# 2026 Biennial Report on ORDC
## And Initial Report on ASDC

**Key Takeaway:**

Significant growth in solar generation and energy storage resources increased the quantity and availability of on-line reserves during the study period, contributing to less frequent system scarcity. Less extreme weather relative to the prior two years and more flexible demand also reduced scarcity conditions. When scarcity did occur, both the ORDC and ASDC operated consistently with design expectations.

© 2026 ERCOT. All rights reserved.

September 29, 2026

# Table of Contents

**Table of Contents** ..... i

**List of Acronyms** ..... 1

**Executive Summary** ..... 2

**1. Background and Transition from ORDC to ASDC** ..... 9

1.1. ORDC Scarcity Pricing Before RTC+B ..... 9

1.2. ASDC Scarcity Pricing Under RTC+B ..... 10

1.3. Study Period Definitions ..... 12

**2. Final ORDC Period (Oct 2024-Dec 2025)** ..... 14

2.1. ORDC Efficacy ..... 14

2.1.1. Relationship between RTORPA and RTOLCAP ..... 14

2.1.2. Relationship between RTORPA and Spinning/Non-Spinning Reserves ..... 16

2.1.3. Relationship between RTORPA and Self-Commitment Incentives ..... 18

2.1.4. ORDC Price Signals During Scarcity ..... 19

2.2. ORDC Utilization ..... 21

2.3. ORDC Related Costs ..... 23

2.3.1. ORDC Impact on Peaker Net Margin ..... 23

2.3.2. Impact of ORDC Price Floor ..... 24

2.4. ORDC Contribution to Grid Reliability ..... 27

**3. Initial ASDC Period (Dec 2025-Sep 2026)** ..... 28

3.1. ASDC Efficacy ..... 28

3.1.1. Shortage and Real-Time Conditions ..... 29

3.1.2. Shortage Severity and Persistence ..... 31

3.1.3. Allocation of Scarcity Across Products ..... 31

© 2026 ERCOT. All rights reserved.

3.1.4. Price Response to Shortfall Magnitude ..... 33
3.1.5. Relative Pricing during Coincident Shortfall ..... 34
3.2. ASDC Utilization ..... 36
3.2.1. Procurement Relative to the Ancillary Service Plan ..... 36
3.2.2. Application of Ancillary Service Shortage Floor Price ..... 39
3.2.3. Application of the Proxy Offer Floor Mechanism ..... 40
3.3. ASDC Related Costs ..... 42
3.3.1. Cost of Non-Spin Procurement above the Requirement ..... 42
3.3.2. Cost of Non-Spin by Pricing Parameter ..... 43
3.4. ASDC Contribution to Grid Reliability ..... 45
**4. Conclusion ..... 46**
**5. Appendix: Technical Background on ORDC and ASDC Methodologies ..... 48**
5.1. ORDC Methodology and Parameter History ..... 48
5.2. Real-Time Co-optimization and Ancillary Service Demand Curve Design ..... 53
5.2.1. Scarcity Pricing Under Co-Optimization ..... 54
5.2.2. Construction of Product-Specific ASDCs ..... 54
5.2.3. ASDC Shortage and Proxy-Offer Floors ..... 55

© 2026 ERCOT. All rights reserved.

# List of Acronyms

| | |
|---|---|
| ASDC | Ancillary Service Demand Curve |
| DAM | Day-Ahead Market |
| DRRS | Dispatchable Reliability Reserve Service |
| ECRS | ERCOT Contingency Reserve Service |
| EEA | Energy Emergency Alert |
| EOC | Energy Offer Curve |
| ERCOT | Electric Reliability Council of Texas |
| ERS | Emergency Responsive Service |
| ESR | Energy Storage Resource |
| HCAP | High System-Wide Offer Cap |
| HSL | High Sustained Limit |
| LCAP | Low System-Wide Offer Cap |
| LMP | Locational Margin Price |
| LOLP | Loss of Load Probability |
| MCL | Minimum Contingency Level |
| NFRC | Non-Frequency Responsive Capacity |
| Non-Spin | Non-Spinning Reserve Service |
| ORDC | Operating Reserve Demand Curve |
| PBMCL | Probability of Reserves Falling Below the Minimum Contingency Level |
| PNM | Peaker Net Margin |
| PRC | Physical Responsive Capability |
| PUCT | Public Utility Commission of Texas |
| QSE | Qualified Scheduling Entity |
| QSGR | Quick-Start Generation Resources |
| RTC+B | Real-Time Co-optimization Plus Batteries |
| RTM | Real-Time Market |
| RTOFFCAP | Real-Time Off-Line Capacity |
| RTOFFPA | Real-Time Off-Line Reserve Price Adder |
| RTOLCAP | Real-Time On-Line Capacity |
| RTORDPA | Real-Time On-Line Reliability Deployment Price Adder |
| RTORPA | Real-Time On-Line Reserve Price Adder |
| RUC | Reliability Unit Commitment |
| SWCAP | System-Wide Offer Cap |
| SCED | Security-Constrained Economic Dispatch |
| VOLL | Value of Lost Load |

© 2026 ERCOT. All rights reserved.

# Executive Summary

ERCOT provides this biennial report on the Operating Reserve Demand Curve (ORDC) to the Public Utility Commission of Texas (PUCT) in accordance with 16 Texas Administrative Code (TAC) § 25.505(e), which requires:

> *"Operating Reserve Demand Curve (ORDC) report. ERCOT must publish, by November 1 of every even numbered year, a report analyzing the efficacy, utilization, related costs, and contribution of the ORDC to grid reliability in the ERCOT power region."*

This report examines market outcomes from October 1, 2024, through September 30, 2026. During this period, ERCOT transitioned from the Operating Reserve Demand Curve (ORDC) to a new framework where scarcity pricing and the value of reserves is set by individual Ancillary Service Demand Curves (ASDCs). Until December 4, 2025, ERCOT used the ORDC to apply a price adder to real-time energy prices to approximate the value of reserves during scarcity. On December 5, 2025, ERCOT implemented Real-Time Co-optimization (RTC) of energy and Ancillary Services (AS) and replaced the single ORDC with ASDCs defined for each AS. Compared to the ORDC, which priced scarcity based on the system's aggregate operating reserve level, the ASDCs price scarcity independently for each AS product, with shortage (penalty) curves derived hierarchically so that the economic optimization would begin to go short of less critical reserves ahead of more critical ones. Throughout the entire study period, ERCOT maintained a consistent operating posture, reflected in its AS Plan and other operational practices.[1]

Compared to the period covered in ERCOT's 2024 Biennial ORDC Report (November 1, 2023 – September 30, 2024, the "*2024 ORDC Report*"), the ERCOT System saw substantially fewer instances of scarcity pricing intervals across both the final ORDC period (October 1, 2024 – December 4, 2025, the "ORDC period") and in the initial period where the ASDC was in effect (December 5, 2025 – September 30, 2026, the "ASDC

[1] In July 2026, ERCOT identified errors in the probabilistic model used to determine the posted 2026 ECRS and Non-Spin quantities. The errors understated modeled net-load uncertainty and resulted in lower posted quantities than the corrected model would have produced. ERCOT reported no reliability issues attributable to the lower quantities and corrected the model for use in developing the proposed 2027 Ancillary Services Methodology.

© 2026 ERCOT. All rights reserved.

period"). The reduction was driven by continued solar and Energy Storage Resource (ESR) capacity growth (which increased quantity and availability of on-line reserves), less extreme weather, and an increase in price-responsive cryptocurrency mining load curtailment when conditions on the system would have otherwise been tight.[2] Both the ORDC and ASDC pricing outcomes were consistent with their design intent when low reserve levels did occur: ORDC price signals tracked tightening system conditions, and the ASDC hierarchy of reserve products allocated shortfalls in the intended order.

The key takeaways below are organized around the four reporting dimensions required by the PUCT's rule (efficacy, utilization, related costs, and contribution to reliability), measured for the ORDC and ASDC periods.

## EFFICACY

In this report, efficacy refers to the extent to which the ORDC and ASDCs' scarcity pricing mechanisms triggered during tight conditions and allocated scarcity across AS products consistent with design expectations.

**ORDC Period:**

Instances of higher ORDC price adders were directionally aligned with tighter system conditions, including lower levels of capacity available to be dispatched. During intervals with less than 3,000 megawatts (MW) of on-line dispatchable capacity, the average Real-Time On-Line Reserve Price Adder (RTORPA) was higher than during normal conditions, although its contribution to Settlement Point Prices (SPPs) remained lower than what was observed in the *2024 ORDC Report*.

**ASDC Period:**

Shortage pricing under the ASDC framework was directionally aligned with tighter system conditions, which was more prevalent when the system had less surplus dispatchable capacity available. The individual ASDC penalty curves forgo procurement of the fully planned quantity of Non-Spinning Reserve Service (Non-Spin) before higher-priority reliability services, such as ERCOT Contingency Reserve Service (ECRS), Responsive

[2] ERCOT, "ERS/Crypto Mining Load," presentation to the Wholesale Market Subcommittee, January 7, 2026.

© 2026 ERCOT. All rights reserved.

Reserve Service (RRS), and Regulation Up and Regulation Down. This hierarchy was observed in real-time outcomes in all but a small number of intervals; later sections of this report examine those exceptions in detail. Shortage magnitude also declined for each product moving up the curve hierarchy, reflecting the steeper penalty costs assigned to forgoing more critical products.

## UTILIZATION

In this report, utilization refers to how often scarcity was reflected in prices. Specifically, it measures the relative frequency in which system conditions tightened enough to trigger ORDC price adders or ASDC shortage pricing. This section also examines the frequency in which Proxy Offer Floors and AS shortage floors determine AS clearing prices during the ASDC period.

**ORDC Period:**

Scarcity conditions were observed less frequently in the study period than in the *2024 ORDC Report*, resulting in fewer intervals of ORDC price adders. Instances of low on-line dispatchable capacity (i.e., below 3,000 MW) fell from 13.31% of SCED intervals to 1.38%.[3]

This decline reflects continued solar and ESR capacity growth (solar capacity increased by 20 gigawatts (GW) and ESR capacity by 16 GW from October 2024 to December 2025), and less extreme summer and winter weather than in the prior two years. Additionally, price-sensitive cryptocurrency mining load reduced demand during tight conditions, creating additional flexibility.

As a result, the RTORPA contribution to the all-in real-time price fell from 0.7% to 0.2% and its share of Peaker Net Margin (PNM) fell from 6.8% to 3.2%.

**ASDC Period:**

Scarcity conditions were rare in the ASDC period: only 2.03% of SCED intervals cleared below the Non-Spin AS Plan, compared with just 0.12% for ERCOT Contingency Reserve

[3] On-line dispatchable capacity is measured as the sum of the High Dispatch Limits of all on-line resources less system-wide Generation To Be Dispatched (HDL-GTBD). For this analysis, low on-line dispatchable capacity is defined as HDL-GTBD below 3,000 MW.

© 2026 ERCOT. All rights reserved.

Service (ECRS) and 0.03% for Responsive Reserve Service (RRS). By contrast, Non-Spin awards exceeded the Non-Spin AS Plan requirement in approximately 91% of intervals. This outcome is consistent with the design whereby Non-Spin ASDCs use the low-priced 'tail' of the ORDC, allowing SCED to procure reserves past requirements at lower cost than at the AS Plan requirement.

## RELATED COSTS

In this report, related costs refer to scarcity cost impacts, including the incremental revenue attributable to ORDC price floors and the share of AS procurement cost attributed to shortage prices.

**ORDC Period:**

The RTORPA price-adder floors provided incremental price support but had a limited overall market impact. The floors affected prices in relatively few intervals and added approximately $18.3 million in cumulative revenue across the period. Dispatchable resources supplied approximately 78% of generation output during floor-affected intervals.

**ASDC Period:**

Non-Spin is the AS product where shortfalls are observed first and its price is most sensitive to system conditions. Shortage conditions occurred in 2% of SCED intervals and were concentrated in spring and early summer evening hours, predominantly in May and June, the two months with the largest Non-Spin requirements in the evening hours when shortfalls occurred. The $15 shortage floor price set the clearing price for 63.2% of total Non-Spin shortage volume (86.4 of 136.7 GWh of unmet requirement) over the study period. In months with smaller requirements, such as March and July, the floor was rarely binding.

## CONTRIBUTION TO RELIABILITY

In this report, the contribution of ORDC and ASDC to reliability is measured by the extent to which ORDC price adders encourage resources to self-commit. For the ASDC, reliability is considered as part of the broader operation of the ERCOT System under RTC

© 2026 ERCOT. All rights reserved.

and the extent to which shortage penalty prices preserve the hierarchy of Ancillary Service products, as designed, when the system operates under tight conditions.

**ORDC Period:**

The ORDC promoted reliability by providing incentives for resources to self-commit into the on-line reserve pool during times of system scarcity, thereby reducing reliance on out-of-market Reliability Unit Commitments (RUCs). ERCOT estimated that a $10 per megawatt hour (MWh) RTORPA value would be sufficient to cover the start-up cost of a marginal combustion turbine with a four-hour minimum run time.[4]

This threshold was met in only 0.7% of days during the final ORDC period, compared with 1.8% in the *2024 ORDC Report* period. This decline does not indicate a defect in design; rather, it reflects that elevated on-line reserve levels, driven by continued solar and ESR growth, along with flexible demand, reduced frequency and magnitude of ORDC conditions.

**ASDC Period:**

Contribution to reliability is best considered in the broader context of reliability gains attributable to RTC. Co-optimizing energy and Ancillary Services at least every five minutes allows ERCOT to dispatch resources, dynamically procure Ancillary Services, and manage congestion more efficiently. The inherent gains from RTC (and the operation of ASDCs) contribute to both improved efficiency and reliability outcomes.

The ASDCs are an input into price formation under RTC rather than a separate, sequential price adder such as the ORDC. As a result, this report cannot make as direct a determination of the contribution of ASDCs to PNM as was the case with ORDC. However, PNM during the ASDC period has remained consistent with PNM observed during the ORDC period.

[4] *Review of Wholesale Electric Market Design*, PUCT Project No. 52373, The Brattle Group and Astrapé Consulting, Impact Assessment of ORDC Changes (Nov. 5, 2021).

© 2026 ERCOT. All rights reserved.

## CONCLUSION

Overall, the results indicate that the ORDC and ASDC frameworks operated as intended during the study period. The ORDC provided increasing scarcity pricing signals as reserve conditions tightened, while the ASDCs generally preserved the intended hierarchy of Ancillary Service product shortages and pricing, as designed.

Compared to the previous report, this study period experienced fewer instances of limited operating reserves in real-time, driven largely by significant growth in solar generation and Energy Storage Resources (ESRs). The implementation of RTC also improved market efficiency by jointly optimizing energy and Ancillary Services and dynamically allocating available resource dispatch capability between the two, based on system conditions and economics.

## NEXT STEPS AND RECOMMENDATIONS

Looking forward, ERCOT will continue evaluating the ASDC framework as operating experience under RTC+B accumulates and system needs evolve. ERCOT agrees, in principle, that the ASDCs should be re-evaluated. Following the PUCT's determination that the AORDC is no longer binding on ASDC design, ERCOT will work with the PUCT, Independent Market Monitor (IMM), and stakeholders to consider whether the ASDC design. As part of this effort, the question of whether the ASDCs should be designed to more directly reflect the marginal reliability value of each Ancillary Service will be explored, for example. The forthcoming Triennial Reliability Standard Assessment can further inform broader resource-adequacy and market-design decisions.

**The Triennial Reliability Standard Assessment will help to inform consideration of future resource-adequacy and market-design changes.**

The Triennial Reliability Standard Assessment will provide additional information on ERCOT's ability to meet the reliability standard adopted by the PUCT in 2024. Its findings can help inform the consideration of potential market design solutions to contribute to resource adequacy, including the Dispatchable Reliability Reserve Service (DRRS) and changes to scarcity-pricing parameters such as Value of Lost Load (VOLL).

© 2026 ERCOT. All rights reserved.

**ERCOT recommends evaluation of the ASDC design as additional operating experience becomes available and ERCOT's resource mix and reliability needs evolve.**

The current ASDCs were derived from the historical AORDC to preserve historical scarcity-pricing relationships. The PUCT determined at its August 20, 2026 Open Meeting that ASDCs need not remain derived from the AORDC.[5] ERCOT is analyzing ASDC performance as part of its post-RTC+B implementation review and expects to recommend potential improvements in 2027, including whether individual ASDCs should reflect more directly the marginal reliability value of each Ancillary Service. Commission Staff has requested comments on potential ASDC modifications in Project No. 59550.[6]

[5] *See Review of Real-Time Co-optimization in the ERCOT Market*, Project No. 48540, PUCT Staff Memorandum (Aug. 21, 2026) (memorializing the PUCT's discussion from the August 20, 2026 Open Meeting).

