modeling, allocation and accreditation method are significantly different between the two models. For example, a MW of UCAP Pre-CIFP is not the same as a Post-CIFP MW.
- Regardless, PJM put this together for illustrative purposes and to promote discussion.
- Unless otherwise noted, EE offers, EE addbacks and seasonal offers are excluded.

(5) CIFP Rule Changes: Change in Capacity Demand

Parameter	2024/2025	2025/2026 (Pre-CIFP Rules)	2025/2026 (CIFP rules)
Peak Load	150,640.3 MW	153,883.0 MW	153,883.0 MW
IRM	14.7%	17.7%	17.8%
Pool-wide EFORd	5.02%	5.09%	-
Pool-wide AUCAP	-	-	79.7%
Forecast Pool Reserve	1.0894	1.1171	0.9387
RTO Reliability Requirement	164,107.6 MW	171,903 MW	144,450 MW

- To assess the impact of the CIFP rules on capacity demand, we subtract the Reliability Requirements above.

RTO Reliability Requirement = 171,903 MW – 144,450 MW

27,453 MW reduction in RTO Reliability Requirement

- To get to the demand in the auction we have to adjust for FRR load that is removed from the auction.

Parameter	25/26 Pre-CIFP Rules	25/26 CIFP Rules
RTO Reliability Requirement	171,903 MW	144,450.0 MW
FRR Load	11,597.3 MW	11,597.3 MW
FPR	1.1171	0.9387
FRR Obligation	12,955 MW	10,886 MW
FRR-Adjusted Reliability Requirement	158,946 MW	133,563.6 MW

Reduction in BRA Reliability Requirement from CIFP = 158,946.0 MW – 133,563.6 MW

25,382.4 MW reduction in BRA Reliability Requirement

Approach Employed to Assess Changes in Accreditation

- Start with the ICAP offered into the 25/26 BRA.
- Remove EE and seasonal offers for simplicity.
- Calculate UCAP under the Pre-CIFP Rules:
 - Convert all generation offered to UCAP using the pool-wide EFORd of 5.09%
 - Convert all DR offered to UCAP using an FPR of 1.1171
- Calculate UCAP under the CIFP Rules:
 - Convert all generation offered to UCAP using applicable accreditation factor (may be resource-specific ELCC, class-average ELCC * Performance Adjustment Factor or class-average ELCC)
 - Convert all DR offered to UCAP using the ELCC Class Rating of 76%

(5) CIFP Rule Changes: Estimating Accredited 25/26 UCAP Under Pre-CIFP Rules

Resource Type	ICAP Offered (MW)	UCAP Offered (MW)
Generation	161,335	153,123
DR	7,849	8,769
Aggregate Resources	251	251
Total	169,435	162,142

- UCAP values are estimates of how 2025/26 BRA offered capacity would have been accredited absent CIFP changes.

(5) CIFP Rule Changes: Actual Accredited UCAP from 25/26 BRA Offers

Resource Type	ICAP Offered (MW)	UCAP Offered (MW)
Generation	161,335	127,864
DR	7,849	5,963
Aggregate Resources	251	251
Total	169,435	134,078

- UCAP values are what was actually used in the auction.
- Subtract the two UCAP values:

Supply Reduction from CIFP = 162,142 MW – 134,078 MW = **28,064 MW**

- The impact below is calculated by direct comparisons of the new and old Reliability Requirements and accredited UCAP. As stated, there are shortcomings with this approach.
- The impacts could be quantified at the RTO level or for RPM only (excluding FRR). When considering just the auction:

CIFP Rule Impact = BRA Reliability Requirement Reduction – Supply Reduction

CIFP Rule Impact = 25,382 MW – 28,064 MW

CIFP Rule Impact = -2,682 MW (less supply to meet demand)

This result, which PJM agrees with directionally, is that the CIFP rules resulted in a **net tightening of the supply/demand balance. The price impact of this depends on the amount of excess in the system that the changes are applied to and the order in which all other changes from 24/25 are evaluated (changes to load, IRM, etc.).**



PRICE IMPACTS



24/25 BRA CIFP Simulations - August 2023

Parameter	2024/2025 Simulation Base Case	2024/2025 Initial CIFP Simulation
Peak Load	150,640.3 MW	150,640.3 MW
FPR	1.0894	0.9799
FRR-Adjusted Reliability Requirement	132,055.7 MW	118,087 MW
Cleared UCAP	139,145 MW	124,610 MW
RTO Clearing Price	\$43.33/MWd	\$52.48/MWd
Excess Cleared UCAP	7,089.3 MW	6,523 MW

- [Initial simulations of the CIFP Rules](#) were done on an unconstrained version of the 24/25 BRA in August 2023. Updated simulation results were provided in October with the same effect.
- Both the Base Case and the simulation cleared significantly in excess of the Reliability Requirement because the 24/25 BRA system was significantly long on capacity.
- That model did not include demand increases and supply reductions that were observed between the 24/25 and 25/26 BRAs that have been detailed herein.