[6] Quinquennial Review of System-wide Offer Cap Programs under 16 TAC § 25.509(d), Project No. 59550, Staff's Questions for Comments at 2 (Aug. 20, 2026) (Question 3).

© 2026 ERCOT. All rights reserved.

# 1. Background and Transition from ORDC to ASDC

## 1.1. ORDC Scarcity Pricing Before RTC+B

Before ERCOT implemented real-time co-optimization of energy and Ancillary Services on December 5, 2025, ERCOT used the Operating Reserve Demand Curve (ORDC) to reflect the value of operating reserves in real-time market prices. The ORDC produced higher price adders as reserves declined because the risk of insufficient reserves increased. The calculation used the estimated probability that reserves would fall below the Minimum Contingency Level.

The primary ORDC price adder evaluated in this report is the Real-Time On-Line Reserve Price Adder (RTORPA). RTORPA reflected the value of on-line reserves that could be made available within 30 minutes. The ORDC also calculated the Real-Time Off-Line Reserve Price Adder (RTOFFPA), which valued Off-Line reserves that could become available between 30 minutes and one hour.[7] Security-Constrained Economic Dispatch (SCED) first determined energy dispatch. ERCOT then calculated RTORPA based on the resulting reserve levels and loss-of-load probability and added the RTORPA to the energy price. As reserve levels decreased, RTORPA generally increased.

ERCOT modified several ORDC parameters over time including:

- the System-Wide Offer Cap,
- the Minimum Contingency Level, and
- the reserve price-adder floors.

During the final ORDC period, the design included $10 per megawatt hour (MWh) and $20/MWh price-adder floors that applied when on-line reserves fell below specified

[7] RTOFFPA entered the RTORPA calculation as the component reflecting the value of reserves available in the second half of the operating hour, when both on-line and off-line capacity could respond. Appendix describes the relationship between the two adders.

© 2026 ERCOT. All rights reserved.

thresholds.[8] Appendix A provides additional detail on the ORDC calculation, on-line and off-line reserve categories, parameter history, and RTORPA floors.

## 1.2. ASDC Scarcity Pricing Under RTC+B

ERCOT implemented real-time co-optimization of energy and Ancillary Services on December 5, 2025, through the Real-Time Co-optimization Plus Batteries (RTC+B) project. Under real-time co-optimization, SCED jointly optimizes energy and Ancillary Services every five minutes and determines energy dispatch and Ancillary Service awards in the same solution. The implementation also introduced a single-resource model for battery Energy Storage Resources (ESRs) that considers state of charge when determining their ability to provide energy and Ancillary Services.

Before real-time co-optimization, ERCOT procured Ancillary Services in the Day-Ahead Market and generally held those awards fixed throughout the Operating Day. SCED determined energy dispatch first, and ERCOT calculated reserve scarcity prices afterward. Because Ancillary Service quantities were already fixed, the real-time scarcity-price signal did not directly affect Ancillary Service procurement.

Under real-time co-optimization, Ancillary Service Demand Curves (ASDCs) are direct inputs to SCED and therefore influence energy dispatch, Ancillary Service procurement, and prices in each dispatch interval. Real-time co-optimization replaced the single ORDC with product-specific demand curves for Regulation Up (Reg-Up), Regulation Down (Reg-Down), Responsive Reserve Service (RRS), ERCOT Contingency Reserve Service (ECRS), and Non-Spinning Reserve Service (Non-Spin). Each ASDC represents the value of procuring an additional quantity of the corresponding service.

To preserve historical ORDC pricing outcomes, as required by the PUCT,[9] ERCOT derived the four ASDCs from a single Aggregate Operating Reserve Demand Curve (AORDC). ERCOT constructed the AORDC from historical real-time Market pricing data

[8] Under the final ORDC design, a $20/MWh price floor applied to the Real-Time On-Line Reserve Price Adder (RTORPA) when Real-Time On-Line Capacity (RTOLCAP) was at or below 6,500 MW. A $10/MWh price floor applied when RTOLCAP was above 6,500 MW and at or below 7,000 MW.

[9] *See Review of Real-Time Co-optimization in the ERCOT Market*, Project No. 48540, Memorandum by Chairman Walker at 2 (June 26, 2019).

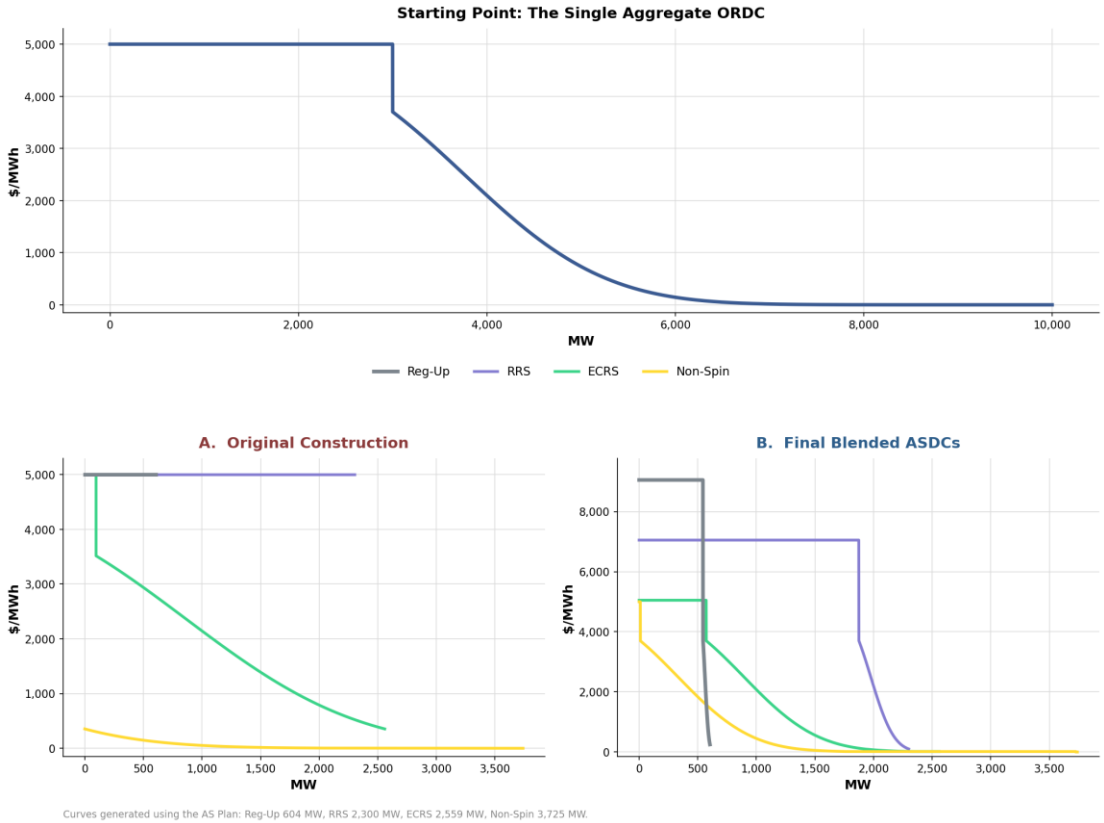
© 2026 ERCOT. All rights reserved.

in accordance with PUCT policy direction. Using one aggregate curve as the basis for all four ASDCs helped preserve the intended scarcity-pricing relationships and limit abrupt price changes after implementation of real-time co-optimization.

Under the original curve-construction methodology, ERCOT proposed assigning separate portions of the AORDC to the four products in a fixed order. Reg-Up received the highest-priced portion, followed by RRS, ECRS, and Non-Spin. This structure limited SCED's ability to make tradeoffs among the products and could leave Non-Spin with only the lowest-priced portion of the curve, weakening its price signal during shortages.

ERCOT eventually adopted a blended methodology that allows portions of the discrete curves to overlap while generally preserving their relative pricing order. The blended design gives SCED greater flexibility to make tradeoffs among Ancillary Services and strengthens the Non-Spin price signal during shortage conditions. Figure 1 illustrates the original and blended designs.

*Figure 1: Evolution of Ancillary Service Demand Curve (ASDC) Design*




© 2026 ERCOT. All rights reserved.

The ASDC framework also includes a $15 per MW per hour AS shortage floor price for ECRS and Non-Spin. The floor was designed to provide a meaningful commitment signal when procurement is unable to achieve the quantity in the AS Plan. The floor shapes the demand curves, but market offers determine the clearing price when sufficient resources are available.

ERCOT may also assign a proxy offer when an eligible resource does not submit an offer for an Ancillary Service. The proxy-offer floor is linked to the applicable ASDC to prevent a low administrative offer from understating the resource's opportunity cost and suppressing the clearing price. Appendix A provides additional details on construction of the product-specific ASDCs, the blended methodology, and the shortage-floor and proxy-offer calculations.

## 1.3. Study Period Definitions

This report examines market outcomes from October 1, 2024, through September 30, 2026. ERCOT implemented RTC+B on December 5, 2025, replacing the ORDC with product-specific ASDCs. The analysis therefore uses two study periods to distinguish the final ORDC period from the initial ASDC period under real-time co-optimization.

The study periods are:

- **October 1, 2024 – December 4, 2025**: Final ORDC period, with RTORPA floors in effect
- **December 5, 2025 – September 30, 2026**: Initial ASDC period, following the implementation of RTC+B and the ASDC framework

Appendix A provides additional technical background on the ORDC and ASDC methodologies, including historical ORDC parameter changes and the study periods covered by prior ORDC Reports.

The PUCT's rule 16 Texas Administrative Code (TAC) § 25.505(e) establishes the requirement that ERCOT analyze the efficacy, utilization, related costs, and contribution of the ORDC to the reliability of the grid in the ERCOT Region. ERCOT must publish the biennial report presenting this analysis by November 1 of every even numbered year. Although the requirement of the rule is limited to an analysis of the ORDC, ERCOT has

© 2026 ERCOT. All rights reserved.

included a similar analysis of the new ASDCs because they have replaced the ORDC Whether 16 TAC § 25.505(e) should be amended to replace the ORDC reporting requirement with a requirement for an ASDC report is within the scope of Commission Staff's Review of Chapter 25 Substantive Rules, Project No. 57999.

© 2026 ERCOT. All rights reserved.

# 2. Final ORDC Period (Oct 2024-Dec 2025)

During the final ORDC period, scarcity conditions occurred substantially less frequently than in the prior study period, with observations concentrated at higher levels of on-line reserves. When tighter conditions occurred, higher Real-Time On-Line Reserve Price Adder (RTORPA) values generally corresponded with lower reserve availability and dispatchable headroom. With scarcity pricing occurring less frequently and at lower magnitudes, RTORPA contributed less to real-time prices and Peaker Net Margin (PNM). The RTORPA floors affected relatively few intervals and had a limited overall market impact. These results continue the downward trend in scarcity conditions identified in the *2024 ORDC Report*.

## 2.1. ORDC Efficacy

### 2.1.1. Relationship between RTORPA and RTOLCAP

The inverse relationship between on-line reserve levels and ORDC-influenced prices held during the final ORDC period. Observations were concentrated at higher levels of on-line resource availability, while low-reserve scarcity conditions occurred less frequently (Figure 2). To isolate this relationship, we subtract the Real-Time On-Line Reliability Deployment Price Adder (RTORDPA) from the system-wide price signal “System Lambda plus Price Adders” to obtain “System Lambda plus RTORPA” and plot it against Real-Time On-Line Capacity (RTOLCAP). Because the plotted price includes both System Lambda and RTORPA, elevated observations may reflect energy-market conditions, low operating-reserve levels, or a combination of the two.

The shaded area represents all possible RTORPA values. Its upper bound represents when Real-Time Off-Line Capacity (RTOFFCAP) is zero, which puts the Real-Time Off-Line Reserve Price Adder (RTOFFPA) component of RTORPA at its maximum. Its lower bound represents when RTOFFCAP is arbitrarily large, which drives the RTOFFPA component of RTORPA toward $0/MWh. Note that RTORPA is a minimum ORDC adder contribution to the full price signal, plotted as System Lambda plus RTORPA. Because RTORPA also reflects off-line reserve availability, lower off-line reserves can contribute to higher RTORPA even when on-line reserves remain relatively high.

© 2026 ERCOT. All rights reserved.

Moving from left to right across RTOLCAP levels in the final ORDC period (10/1/24–12/4/25), the expected inverse relationship between the price signal and on-line reserve levels generally persists: lower on-line reserve levels correlate to higher potential RTORPA values and higher on-line reserve levels correlate to lower potential RTORPA values. In the final ORDC period, observations are concentrated at higher levels of on-line reserves. The shift in reserve composition toward more on-line and fewer off-line reserves also helps explain why RTORPA can occur at relatively high RTOLCAP levels. This concentration also reflects growth in resources that remain available as on-line supply, particularly ESRs, which do not have an off-line status. Consistent with this greater on-line resource availability, the system entered low-reserve conditions less frequently. The concentration at higher on-line reserve levels was consistent with continued solar and ESR additions[10], less extreme weather[11], and increased price-responsive cryptocurrency-mining load.[12]

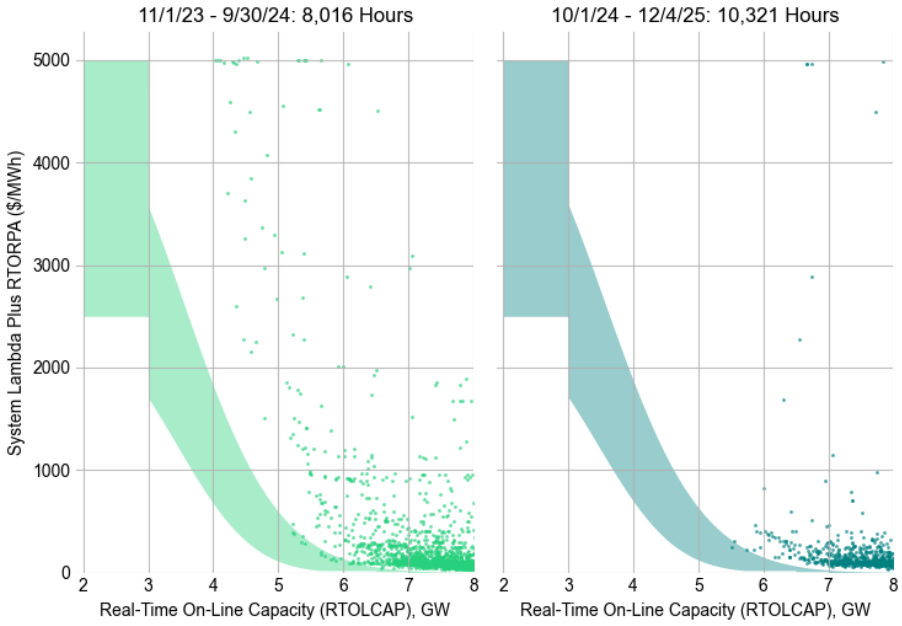
[10] From October 2024 to December 2025, solar capacity increased by approximately 20 GW and ESR capacity by 16 GW.

[11] Summer 2023 had 49 days with peak demand above 80 GW, compared with 22 days in summer 2024 and 24 days in summer 2025.

[12] Monthly peak cryptocurrency-mining load increased from approximately 2,300 MW in late 2023 to more than 4,300 MW in 2025.

© 2026 ERCOT. All rights reserved.

*Figure 2: System Lambda plus Price Adders versus RTOLCAP during two subperiods. The shaded area represents all possible RTORPA values: its lower bound reflects the scenario where RTOFFCAP is arbitrarily large, while its upper bound represents RTOFFCAP = 0 MW.*




### 2.1.2. Relationship between RTORPA and Spinning/Non-Spinning Reserves

While RTORPA is only paid to on-line reserves (i.e., the RTOLCAP category), it is useful to consider its impact on total on-line and off-line reserves. Total reserves may be expressed as RTOLCAP plus RTOFFCAP; this sum is designated as $R_{SNS}$ within the ORDC methodology.

Figures 3 and 4 show how RTORPA affects reserve levels for each study subperiod: on-line reserves ($R_S$) in 3, and off-line reserves ($R_{SNS}$-$R_S$) in 4. For each $3/MWh increment of RTORPA, from $0.01/MWh to $32.50/MWh, we calculated the average reserve level in that increment.

Figure 3 illustrates that both periods exhibit remarkably consistent patterns: spinning reserves remain tightly clustered between 6–8 GW across the full RTORPA range, even as prices rise toward $30/MWh.