Tightening of Supply-Demand Balance in the BRAs

Parameter	2024/2025	2025/2026 (Pre-CIFP Rules)	2025/2026 (CIFP Rules)
Peak Load	150,640.3 MW	153,883.0 MW	153,883.0 MW
IRM	14.7%	17.7%	17.8%
Pool-wide EFORD	5.02%	5.09%	-
Pool-wide AUCAP	-	-	79.7%
RTO Reliability Requirement (no EE addback)	164,107.6 MW	171,902.7 MW	144,450.0 MW
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UCAP Offered (no FRR or no EE)*	148,096 MW	162,142 MW	134,078 MW
Excess UCAP*	16,040 MW	3,196 MW	514 MW

Difference in Excess UCAP in 25/26 Cases= 3,196 MW – 514 MW = 2,682 MW

* Reflects annual offered capacity

Category	MW (UCAP)
Must-Offer Exceptions & Deactivations	-5,696
Miscellaneous Supply Changes	+646
Load Forecast Increase	-3,532
IRM Increase	-4,262
CIFP Impact	-2,682

Values taken from waterfall chart.

MW UCAP in this table are in Pre-CIFP terms as these values were used to track the reduction in excess from 24/25. Applying them to the 25/26 auction would require recalculation.

With the exception of the “Miscellaneous Supply Changes”, all other changes from the 24/25 BRA have a tightening effect on the supply demand balance.

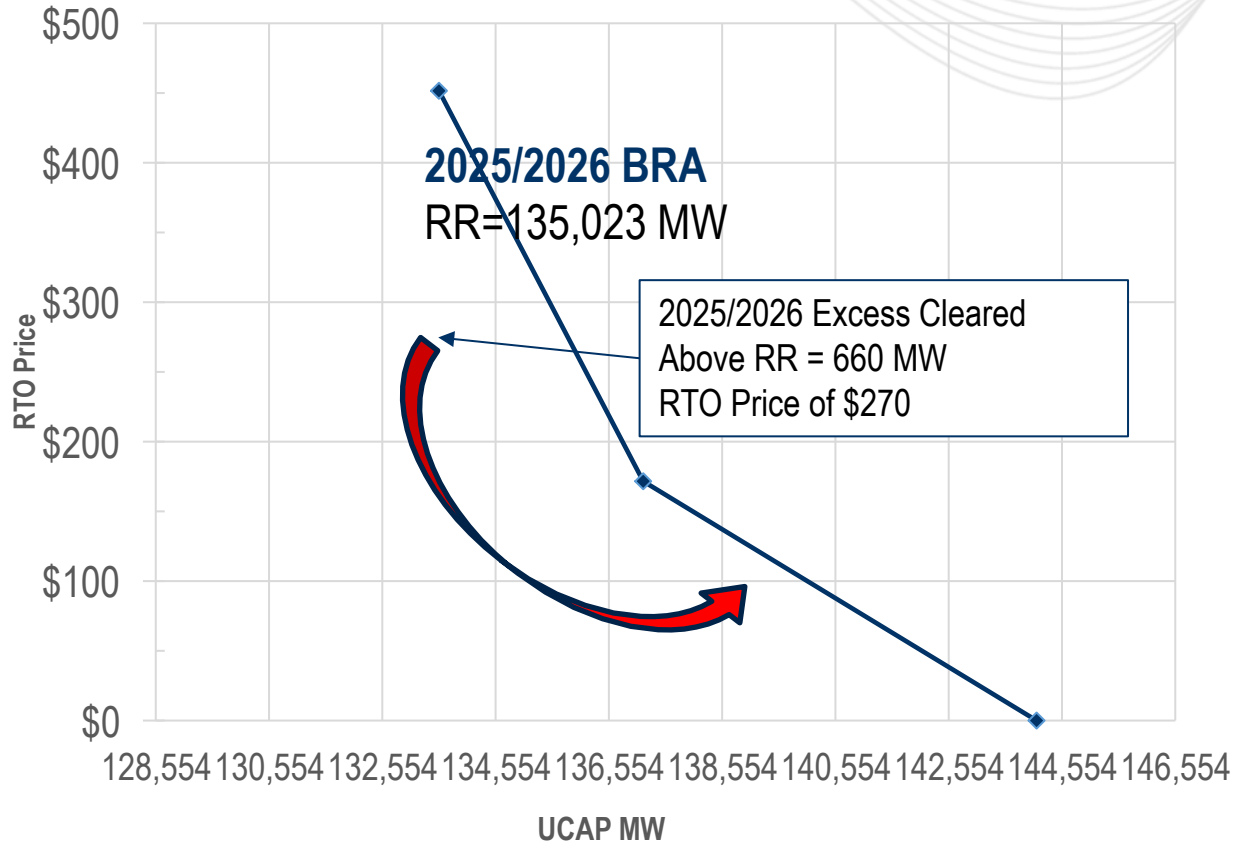
We can calculate a price impact associated with each change by holding the others constant and excluding the targeted change. Doing this maximizes the impact of each individual change being varied because it moves the clearing up and down the demand curve. This occurs because the 25/26 BRA supply/demand is so tight.