Figure 4 illustrates that off-line reserves decline modestly at higher RTORPA levels but remain stable relative to total reserve quantities. The similarity between the two subperiods reflects the absence of major policy changes affecting reserve composition

© 2026 ERCOT. All rights reserved.

during this final ORDC period.[13] The persistence of this reserve-price relationship across both subperiods validates the operational stability of the ORDC in its final months before implementation of real-time co-optimization.

*Figure 3: RTORPA in $3/MWh bins versus bin average Spinning Reserves ($R_S$) during the study subperiods*

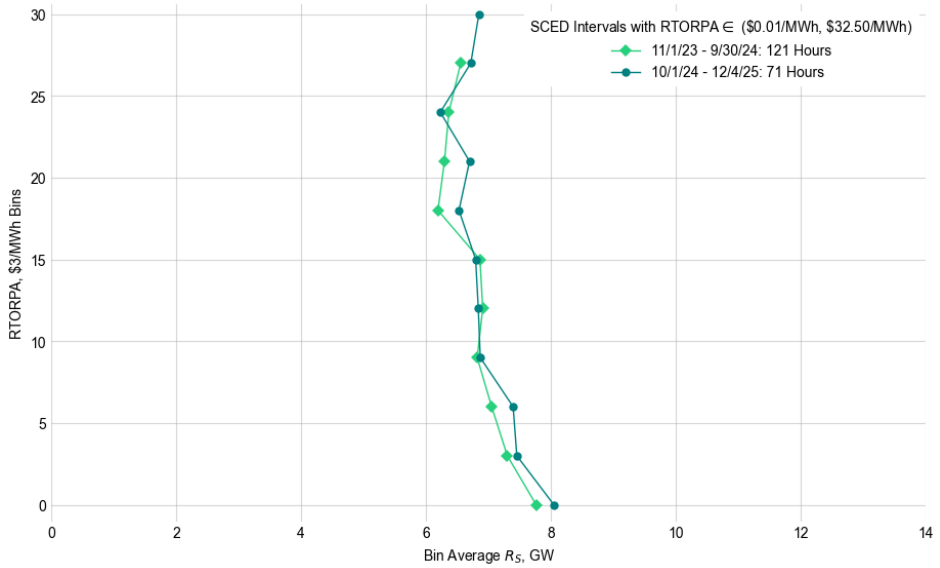
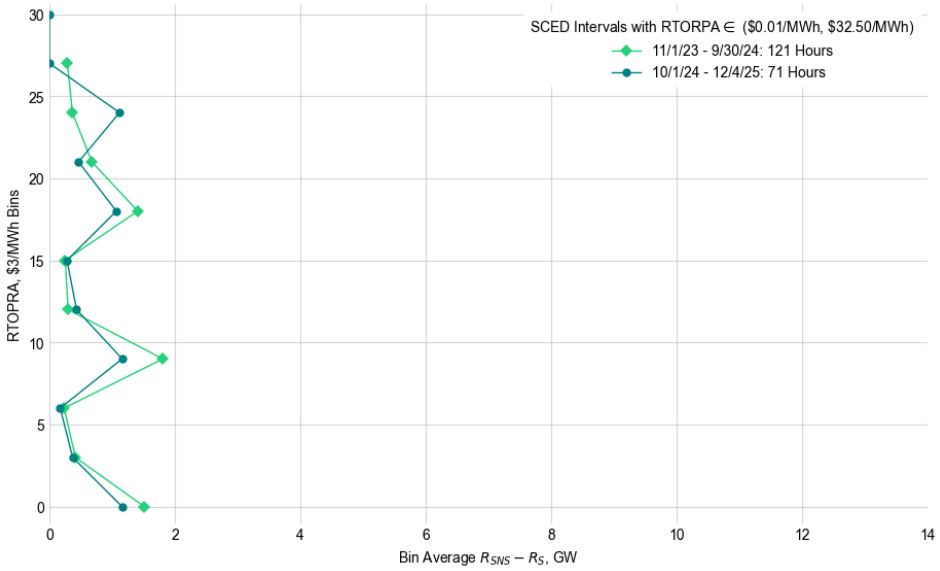



*Figure 4: RTORPA in $3/MWh bins versus bin average Non-Spinning Reserves ($R_{SNS}$ -$R_S$) during the study subperiods*




[13] By contrast, the 2024 ORDC Report period included the introduction of ECRS in June 2023 and the RTORPA price-adder floors in November 2023. See 2024 Biennial ERCOT Report on the ORDC (Nov. 1, 2024).

© 2026 ERCOT. All rights reserved.

### 2.1.3. Relationship between RTORPA and Self-Commitment Incentives

The ORDC and future price expectations for the Operating Day play an important role in spurring the self-commitment of marginal resources, incentivizing them to enter the reserve pool and contribute to on-line reserves. Ideally, this can help avoid out-of-market actions such as RUCs. To determine whether it is economic to commit a particular resource on a given day, a Qualified Scheduling Entity (QSE) must compare the resource's start-up costs to its expected revenue over the course of its minimum run time.

ERCOT has estimated that a $10/MWh RTORPA value is sufficient to cover the start-up costs of a marginal combustion turbine with a four-hour minimum run time.[14] Figure 5 illustrates how often this opportunity occurred during each subperiod. The percentage tied to each subperiod represents the fraction of days where at least one four-hour window had an interval-weighted average RTORPA over $10/MWh. These are days where a resource with a four-hour minimum run time could have received at least $10/MWh on average from RTORPA payments alone by self-committing at an appropriate time.[15]

The self-commitment opportunity declined sharply in the final ORDC period: only 0.7% of days met the $10/MWh, 4-hour rolling time-weighted threshold, a decline compared to the prior subperiod's 1.8%. This decline is consistent with the impact of higher on-line reserve levels driven by increased solar and energy storage capacity additions.[16]

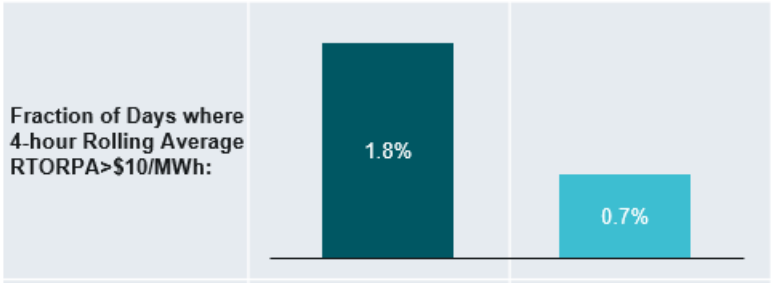
[14] *Review of Wholesale Electric Market Design*, PUCT Project No. 52373, The Brattle Group and Astrapé Consulting, Impact Assessment of ORDC Changes (Nov. 5, 2021).

[15] It is worth noting that a QSE cannot know what RTORPA prices will materialize over the next four hours in advance; in other words, only with perfect knowledge of the future could a QSE self-commit a resource on every day for which it is economical to do so. Also, even if RTORPA payments are expected to cover a resource's start-up costs, a QSE would only commit that resource if anticipated LMPs are sufficiently high compared to its Energy Offer Curve (EOC).

[16] From October 2024 to December 2025 total capacity increased by 20 GW and 16 GW for solar Generation Resources and ESRs respectively.

© 2026 ERCOT. All rights reserved.

*Figure 5: Fraction of days where 4-hour rolling time-weighted average ORDC adder exceeded $10/MWh during the study subperiods*




| | | |
|---|---|---|
| **Interval:** | 11/01/23 - 09/30/24 | 10/01/24 - 12/04/25 |
| **Days above Threshold:** | 6 | 3 |
| **Total Days** | 335 | 430 |

### 2.1.4. ORDC Price Signals During Scarcity

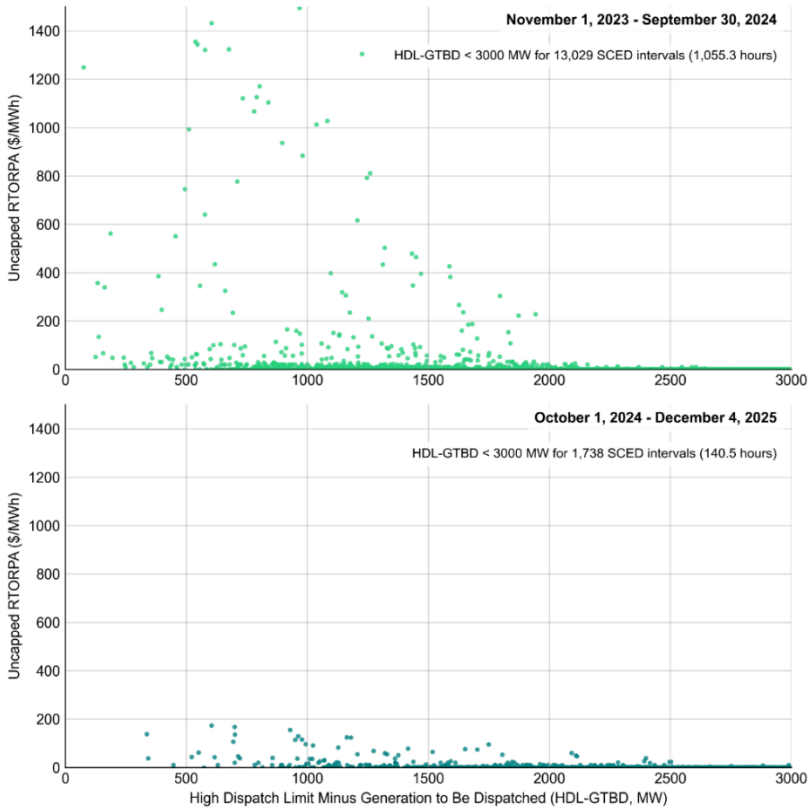
Historically, this report has used Physical Responsive Capability (PRC) to evaluate ORDC outcomes during tight operating conditions. During the final ORDC study period, however, PRC fell below 5,500 MW in less than 0.1% of SCED intervals. The limited number of observations makes PRC less useful for comparing ORDC price signals during tight conditions in this study period. In addition, growing ESR participation can make PRC less representative of available dispatchable capability. ESRs can contribute substantially to PRC even when their state of charge limits the amount or duration of energy they can provide. As a result, a high PRC value does not necessarily indicate an equivalent amount of sustained energy capability. Accordingly, this report uses on-line dispatchable capacity as an interim measure of real-time on-line dispatch headroom.

On-line dispatchable capacity is calculated as the sum of the High Dispatch Limits of all on-line resources minus system-wide Generation-To-Be-Dispatched. It provides a simplified measure of the additional output available from resources already on-line. On-line dispatchable capacity is not an input to the ORDC calculation. RTORPA is determined using ORDC reserve measures, including RTOLCAP, available off-line reserves, and loss of load probability, so on-line dispatchable capacity and RTORPA should not be expected to have a one-to-one relationship.

© 2026 ERCOT. All rights reserved.

Figure 6 shows uncapped RTORPA for SCED intervals in which on-line dispatchable capacity was below 3,000 MW ("low-capacity intervals").[17] The frequency of these intervals declined from 13,029 intervals, or 13.31% of all SCED intervals, during November 2023 through September 2024 to 1,738 intervals, or 1.38%, during October 2024 through December 2025. Among the intervals that did fall below 3,000 MW, however, average on-line dispatchable capacity was nearly identical across the two periods, at 2,334 MW and 2,335 MW, respectively. The minimum increased from 75 MW to 337 MW, indicating that the most extreme low-capacity conditions were less severe in the final ORDC period. Average RTORPA across these intervals declined from $4.17/MWh to $2.69/MWh.

*Figure 6: Uncapped RTORPA (calculated without applying SWCAP to System Lambda plus Price Adders) versus on-line dispatchable capacity for SCED intervals with dispatchable capacity below 3,000 MW*




[17] The 3,000 MW threshold was selected for this analysis to identify relatively tight dispatch conditions while maintaining a sufficient sample of SCED intervals for comparison across study periods. It does not represent an ERCOT operational threshold.

© 2026 ERCOT. All rights reserved.

Despite the large decline in the frequency of low-capacity conditions, average dispatchable capacity within those intervals was nearly identical across the two periods. In other words, tight conditions occurred much less often in this reporting period, but when they did occur, they were about as tight on average.

*Table 7: Summary statistics for SCED intervals with on-line dispatchable capacity below 3,000 MW*

| Study period | Intervals | Share of all SCED intervals | Average capacity | Minimum capacity | Average RTORPA |
|---|---|---|---|---|---|
| **Last report's ORDC period (Nov 2023 – Sep 2024)** | **13,029** | **13.31%** | **2,334 MW** | **75 MW** | **$4.17/MWh** |
| **This report's final ORDC period (Oct 2024 – Dec 2025)** | **1,738** | **1.38%** | **2,335 MW** | **337 MW** | **$2.69/MWh** |

*Note: On-line dispatchable capacity is the sum of the High Dispatch Limits of all on-line resources less system-wide Generation To Be Dispatched (HDL−GTBD).*

## 2.2. ORDC Utilization

Generators and loads in the ERCOT System are settled at Settlement Point Prices (SPPs) every 15 minutes. SPPs are a combination of Locational Marginal Prices (LMPs) for energy, the RTORPA, and the RTORDPA. Figure 8 illustrates the contributions of each of these price components by month going back to October 2023. Real-time hub average prices increased 27.5% from 2024 to 2025. This increase was driven in part by higher natural gas prices, which rose approximately 59.5% over the same period, from an annual average of $1.90/MMBtu in 2024 to $3.04/MMBtu in 2025.

RTORPA's share of the all-in price fell in 2025, dropping from 0.7% ($0.25/MWh) in November 2023 – September 2024 to 0.2% ($0.07/MWh) in October 2024 – December 2025. Compared to the *2024 ORDC Report* study period, renewable and ESR capacity additions likely contributed to increase the pool of on-line reserves and decreased overall ORDC costs.

© 2026 ERCOT. All rights reserved.

*Figure 8: Relative contributions of ORDC and RDPA to total real-time energy prices by month.*

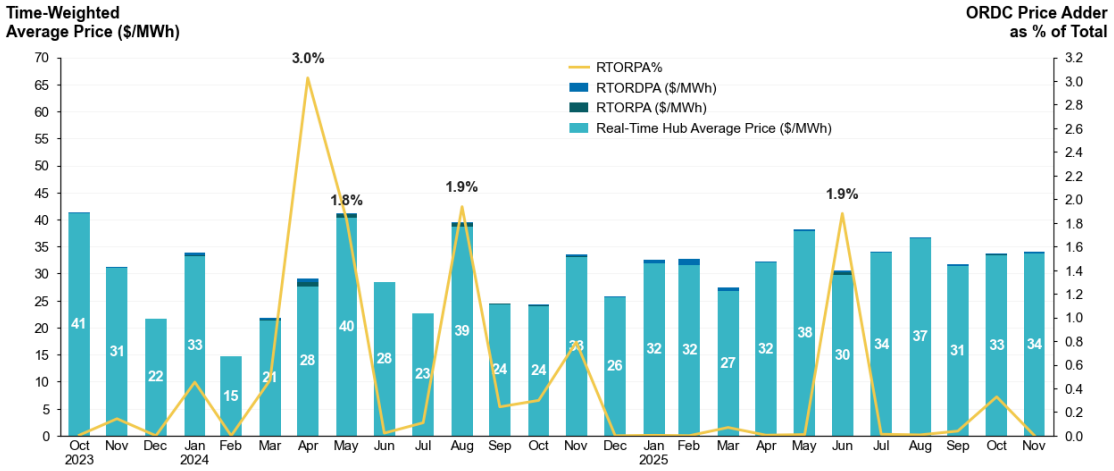
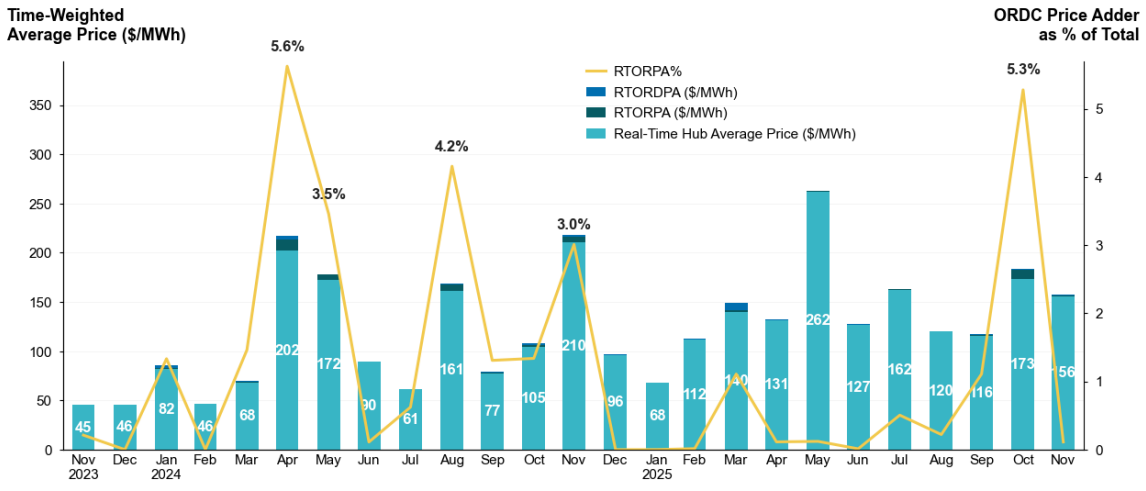



Figure 9 below illustrates the price contributions of LMPs, RTORPA, and RTORDPA specifically during intervals when HDL-GTBD was less than 3,000 MW. As can be seen in Figure 9, price signals were stronger under tight conditions. The time-weighted average RTORPA during these intervals from November 2023 to September 2024 rose to $2.52/MWh (2.6% of all-in price), and $1.54/MWh from October 2024 to December 2025 (1.1% of all-in price).

*Figure 9: Relative contributions of ORDC and RDPA to total real-time energy prices for SCED intervals below 3,000 MW dispatchable capacity by month.*




© 2026 ERCOT. All rights reserved.

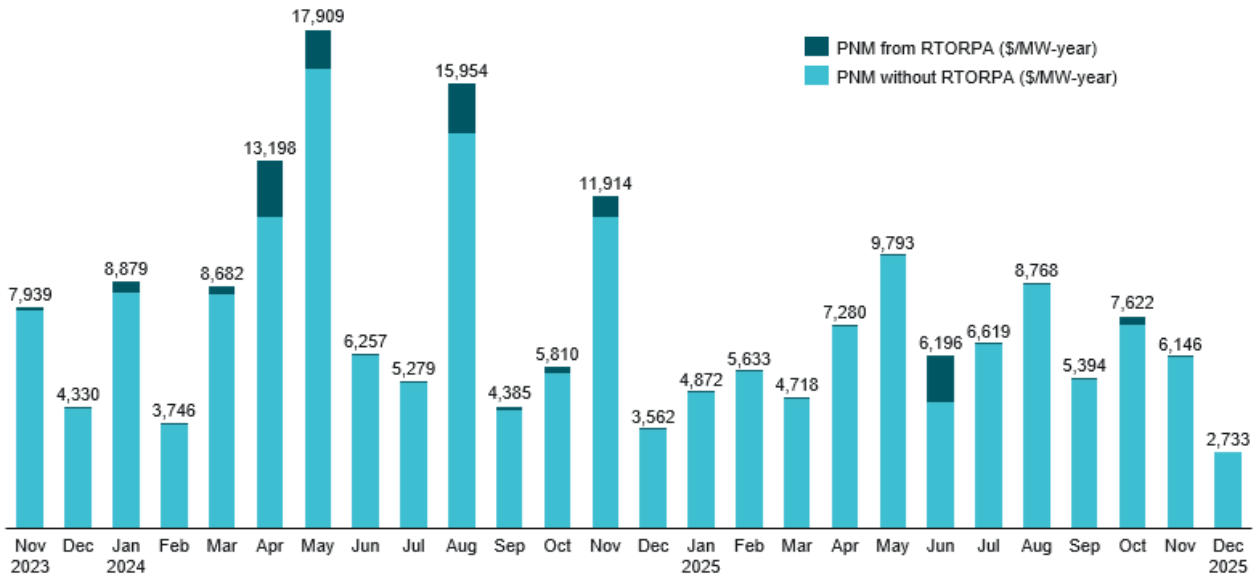
## 2.3. ORDC Related Costs

### 2.3.1. ORDC Impact on Peaker Net Margin

PNM is meant to represent the net revenue that a hypothetical peaker Generation Resource could have earned from the Real-Time Market. This value accumulates throughout the year and is reported on the ERCOT website daily. The PNM threshold is administratively established by 16 TAC § 25.509(b)(6)(C). Once the PNM threshold is met, ERCOT will transition the SWCAP from the HCAP to the LCAP for the remainder of the year. PNM is calculated using SPPs and is therefore sensitive to real-time LMPs, RTORPA, and RTORDPA. Figure 10 indicates that monthly PNM totals have been lower overall in 2025 than in 2024. The contribution from RTORPA is also lower overall in 2025 compared to contributions from higher Hub Average prices in 2024.

Figures 11 and 12 below illustrate the accumulation of PNM for 2024 and 2025. The RTORPA made up 6.8% of the total PNM from November 2023 to September 2024 and 3.2% of the total PNM from October 2024 to December 2025. PNM accumulation in both years has been relatively modest due to less extreme weather and increasing levels of generation supply.

*Figure 10: Peaker Net Margin with and without the ORDC Price Adder by month*




© 2026 ERCOT. All rights reserved.

*Figure 11: Cumulative PNM with and without ORDC Price Adders for 2024*

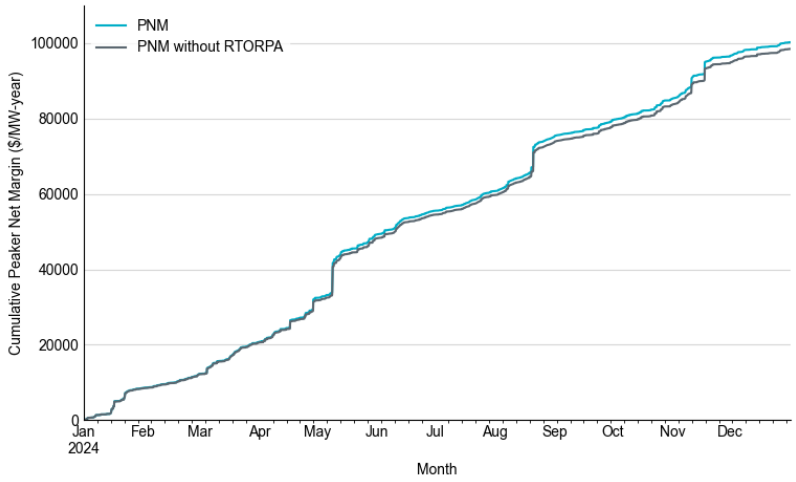
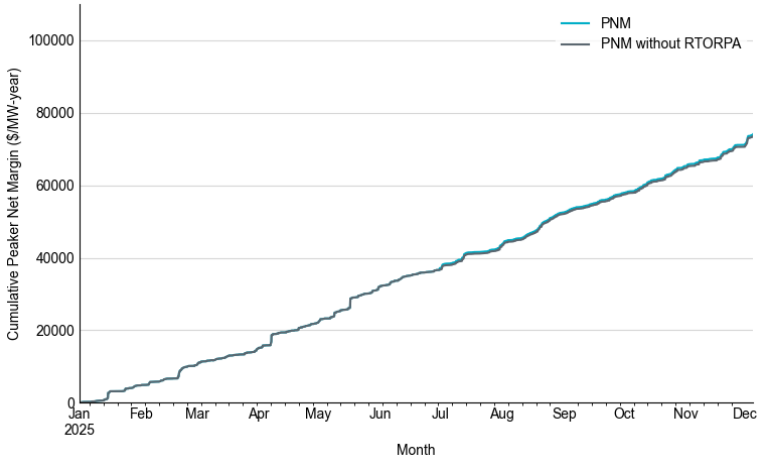



*Figure 12: Cumulative PNM with and without ORDC Price Adders for 2025*



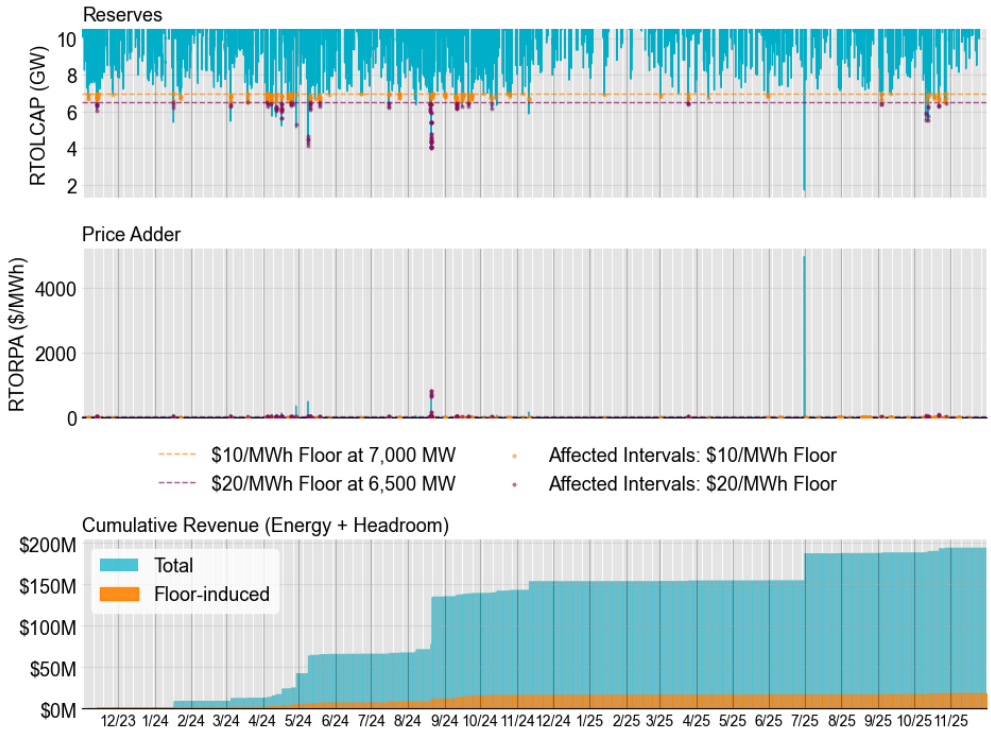

### 2.3.2. Impact of ORDC Price Floor

As indicated previously, ERCOT introduced a multi-step RTORPA floor in November 2023. Figure 13 contains three graphs which illustrate the impact of the ORDC price floors since their implementation. For purposes of this analysis, an “affected interval” is a SCED interval in which the applicable RTORPA floor increased RTORPA above the otherwise-calculated ORDC value. The 7,000 MW threshold refers to intervals in which RTOLCAP was below 7,000 MW and the $10/MWh RTORPA floor applied, while the 6,500 MW threshold refers to intervals in which RTOLCAP was below 6,500 MW and the $20/MWh RTORPA floor applied. The first two graphs show intervals in which the floors impacted RTORPA by highlighting 250 intervals due to the 7,000 MW floor (orange) and 134

© 2026 ERCOT. All rights reserved.

intervals due to the 6,500 MW floor (purple). The third graph shows the ORDC floors' contribution to cumulative revenue. Through the two subperiods of this study, the ORDC floors have contributed an additional approximately $18.3M of revenue.

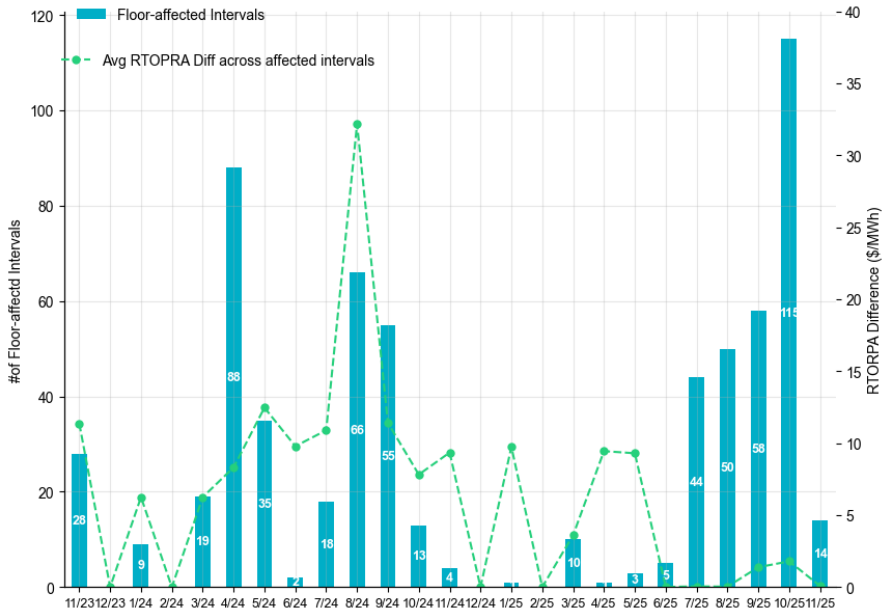
*Figure 13: Floor-affected intervals and floor-induced revenue since the introduction of ORDC price floors*




© 2026 ERCOT. All rights reserved.

Figure 14 illustrates the impact of the ORDC price floors on the RTORPA each month. “RTORPA Difference” is the increase in RTORPA due to the ORDC floors.

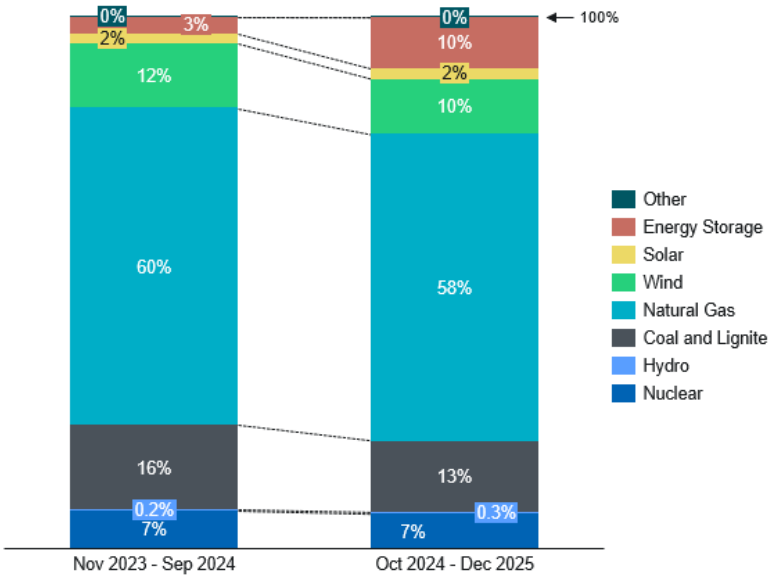
*Figure 14: Number of floor-affected intervals and average RTOPRA difference*




© 2026 ERCOT. All rights reserved.

Figure 15 shows the fuel mix of generation during intervals when the ORDC price floor was in effect. Dispatchable generation accounted for approximately 83% of energy output from November 2023 through September 2024 and 78% from October 2024 through December 2025. Natural gas remained the largest source of energy output in both periods, while energy storage increased from 3% to 10% in the later period.

*Figure 15: Contribution of energy output by fuel type when ORDC price adder-floor was in effect*




## 2.4. ORDC Contribution to Grid Reliability

ORDC's observable contribution to grid reliability was limited during the final study period because tight reserve conditions occurred infrequently. The share of SCED intervals with less than 3,000 MW of on-line dispatchable capacity declined from 13.31% in the prior comparison period to 1.38% from October 2024 through December 2025. Continued capacity additions, predominantly solar and Energy Storage Resources, increased the quantity and availability of on-line reserves, while less extreme weather and price-responsive cryptocurrency-mining load also reduced system stress during tight conditions. Together, these factors reduced the frequency of conditions in which ORDC scarcity pricing would be expected to materially affect reliability outcomes. When tight conditions did occur, higher RTORPA outcomes remained directionally aligned with lower dispatchable headroom.

© 2026 ERCOT. All rights reserved.