A simple example is provided on the next slide.



2025/2026 BRA Results Example: Must-Offer Exceptions and Deactivations

2025/2026 BRA RESULTS



Numbers include EE, EE addback and cleared seasonal offers.

There are approximately 4,741 MW of Must-Offer Exceptions and Deactivations when accredited under the CIFP rules.

$$(5,696 \text{ MW} / 0.95) * 0.79 = 4,797 \text{ MW}$$

If we assume all of this would have cleared, the cleared MW would increase from 135,684 MW to 140,481 MW. This would result in a price of around \$100/MW-d.

Similar effects can be demonstrated for the other categories (load, IRM, CIFP, etc.) when assessed in isolation. We confirmed this with simulations.

The sum of the price changes for each is much higher than the \$270/MWd clearing price itself.

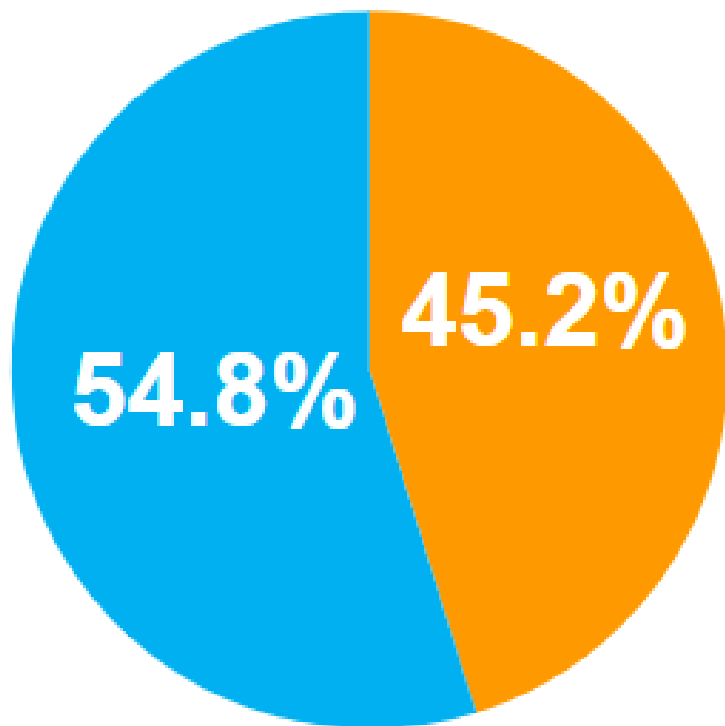
- The system has gotten much tighter since the 24/25 BRA.
 - This is aligned with the [4R Report](#) issued in Feb. 2023.
 - CIFP changes to risk modeling and accreditation have contributed to this but to a lesser degree than other changes that have occurred.
- The capacity market is signaling the need for investment now.
- In 26/27 the load forecast and IRM are both increasing relative to 25/26.