# 3. Initial ASDC Period (Dec 2025-Sep 2026)

## 3.1. ASDC Efficacy

This section examines whether and how the ASDCs contributed to price formation and allocated scarcity consistent with design expectations. Efficacy is assessed on five observable properties:

1) whether shortage occurred when the system had less surplus dispatchable capacity available;

2) the severity and persistence of shortage when it occurred;

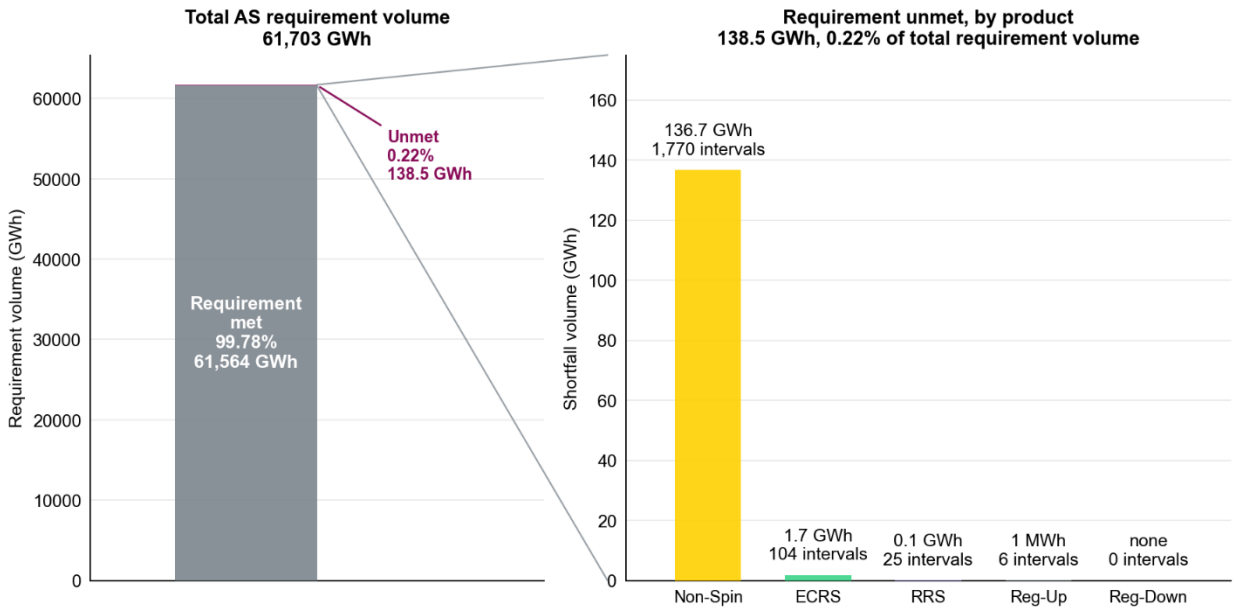
3) whether scarcity is allocated across products in the order the hierarchy implies;

4) whether the price response scales with the magnitude of a shortfall; and

5) whether the relative pricing of products during coincident shortfalls is consistent with their position in that hierarchy.

Before considering these questions, Figure 16 establishes the scale of shortage over the period, which frames the following analysis.[18]

*Figure 16: Real-time Ancillary Service shortage volume, total and by product*




© 2026 ERCOT. All rights reserved.

Figure 16 shows that, across the period, 136.7 gigawatt hours (GWh) of Ancillary Service requirement was unmet, equal to 0.22% of the approximately 61,702 GWh total requirement volume. Non-Spin accounted for most of that shortfall at 136.7 GWh over 1,770 intervals, with ECRS contributing 1.7 GWh over 104 intervals, RRS a negligible amount over 25 intervals, and Reg-Up a negligible amount over 6 intervals. Reg-Down recorded no shortfall in any interval.

The scale matters for reading the rest of this section. SCED procured Ancillary Services consistent with the AS Plan in most intervals and for nearly all of the requirement volume over the period. What follows is an analysis into the instances of procurement shortfalls and the factors that contributed to pricing outcomes.

Two ASDC-related design features contribute to price formation discussed throughout this section and are set out in detail in the utilization section that follows. The first is the AS shortage floor price of $15 per MW per hour applied to the ECRS and Non-Spin demand curves, which sets a penalty price floor whenever procurement falls short of the AS Plan. The second is the dynamic AS Proxy Offer Floor assigned to qualified resources that did not submit offers.

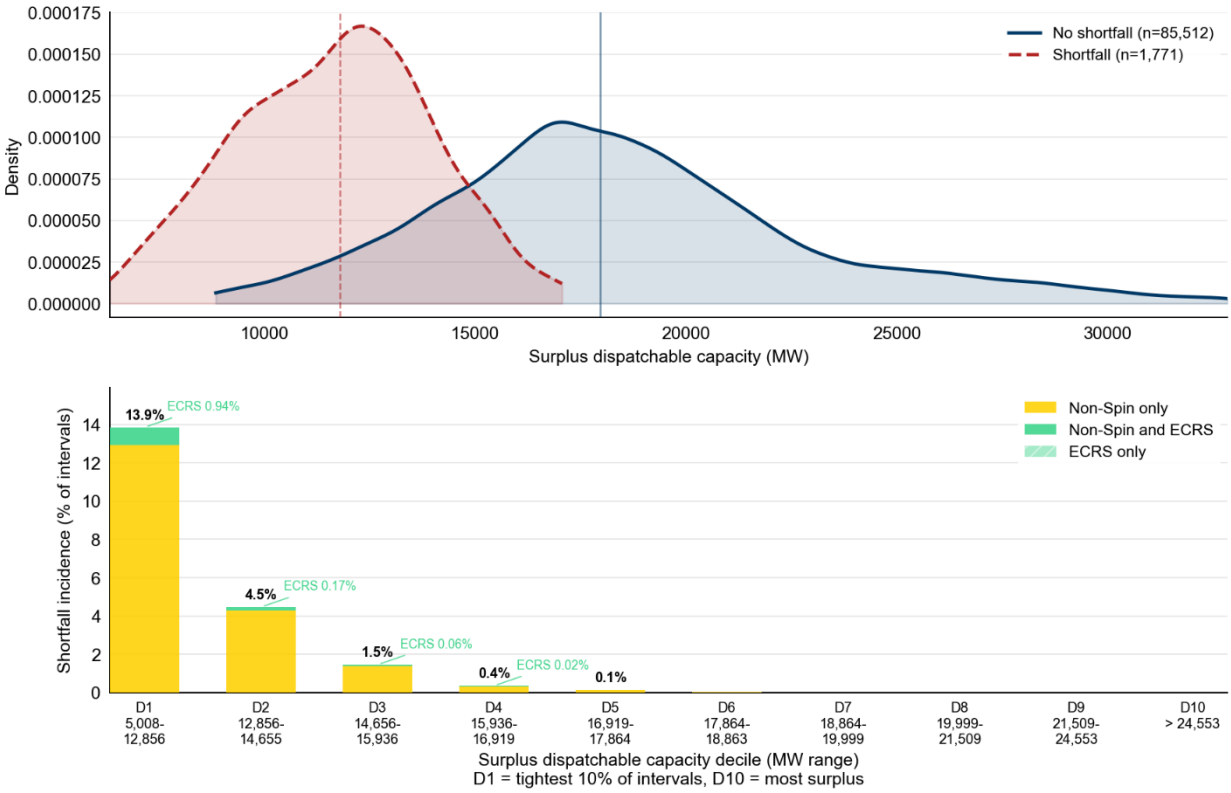
### 3.1.1. Shortage and Real-Time Conditions

Figure 17 compares shortfall incidence to surplus dispatchable capacity (i.e., relative system scarcity). Surplus dispatchable capacity measured as the aggregate High Dispatchable Limit of on-line SCED-dispatchable resources minus the estimated demand for the coming five-minute interval.

[18] Between December 5, 2025, and January 7, 2026, SCED periodically failed to reach an optimal solution due to an issue with the Barrier solver method. ERCOT implemented a software fix on January 8, 2026. Where identifiable through price-based tests, affected intervals were excluded from the analyses in this section. Because these tests may not identify every affected interval, December 2025 and January 2026 results should be interpreted with caution, particularly January ECRS results.

© 2026 ERCOT. All rights reserved.

*Figure 17: Shortfall incidence and surplus dispatchable capacity*



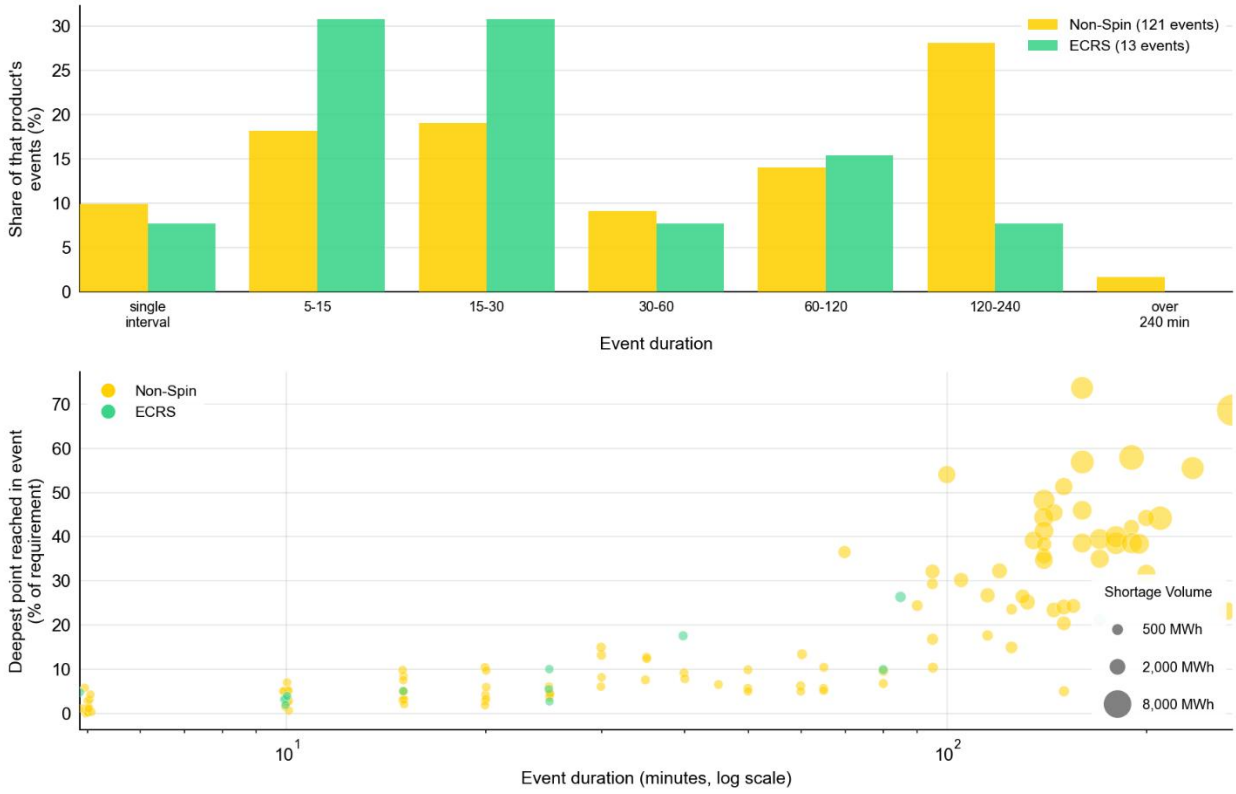

The upper panel shows that shortage intervals occurred at a median surplus dispatchable capacity roughly 6,000 MW below that of non-shortfall intervals. Non-Spin and ECRS shortfalls were concentrated in tighter system conditions, particularly for ECRS, consistent with the ASDC hierarchy in which shortages of higher-priority Ancillary Services are expected to occur less frequently and under more constrained conditions. The density curves show the relative concentration of observations across surplus-capacity levels rather than the percentage of intervals. The bottom panel sorts every interval into ten equally sized groups from the least surplus dispatchable capacity to the most and reports how often a shortfall occurred within each. Shortfall occurred in roughly 14% of intervals in the tightest group, falling below 1% once surplus dispatchable capacity exceeded about 16,000 MW. Both panels describe how shortfall incidence varied with the surplus dispatchable capacity that was observed. Neither addresses why this surplus dispatchable capacity was at the level it was in any given interval, which depends on load, renewable output, unit availability and commitment decisions that this analysis does not examine.

© 2026 ERCOT. All rights reserved.

### 3.1.2. Shortage Severity and Persistence

Figure 18 separates shortfall frequency from severity, recognizing that incidence rate measures how often shortages occur but not how large or persistent they are. The upper panel shows the distribution of event duration, where an event is a run of consecutive intervals in shortfall for the same product. Non-Spin shortfalls varied in duration. For example, 16.5% lasted a single interval, but 43.8% exceeded an hour and the longest ran four and a half hours.

*Figure 18: Shortfall event duration and magnitude, by product*




The bottom panel compares each event's duration to the deepest point it reached, with marker size proportional to shortage volume, and shows that the longest events were also the deepest and carried the most volume. The ten largest Non-Spin events accounted for 41.4% of shortage volumes across the period, and eight of the ten began between 7:20 and 8:45 p.m. in May or June.

### 3.1.3. Allocation of Scarcity Across Products

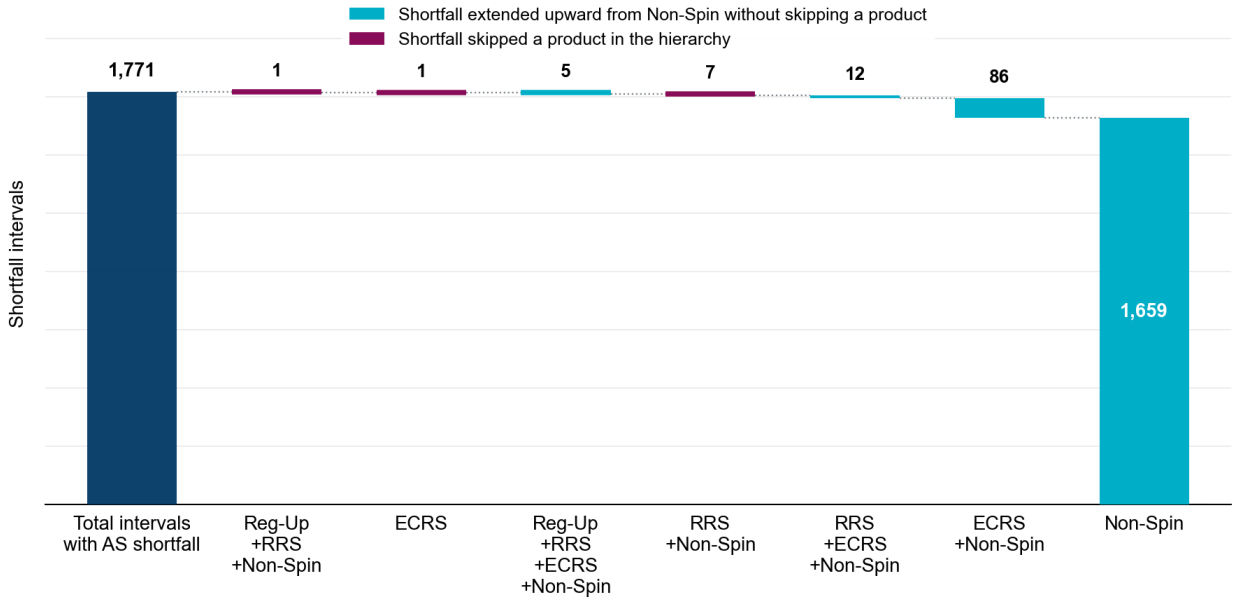
Having established the scale of shortage, the first efficacy question is whether and how shortages were allocated within the ASDC hierarchy as designed. The ASDCs are

© 2026 ERCOT. All rights reserved.

derived as slices of a single aggregate curve, so shortfall would be expected to begin with the lowest-priority product and extend upward without skipping any product in between. Shortages declined in severity moving up the product hierarchy. Non-Spin recorded 1,770 shortfall intervals at a median magnitude of 16.2% of requirement, ECRS 104 intervals at 6.2%, RRS 25 intervals at 1.6%, and Reg-Up 6 intervals at 0.6%. Reg-Down recorded no shortages compared to the AS plan.

Figure 19 partitions every shortfall interval into the exclusive combination of products affected.

*Figure 19: Real-time shortage intervals by product combination*




As displayed in the figure, Reg-Down did not experience shortage in any interval over the period. Shortfall is overwhelmingly a Non-Spin phenomenon. Of the 1,771 intervals with any AS shortfall, 1,659 involved Non-Spin alone, 86 involved ECRS and Non-Spin together, 12 involved RRS, ECRS, and Non-Spin and 5 intervals involved Reg-Up, RRS, ECRS, and Non-Spin. In total 1,762 of 1,771 intervals or 99.5%, the ASDCs allocated shortfalls consistent with the hierarchical design.

Only nine intervals did not. In one, ECRS went short while Non-Spin met its requirement. In seven others, RRS and Non-Spin both went short while ECRS, which sits between them in the hierarchy, cleared its requirement. In one, Reg-Up, RRS, and Non-Spin all

© 2026 ERCOT. All rights reserved.

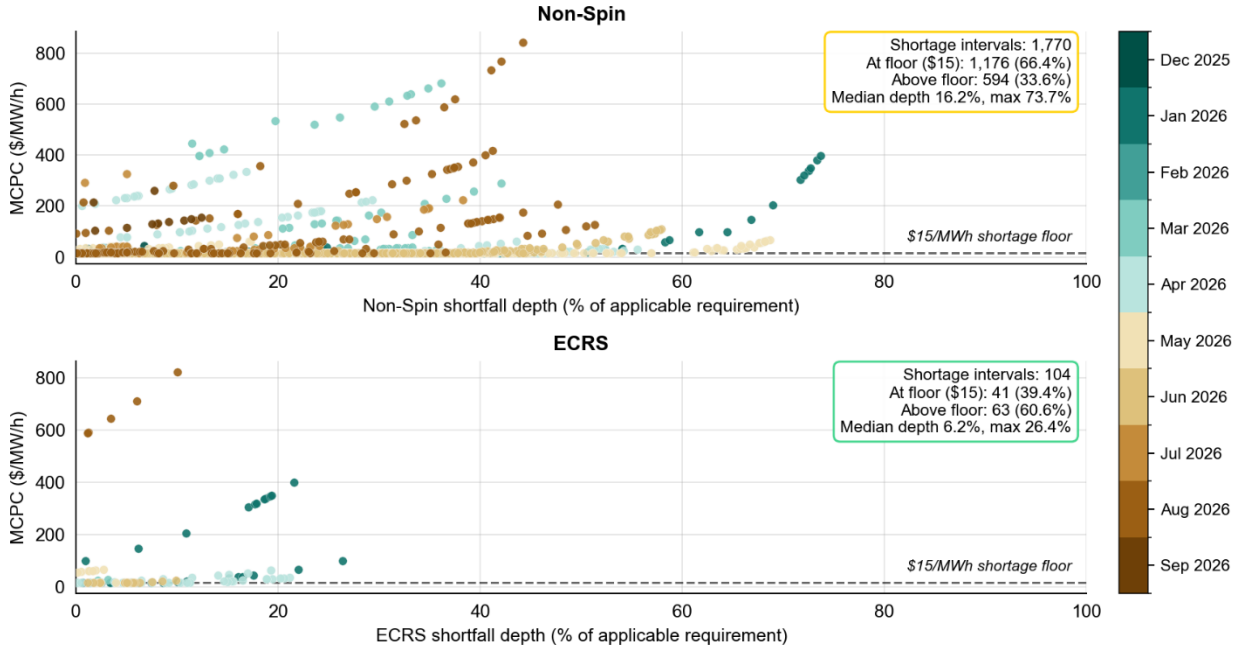
went short while ECRS cleared its requirement. The second and third condition are more consequential compared to the first, since a gap at the end of the hierarchy is easier to reconcile with marginal effects than a gap in the middle.

These nine intervals are too few to distinguish a design characteristic from an isolated occurrence. These are likely related to the ASDC disaggregation methodology, which applies minimum sampled prices to Reg-Up and RRS but not to ECRS, creating the potential for ECRS pricing to fall out of strict hierarchical order in limited cases. This may warrant review as part of future design discussions.

### 3.1.4. Price Response to Shortfall Magnitude

Another dimension of ASDC efficacy is whether scarcity prices appropriately reflect the magnitude and severity of Ancillary Service shortfalls. Figure 20 traces the portion (or segment) of each demand curve reached during shortage conditions from observed market outcomes. This helps to establish how the ASDC penalty prices were applied in practice and whether the response scales with severity.

*Figure 20: Real-time shortage magnitude and clearing price, Non-Spin and ECRS*




The figure shows that Non-Spin cleared at the $15 shortage floor price in 66.4% of shortage intervals and above it in 33.6%, with prices in the latter group reaching $200 to over $800 per MWh. ECRS cleared above the floor more often, 60.6% of its 104 shortage

© 2026 ERCOT. All rights reserved.

intervals, reflecting its higher position (i.e., penalty cost in the optimization) in the aggregate curve hierarchy. Shortfall magnitude also differs markedly between the two: Non-Spin median shortfall was 16.2% of requirement with a maximum of 73.7%, compared with 6.2% and 26.4% for ECRS. The prices are not a simple function of shortfall magnitude. The chart shows distinct strands by operating month, and the same proportional shortfall prices vary widely depending on which curve was binding. A 20% shortfall in the winter months cleared at $400 to $500 per MWh, while a 60% shortfall in early summer cleared below $100 per MWh. This follows from the requirement being month-hour specific: a given proportional shortfall in a low-requirement month sits at a smaller absolute quantity, further left on the curve where it is steepest.

These outcomes are consistent with design expectations, with ASDC penalty prices rising as reserve shortages increase, differentiating between products consistent with their position in the hierarchy. Two additional observations are worth noting. The shortage floor price rather than the non-linear portion of the curve determined the price in the majority of Non-Spin shortage intervals. Secondly, magnitude of that signal for a given proportional shortfall varies by roughly an order of magnitude across the year, which is a consequence of the AS requirement-setting methodology rather than of the curve design.

### 3.1.5. Relative Pricing during Coincident Shortfall

The ASDCs are derived as slices of one aggregate curve, so where two products are short in the same interval the higher-priority product would be expected to price at or above the one below it. Table 21 evaluates that ordering directly and, alongside it, whether the Non-Spin price escalates as shortfall extends further up the product stack.

© 2026 ERCOT. All rights reserved.

*Table 21: Real-time clearing price by product within each shortfall regime*

| Shortfall Combination | Intervals | Reg-Up Median Price ($/MWh) | RRS Median Price ($/MWh) | ECRS Median Price ($/MWh) | Non-Spin Median Price ($/MWh) |
|---|---|---|---|---|---|
| Non-Spin only | 1,659 | — | — | — | $15.00 |
| ECRS + Non-Spin | 86 | — | — | $15.86 | $15.00 |
| RRS + ECRS + Non-Spin | 12 | — | $168.73 | $318.17 | $329.62 |
| Reg-Up + RRS + ECRS + Non-Spin | 5 | $330.39 | $322.38 | $644.66 | $734.25 |

Four shortfall clusters occur in the data. In the 1,659 intervals where Non-Spin alone was short, the median clearing price was $15.00, the AS shortage floor price. In the 86 intervals where ECRS and Non-Spin were both short, both cleared at or near the floor, $15.86 and $15.00 respectively, so the two products carried effectively the same price. In the 12 intervals where RRS, ECRS, and Non-Spin were all short, prices rose by more than an order of magnitude, to medians of $168.73, $318.17, and $329.62, respectively. Similarly in the 5 intervals where Reg-Up, RRS, ECRS and Non-Spin were all short median prices rose to $330.39, $322.38, $644.66, and $734.25 respectively.

As shown, the Non-Spin price resides at the AS shortage floor price in the great majority of shortfall intervals and rises sharply only where shortfall extends to the products above it. The ASDC penalty price correlates with the severity of the shortfall and increases quicker with the shortfall of higher-priority products, which is the intended behavior. The AS shortage floor price determines the price in most shortfall intervals, so price differentiation between products is largely absent outside intervals where the system is experiencing relatively tight conditions. In such intervals where Reg-Up, RRS, ECRS, and Non-Spin were experiencing shortages, higher priority Ancillary Services such as Reg-Up and RRS were priced below ECRS and Non-Spin, contrary to their relative position in the hierarchy. As noted in the preceding section, this reflects the sampling methodology used to derive individual product curves from the aggregate ORDC, which does not

© 2026 ERCOT. All rights reserved.

always guarantee strict price ordering between products at all quantities. With only 17 such intervals, this warrants further observation as more operating data and experience becomes available.

## 3.2. ASDC Utilization

The efficacy section established that shortfall was rare, fell on the products the hierarchy implies, and was priced predominantly at the AS shortage floor price. This section examines how and when the ASDCs were utilized. Utilization is assessed on three observable dimensions: 1) the magnitude of shortages against requirements across the five AS products; 2) how often the AS shortage floor determined the clearing price, and 3) how often the Proxy Offer Floor determined the clearing price. Together these establish the segments reached on each ASDC (i.e., penalty curve) in the Real-Time Market--including which curves were not reached at all--and which features of the design bound routinely versus rarely.

### 3.2.1. Procurement Relative to the Ancillary Service Plan

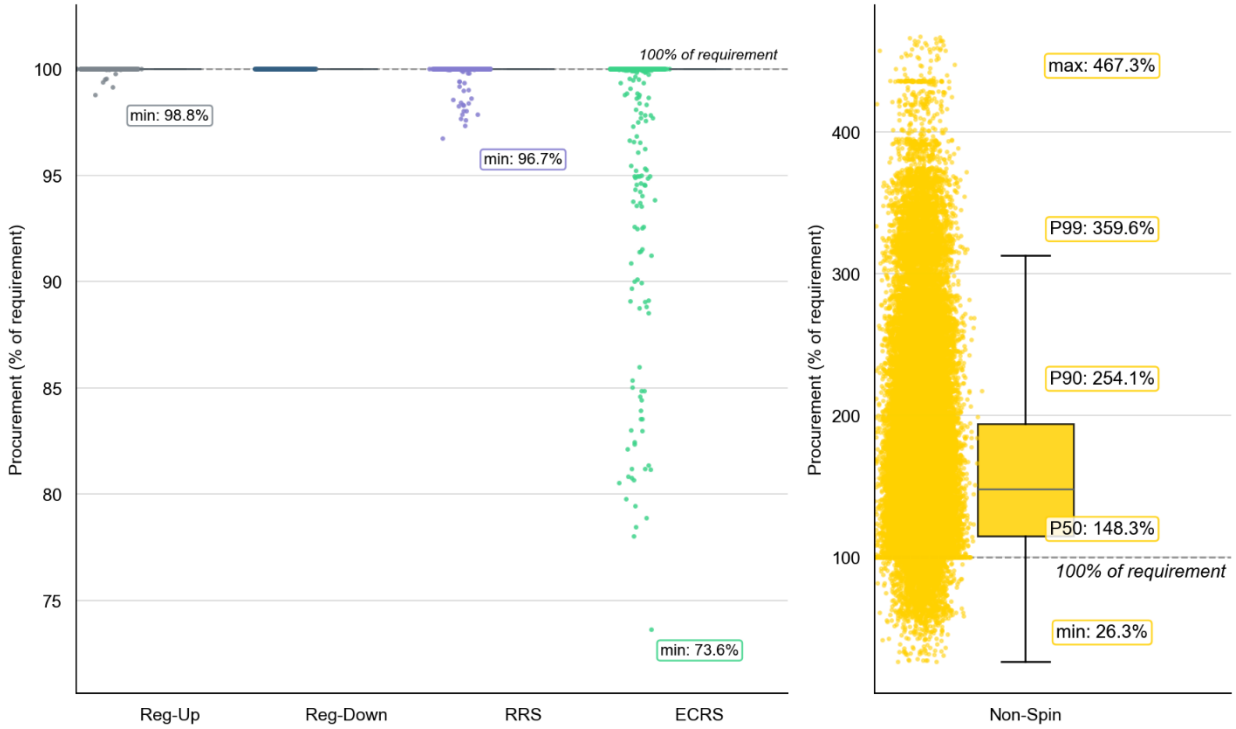
Figure 22 illustrates Ancillary Service awards relative to the applicable requirement for each product. Each point represents a SCED interval, and 100% represents the applicable published AS Plan requirement. The box plot summarizes the distribution of those interval-level awards. With the exception of Non-Spin, awards were cleared at their requirement most or all of the time. Non-Spin awards, however, were observed to clear both below and above the published AS plan requirements.[19] The two panels are drawn on separate vertical scales because the distributions differ by an order of magnitude: Reg-Up, Reg-Down, RRS and ECRS cleared at their requirement in essentially every interval, so their spread is only visible on a tight axis, while Non-Spin ranges from under 30% to over 400%. For four of the five products, the demand curve does not support procurement above the applicable AS Plan requirement. Only Non-Spin routinely clears quantities

[19] ERCOT subsequently identified errors in the probabilistic model used to determine the posted 2026 ECRS and Non-Spin quantities. The errors understated modeled net-load uncertainty and resulted in lower posted quantities than the corrected model would have produced. Accordingly, awards above the published requirement should not necessarily be interpreted as procurement above the quantity indicated by the corrected methodology.

© 2026 ERCOT. All rights reserved.

below or above the published AS Plan requirement, clearing above the published requirement in the great majority of intervals and falling short in a small minority.

*Figure 22: Distribution of real-time Ancillary Service awards relative to the published AS Plan requirement*




Non-Spin procurement above the requirement is a feature of the design rather than a departure from it. The ASDCs are derived from the aggregate ORDC, and the curve extends in most cases beyond the sum of the Ancillary Services requirements for a given month-hour. Under the approved design, the portion of the aggregate curve priced at or above $0.01 per MWh beyond the aggregate AS Plan would be assigned to Non-Spin, which sits at the bottom of the product hierarchy. Therefore, the Non-Spin ASDC can extend well past the AS Plan for a given hour. RTC+B SCED jointly optimizes energy and Ancillary Services, with a significant portion of Non-Spin offered at or near zero, SCED will award Non-Spin where the demand curve value (i.e., the penalty of going short) exceeds what the same capacity would earn in energy or in another service. When reserves are plentiful and energy prices are low, that condition is met across a wide range and Non-Spin clears well above its requirement. As conditions tighten, the opportunity cost of reserves increases and the SCED optimization awards Non-Spin at levels closer

© 2026 ERCOT. All rights reserved.

to requirements (or below it). The distribution in the right-hand panel reflects that construction. It is not evidence of a design error.

The box plots show the shape of each distribution but not the underlying counts. Table 23 reports the same relationship as shares of intervals, distinguishing procurement at, above and below the requirement, alongside the median clearing price.

*Table 23: Ancillary Service procurement relative to the applicable requirement, by product.*

| Ancillary Service | Median procurement (% of Plan) | Cleared at AS Plan (%) | Cleared above AS Plan (%) | Cleared below Plan (%) | Median clearing price ($ per MWh) |
|---|---|---|---|---|---|
| Reg-Up | 100 | 99.96 | 0 | 0.01 | 0.62 |
| Reg-Down | 100 | 100 | 0 | 0 | 0.45 |
| RRS | 100 | 99.82 | 0 | 0.03 | 0.03 |
| ECRS | 100 | 99.73 | 0 | 0.12 | 0.05 |
| Non-Spin | 148.29 | 6.66 | 91.3 | 2.03 | 0.25 |

* Shares may sum to slightly less than 100%. Intervals that fell below the Plan but cleared under $15 are excluded due to being solver-affected intervals before January 8, 2026 (see footnote 18)..

As noted above, four of the five products cleared at their requirement in essentially every interval: Reg-Down in all of them, Reg-Up and RRS in all but a negligible fraction, and ECRS in 99.73%. As by design, none cleared above the requirement in any interval. Non-Spin is the exception on both counts, clearing above its requirement most intervals with a median of 148%, and below it in a small minority.

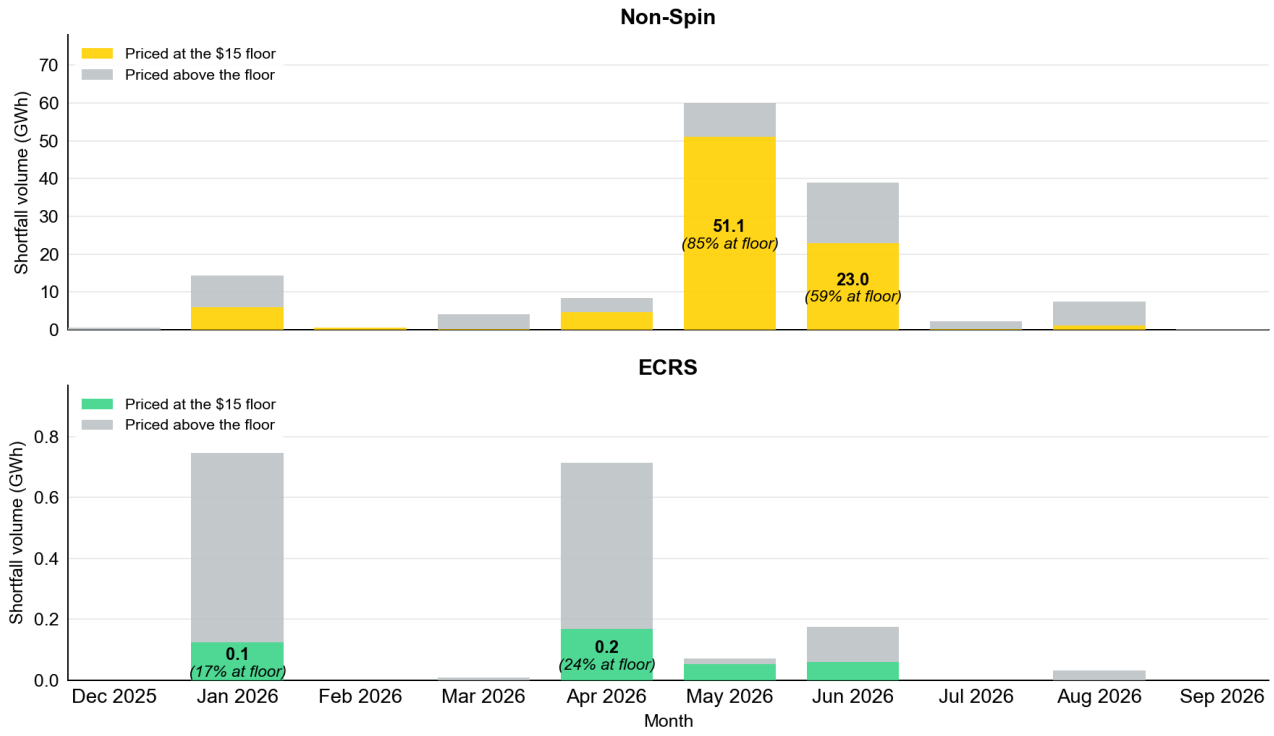
Median clearing prices confirm that the higher-priority curves are exercised at a single point rather than across their range. Reg-Up, Reg-Down, RRS, and ECRS cleared at medians between $0.03 and $0.62 per MWh, at or near the value of their curves at the requirement quantity. Non-Spin's median of $0.25 is comparable, but its distribution extends far higher, which is what the cost section examines.