ADDITIONAL INFORMATION

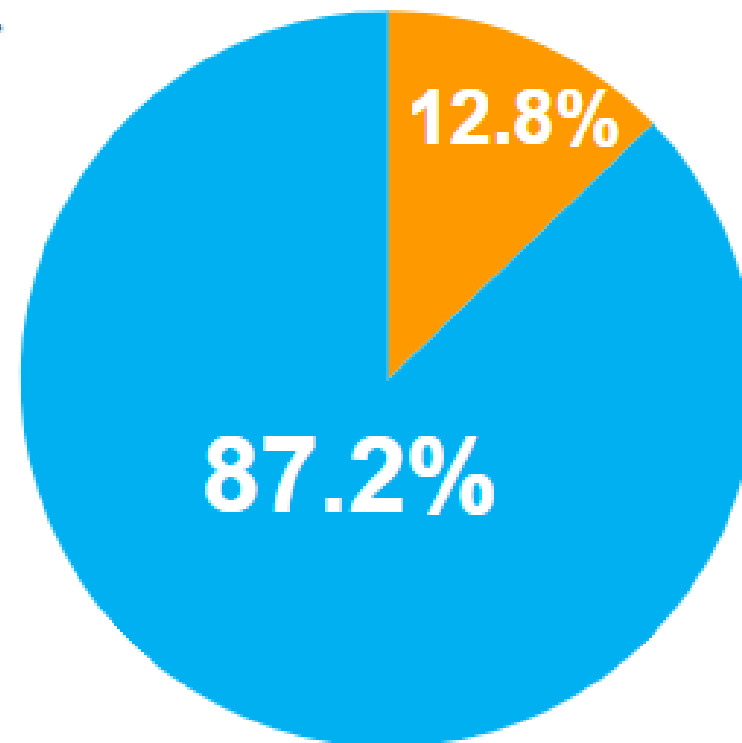
Seasonal Share of LOLE = 0.1 days/year

■ Summer
■ Winter



Seasonal Share of EUE = 1462.6 MWh/year

■ Summer
■ Winter



PC Presentation on IRM and FPR: <https://www.pjm.com/-/media/committees-groups/committees/mc/2024/20240320/20240320-item-01---irm-fpr-and-elcc-for-25-26-bra---presentation.ashx>

Parameter	2025/2026 (Pre-CIFP Rules)	2025/2026 (CIFP Rules)
2025/2026 BRA Offered Supply	162,142 MW	134,078 MW
2025/2026 BRA Reliability Requirement	158,946 MW	133,563 MW
Excess Supply	3,196 MW	514 MW
Excess Supply / Reliability Requirement	2.01%	0.38%
Reduction in Excess under CIFP Rules (% of Rel. Req.)	1.63% Decrease	
Reduction in Excess (in Pre- and Post-CIFP UCAP MW)	2,591 MW	2,177 MW

This is another way to look at the CIFP impact that contains the calculation for the 25/26 BRA only and expresses excess under the Pre- and Post-CIFP models as a percentage of the respective Reliability Requirements.

Relative to the Reliability Requirement, there is a 1.63% reduction in excess capacity under the CIFP rules indicating that, in this scenario, the old model tended to overstate the reliability level of the system.

Capacity Performance

Resource Type	Offered MW (UCAP)			Cleared MW (UCAP)		
	Annual	Summer	Winter	Annual	Summer	Winter
GEN	128,115.1	45.0	1,447.4	128,114.5	45.0	448.0
DR	5,963.8	122.3	-	5,942.4	122.3	-
EE	1,179.1	280.7	-	1,179.1	280.7	-
PRD	210.2	-	-	210.2	-	-
Grand Total	135,468.2	448.0	1,447.4	135,446.2	448.0	448.0

Most calculations in this deck exclude seasonal offers for simplicity. This table shows seasonal offer information from the 25/26 BRA under the CIFP Rules.

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2025/2026 Base Residual Auction



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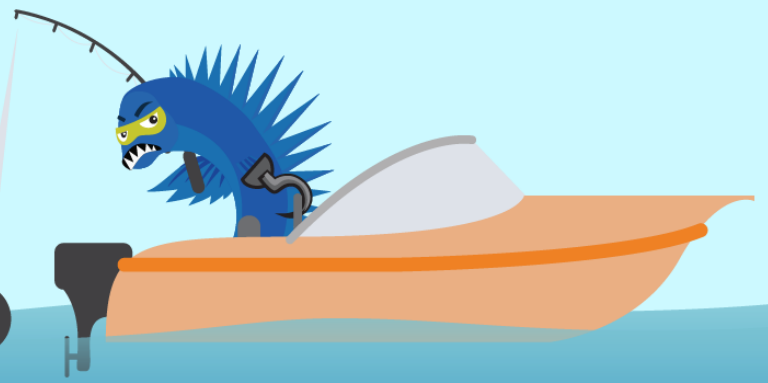
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