© 2026 ERCOT. All rights reserved.

### 3.2.2. Application of Ancillary Service Shortage Floor Price

Table 23 shows procurement levels relative to the requirement, but not how prices responded when procurement fell below it. Two mechanisms govern that, and both apply to ECRS and Non-Spin alone. Figure 24 examines the first: the $15 AS shortage floor price, and how much of the unmet requirement cleared at this price.

*Figure 24: Real-time Non-Spin and ECRS monthly shortage volume priced at the shortage floor price*




The AS shortage floor price set the Non-Spin clearing price for 86.4 of 136.7 GWh of unmet requirement over the period, 63.2%. Its effect is concentrated in months with higher AS Plan quantities. For instance, May and June alone account for 74.1 GWh clearing at the AS shortage floor price; 86% of the total. In May the floor set the price for 85% of that month's shortfall volume. In months with smaller requirements the floor was rarely reached, with March at 1.6% and July at 2.9%. For ECRS the floor applied to 0.4 of 1.7 GWh, 23.2%. ECRS shortfalls are less frequent: 104 intervals (against 1,770 for Non-Spin).

© 2026 ERCOT. All rights reserved.

The pattern is correlated with the AS procurement requirement. A larger requirement places the relevant portion of the demand curve further out, where its value is lower and more likely to fall beneath the AS shortage floor price, and May and June carry the highest Non-Spin requirements in the sample.

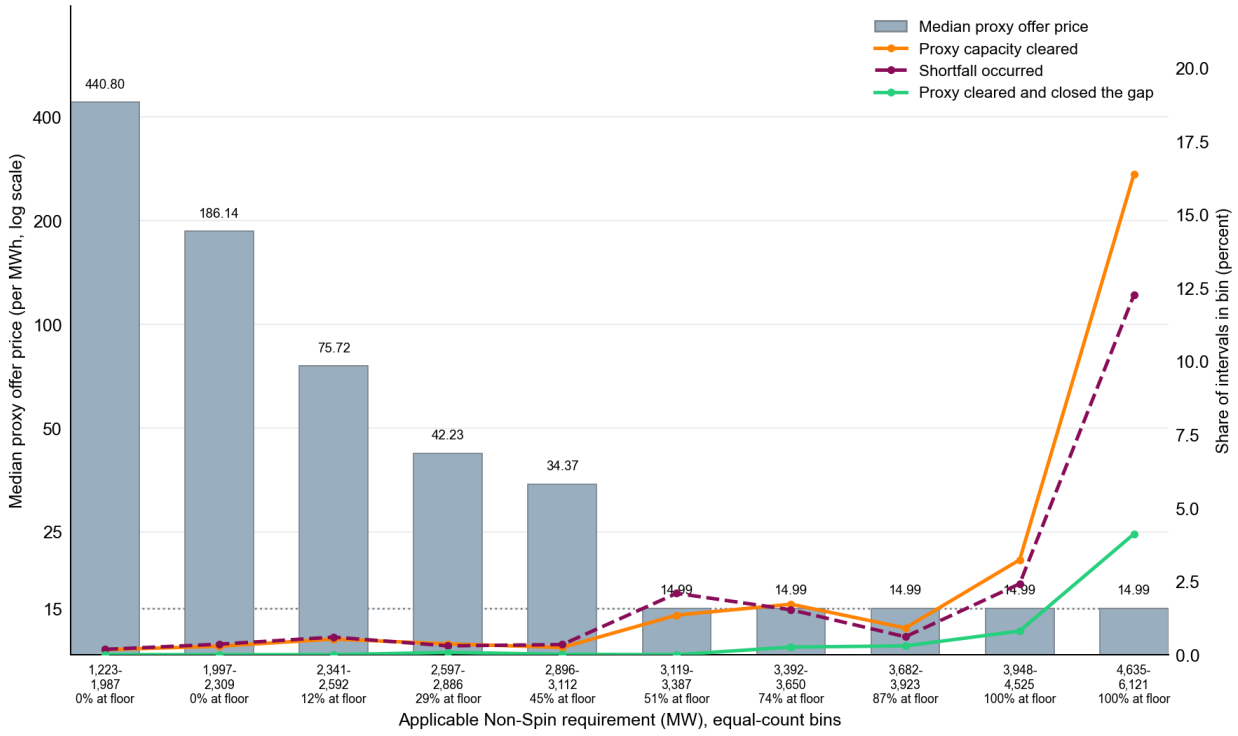
### 3.2.3. Application of the Proxy Offer Floor Mechanism

The floor's effect on real-time pricing is one of the two mechanisms which impact market outcomes. The other is the Proxy Offer Floor, and the two are linked directly, i.e., the Proxy Offer Floor price is derived from the demand curve at 95% of the AS Plan. So, where the dynamically calculated Proxy Offer Floor falls below the AS shortage floor price of $15, it is set at $14.99, one cent below, to keep it distinguishable for the optimization engine. The proxy is therefore lowest during the conditions where the AS shortage floor price is active. Figure 25 illustrates the impact across the range of Non-Spin requirements.

The Proxy Offer Floor price falls from a median of $440.80 per MW per hour in the lowest requirement bin to $14.99 in the top five highest requirements bins. This is because reading the curve at 95% of a larger plan corresponds to much greater quantities, where the value is lower. This determines when SCED can access proxied capacity in its clearing. At $440 per MW per hour the Proxy Offer Floor price is positioned far up the supply stack and clears only once submitted offers are exhausted, by which point there is already a shortfall condition. At $14.99 it clears just ahead of a shortfall.

© 2026 ERCOT. All rights reserved.

*Figure 25: Real-time Non-Spin proxy offer price and outcome rates by applicable requirement*




In practice, the Proxy Offer Floor clears rarely and prevents shortage. Proxied capacity cleared in 4.4% of floor-priced intervals, rising to 16.4% in the highest requirement bin. Submitted offers are priced well below $14.99, typically around $1 per MW, and cover the requirement in the great majority of intervals, so the Proxy Offer Floor is not reached. Where a proxy offer did clear, the requirement was met in about a quarter of cases. In the remainder, the interval was short despite the Proxy Offer Floor having cleared, by a median of 883 MW against a typical proxy award of roughly 250 MW.

The pattern in the bins with the largest requirements (on the far right of the chart) is the clearest statement of this. Proxy clearing and shortfall rise together to 16.4% and 12.3% of intervals, while those proxies that cleared to meet the AS Plan stay near 4%. Proxy Offer Floor values become more active in price-setting exactly where shortfall becomes more common (i.e., at larger procurement plan quantities), but the ability of proxies to resolve a shortage does not follow at the same rate. This is not evidence of a pricing defect, but rather creates outcomes consistent with expectations given underlying requirements.

© 2026 ERCOT. All rights reserved.

Similar intuitive outcomes apply to ECRS but far less often. The ECRS proxy offer is priced at the floor in 14.5% of hours against 49.3% for Non-Spin, and it cleared in 81 intervals against 2,150. Of those 81, seven were price-setting during instances when AS shortage floor prices were binding and the requirement was met in each. In the remaining 74 intervals the Proxy Offer Floor price cleared infra-marginally (i.e., below the clearing price) and the interval was short in 92% of cases, by a median of 206 MW. The outcomes are directionally consistent with those observed for Non-Spin.

## 3.3. ASDC Related Costs

This section examines Ancillary Service procurement cost over the period and what drove it. Cost is assessed at two levels[20]: 1) the split of Non-Spin cost between the portion meeting the requirement and the portion cleared above it, which shows how much of the cost came from procuring more than the AS Plan required; and 2) the split of Non-Spin cost by pricing condition, separating intervals in which the requirement was met from shortage intervals priced at the $15 AS shortage floor and shortage intervals priced above it on the demand curve. Non-Spin accounts for the majority of Ancillary Service cost throughout, so the analysis narrows to that product after the cross-product comparison.

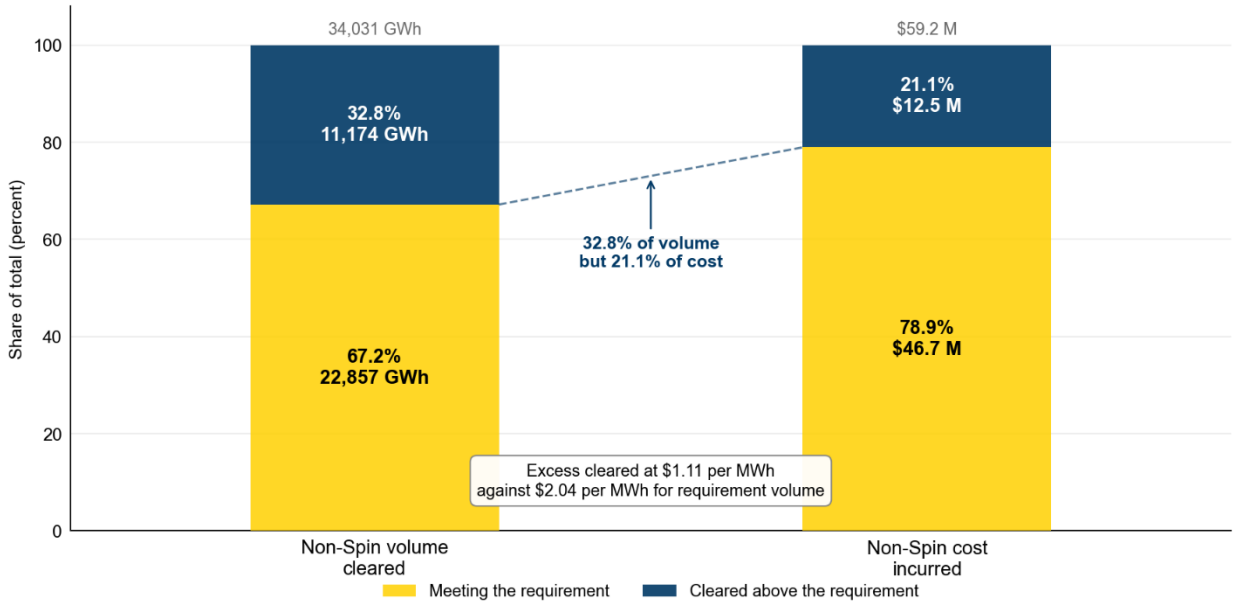
### 3.3.1. Cost of Non-Spin Procurement above the Requirement

Non-Spin's cost concentration invites the question of whether capacity cleared above the requirement is a material contributor to it. Figure 26 separates Non-Spin volume and cost into the portion meeting the applicable requirement and the portion cleared above it, so the two shares can be compared directly.

[20] Costs in this section are calculated for each SCED interval as the cleared Ancillary Service quantity multiplied by the Market Clearing Price for Capacity and the interval's duration, using SCED results.

© 2026 ERCOT. All rights reserved.

*Figure 26: Real-time Non-Spin volume and cost, split by procurement at and above the requirement*




Capacity cleared above the requirement accounted for 32.8% of Non-Spin volume but 21.1% of Non-Spin cost, $12.5 M of the $59.2 M total. The effective price of that capacity was $1.11 per MWh, about half the $2.04 per MWh paid for requirement volume.

The asymmetry is compositional. Capacity clears above the requirement predominantly in intervals where reserves are abundant and the demand curve value is near zero. In tight intervals, procurement compresses toward the requirement and the excess shrinks. Within any single interval both portions clear at the same price, so the difference in average price reflects when the additional volume occurred rather than a discount applied to it.

These are amounts paid rather than amounts avoidable, i.e., clearing a smaller quantity would move up the demand curve and raise the price on the remaining megawatts, so $12.5 M is not a savings figure.

### 3.3.2. Cost of Non-Spin by Pricing Parameter

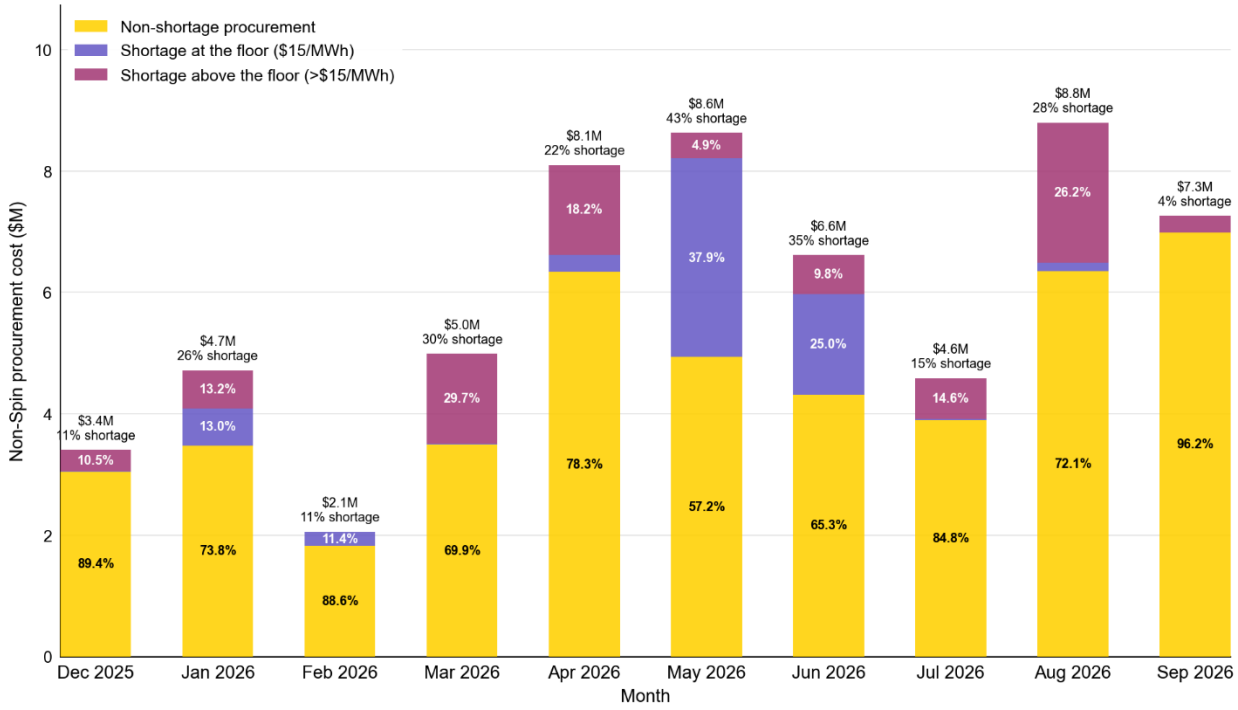
The preceding figure decomposes Non-Spin cost by position relative to the requirement across the full period. Figure 27 decomposes the same cost by month and based on which section of the ASDC prices cleared, distinguishing intervals that met the

© 2026 ERCOT. All rights reserved.

requirement from those in shortfall, and among the latter, those priced at the AS shortage floor price from those where the demand curve set a higher price, i.e., the non-linear portion of the curve.

Shortfall-related cost varies considerably by month, from 4% in September to 43% in May. Non-shortage procurement remains the largest component throughout, between 57 and 96%.

*Figure 27: Real-time Non-Spin procurement cost, split by non-shortage, shortage at floor and shortage above floor volumes*




The composition of the shortfall portion shifts across the period. In March and April, shortfall cost is almost entirely above the floor, at 29.7 and 18.2% of monthly cost against 0.4 and 3.5% at the floor. In May and June the balance reverses, with the floor accounting for 37.9 and 25.0% against 4.9 and 9.8% above it.

That pattern is highly correlated with the requirements of the AS Plan. The floor binds when the curve value below the requirement would otherwise fall under $15, which occurs when the requirement is large, and May and June carry the highest Non-Spin

© 2026 ERCOT. All rights reserved.

requirements in the sample. The utilization section sets out that relationship in more detail. The equivalent decomposition for ECRS shows shortfall-related cost below 19% of monthly cost in every month except January, where it reached 43.7%, reflecting the morning ramp events concentrated in that month. ECRS shortfall is both rarer and shallower than Non-Spin, at 104 intervals against 1,770 and a median magnitude of 6.2% of requirement against 16.2%, so its cost consequence is correspondingly smaller in absolute terms. The composition also differs, i.e., where ECRS was short, the demand curve set the price more often than the floor did, in 60.6% of intervals against 33.6% for Non-Spin.

## 3.4. ASDC Contribution to Grid Reliability

The ORDC market design reflected scarcity through a process that was outside the optimization; ORDC price adders were developed as a proxy for outcomes expected under co-optimization. It was more straightforward to draw a causal inference between ORDC price adders and their contribution to PNM. RTC is also designed to reflect scarcity but now it occurs *within the optimization*. Unlike the ORDC market, the cost of Ancillary Services is factored directly into LMPs. The ASDCs allow the optimization to better distinguish and prioritize between various Ancillary Service products. It is therefore no longer possible to draw as direct a causal inference between the ASDCs and PNM. Nevertheless, PNM levels remained consistent across the transition, indicating that long-term resource commitment incentives were largely preserved.

However, the contribution to reliability of ASDCs within the larger RTC optimization is real and significant. The 5-minute real-time co-optimization of energy and Ancillary Services with individual ASDCs allows SCED to dynamically award Ancillary Services and issue Base Points based on system conditions while mitigating congestion. This increase in flexibility post-RTC allows ERCOT to operate the grid more reliably and efficiently.[21]

[21] ERCOT intends to provide an assessment of realized RTC+B benefits to the ERCOT Board of Directors in February 2027.

© 2026 ERCOT. All rights reserved.

# 4. Conclusion

This biennial report evaluated market outcomes from October 1, 2024 through September 30, 2026 — spanning the final period of the Operating Reserve Demand Curve (ORDC) and the initial operation of the Ancillary Service Demand Curve (ASDC) framework introduced with the Real-Time Co-optimization Plus Batteries (RTC+B) program on December 5, 2025.

Both frameworks performed as designed. Scarcity conditions continued the downward trend identified in the *2024 ORDC Report*, driven by significant solar and Energy Storage Resource (ESR) additions, less extreme weather, and growing price-responsive load. Under the new ASDC framework, the product hierarchy functioned as intended: shortages concentrated in tighter system conditions and Non-Spin procurement above the requirement occurred at low cost. Throughout the entire study period, ERCOT maintained a consistent operating posture, reflected in its Ancillary Service Plan and other operational practices.

Looking forward, ERCOT recommends:

1. Using the forthcoming Triennial Reliability Standard Assessment to inform future resource-adequacy and market-design decisions; and
2. Developing a process to consider whether ASDCs should remain derived from the historical Aggregate ORDC (AORDC) or instead reflect each Ancillary Service's marginal reliability value directly, as operating experience under RTC+B accumulates.

In regard to the latter, the PUCT indicated at the August 20, 2026 Open Meeting that the ASDCs are no longer required to be derived from the AORDC.[22] ERCOT understands that changes to ASDC design may be considered in Project No. 48540 and that the

[22] *See Review of Real-Time Co-optimization in the ERCOT Market*, Project No. 48540, PUCT Staff Memorandum (Aug. 21, 2026) (memorializing the PUCT's discussion from the August 20, 2026 Open Meeting).

© 2026 ERCOT. All rights reserved.

questions filed in Project No. 59550 are a likely near-term venue for that discussion.[23] ERCOT will continue working with the Commission and stakeholders on market enhancements that support reliable, efficient, and adequate grid operations.

[23] Quinquennial Review of System-wide Offer Cap Programs under 16 TAC § 25.509(d), Project No. 59550, Staff's Questions for Comments at 2 (Aug. 20, 2026) (Question 3)

© 2026 ERCOT. All rights reserved.

# 5. Appendix: Technical Background on ORDC and ASDC Methodologies

## 5.1. ORDC Methodology and Parameter History

The Operating Reserve Demand Curve (ORDC) is a market-based construct for valuing operating reserves according to their scarcity. As initially described by Dr. William Hogan in Public Utility Commission of Texas (PUCT) Project No. 40000, the ORDC is based on the following principles:

> "The key connection [for the ORDC] is with the Value Of Lost Load (VOLL) and the probability that the load will be curtailed. Whenever there is involuntary load curtailment and the system has just the minimum of contingency operating reserves, then prices should rise to the VOLL. At any other level of operating reserves, set to protect the system for possible events in the immediate future, the value of an increment of operating reserves should reflect the probability of loss of load."[24]

Due to net load forecast error and other factors, there is uncertainty in the level of operating reserves that will be available in the near-term operational timeframe of the next 30 minutes to one hour. Therefore, there is a probability, referred to as the Loss of Load Probability (LOLP), that operating reserves will fall to the level that would require involuntary load curtailment within that timeframe.

Thus, when there is involuntary load curtailment, the ORDC should theoretically rise to VOLL. At operating reserve levels not requiring firm load shed, the ORDC should theoretically reflect the LOLP multiplied by VOLL such that as operating reserves increase, the LOLP decreases and the ORDC eventually declines to zero.

[24] *Commission Proceeding to Ensure Resource Adequacy in Texas,* Project No. 40000, Second Supplemental Comments of GDF Suez Energy Resources NA, Inc. at bates 6 (Jan. 22, 2013) (see attachment *Improved Electricity Scarcity Pricing and Operating Reserves*, William W. Hogan, Ph.D.).

© 2026 ERCOT. All rights reserved.

Before implementation of real-time co-optimization, the ERCOT ORDC was defined in the Other Binding Document (OBD) titled "Methodology for Implementing ORDC to Calculate Real-Time Reserve Price Adder."[25] This section provides a summary of that methodology.

ERCOT's initial ORDC implementation introduced price adders to the five-minute Real-Time Market (RTM) in summer 2014: for on-line and off-line resources, respectively. The Real-Time On-Line Reserve Price Adder (RTORPA) was associated with Real-Time On-Line Capacity (RTOLCAP), which encompasses all reserves that can be made available to the system within 30 minutes. The Real-Time Off-Line Reserve Price Adder (RTOFFPA) was associated with Real-Time Off-Line Capacity (RTOFFCAP), which refers to reserves that require between 30 minutes and one hour to be made available.

Both adders were calculated using the VOLL and the probability of reserves falling below the minimum contingency level (PBMCL), where VOLL is equal to the System-Wide Offer Cap (SWCAP), and PBMCL is derived from LOLP and the Minimum Contingency Level (MCL).

PBMCL is a shifted version of ERCOT's empirically determined LOLP normal distribution. LOLP, which represents the probability of a real-time reserve shortfall, is determined by comparing the Hour-Ahead forecasted level of reserves to the level of reserves realized in real-time. The gap between these values, termed the reserve error, is assumed to follow a normal distribution characterized by a mean (Mu or μ) and a standard deviation (Sigma or σ).

Once per season, ERCOT determined the LOLP distribution by compiling empirical reserve error data going back to the start of the Nodal Market[26] and fitting this data to a normal distribution. The LOLP curve was then shifted by the MCL to obtain PBMCL. ERCOT's MCL was initially set to 2,000 MW to address concerns related to long-term resource adequacy and to ensure that prices were sufficiently strong when the ERCOT system went into declared emergency conditions but not yet requesting firm load shed.

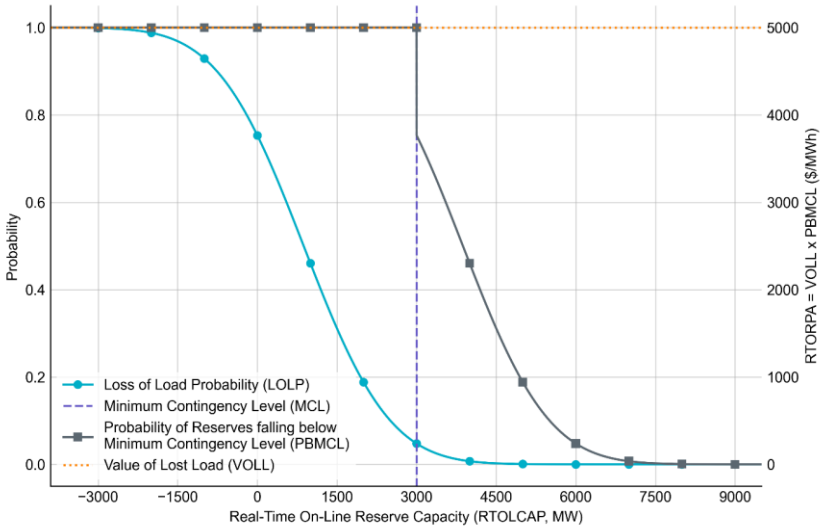
[25] Available on ERCOT's website at: https://www.ercot.com/mktrules/obd/obdlist.

[26] The Nodal Market began on December 1, 2010.

© 2026 ERCOT. All rights reserved.

As discussed in the *2022 ORDC Report*, this value was increased to 3,000 MW.[27] See Figure below for an illustration of RTORPA in terms of LOLP, MCL, PBMCL, and VOLL.

*Figure 30: RTORPA, LOLP, and PBMCL. Reserve error distribution Mu and Sigma are set to their most recent values, and RTOFFCAP is assumed to be 0 MW for illustration purposes. Note that multiplying the PBMCL curve by VOLL (currently equal to SWCAP at $5,000/MWh) yields the ORDC. RTORPA values may therefore be read from the right axis, assuming that System Lambda is zero.*




The value of a particular resource's reserve contribution depends on how quickly it can be made available to the system. The Mu and Sigma parameters of PBMCL were adjusted between RTORPA and RTOFFPA to account for this timing sensitivity. Figure 31 illustrates the difference between the two adders as a function of reserve uncertainty over the next operating hour. Total reserve uncertainty is assumed to be split evenly between two 30-minute intervals.

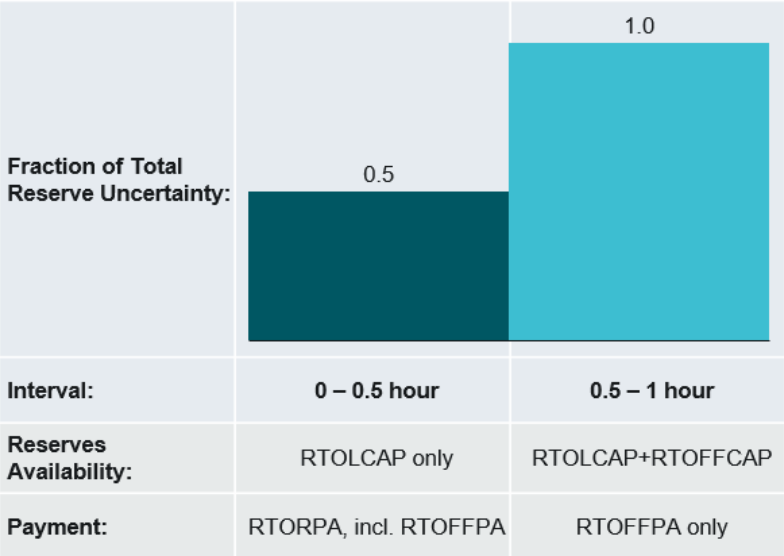
During the second interval, both reserve categories (RTOLCAP and RTOFFCAP) were available. RTOFFPA was therefore calculated using the full Mu and Sigma and was paid to reserves that fall into the RTOFFCAP category. During the first 30-minute interval of the next operating hour, however, only RTOLCAP was available. RTORPA therefore had an extra term, in addition to the RTOFFPA term, to compensate faster-acting reserves for their additional value. The extra term was calculated using a shortened PBMCL curve

[27] Changes to the HCAP and MCL were put into effect on January 1, 2022.

© 2026 ERCOT. All rights reserved.

that captures reserve uncertainty over the first half of the upcoming operating hour, with Mu scaled by one-half and Sigma scaled by 0.707.

*Figure 31: ERCOT ORDC perspective on reserve uncertainty over the next operating hour. During Interval I (the first 30 minutes), only RTOLCAP is available, making it more valuable than RTOFFCAP.*



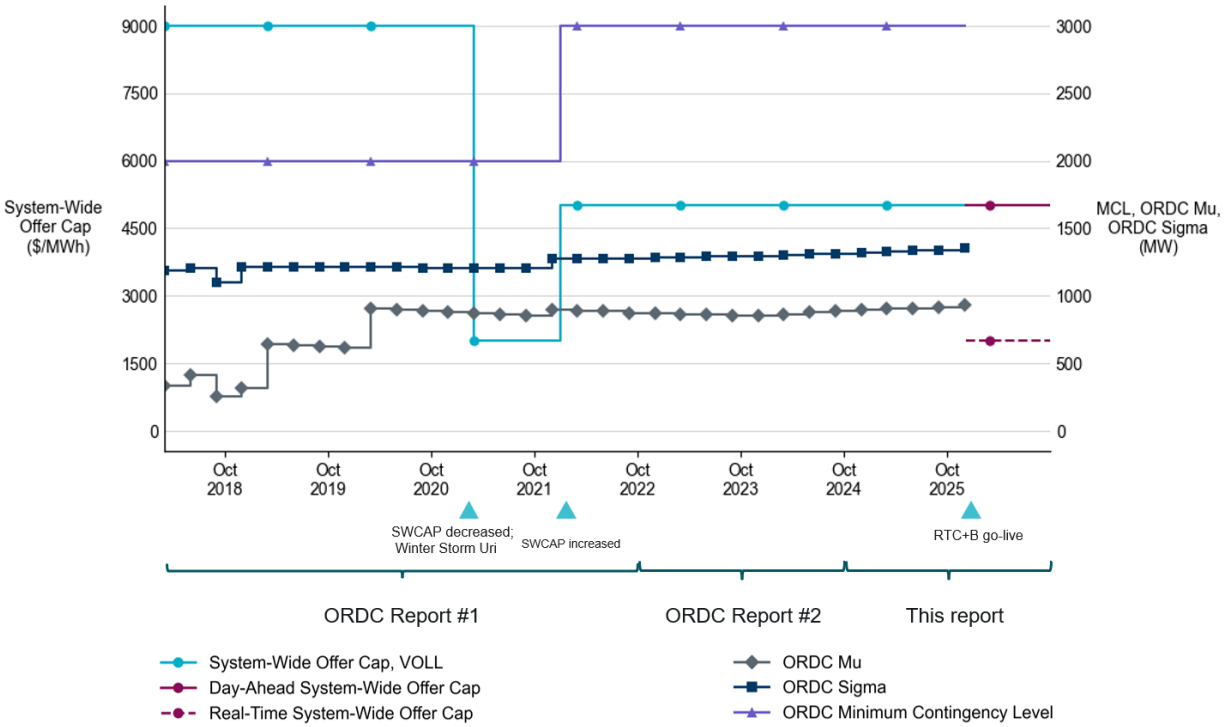

There were two additional relevant details. First, ERCOT Protocols limited the sum of System Lambda and all price adders to SWCAP. Thus, RTORPA could only reach SWCAP if System Lambda is zero. Second, there was one additional price adder called the Real-Time On-Line Reliability Deployment Price Adder (RTORDPA). This adder, which is unrelated to the ORDC and calculated after System Lambda and RTORPA are determined, accounted for the price impacts of Protocol-defined out-of-market actions, such as Reliability Unit Commitment (RUC) and Emergency Response Service (ERS) deployments.

There have been significant administrative changes to ERCOT ORDC parameters since the initial implementation of ORDC in June 2014, as illustrated below. In March 2019, Mu, the mean value of the LOLP distribution, was administratively shifted upward by 0.25 times Sigma, then by an additional 0.25 times Sigma in March 2020. VOLL (which is set equal to SWCAP) changed twice, from the High System-Wide Offer Cap (HCAP) of $9,000/MWh down to the $2,000/MWh Low System-Wide Offer Cap (LCAP) following Winter Storm Uri, then back up to the new HCAP of $5,000/MWh on January 1, 2022. Finally, MCL increased from 2,000 MW to 3,000 MW on January 1, 2022.

© 2026 ERCOT. All rights reserved.

Figure 32 shows the study periods, major ORDC parameter changes, and the implementation of Real-Time Co-optimization Plus Batteries (RTC+B). It also includes the study periods from *2022* and *2024 ORDC Reports* for historical context.

*Figure 32: Timeline of major parameter changes*




*Note: The SWCAP price is plotted against the left vertical axis, while the MW values (minimum contingency level, ORDC Mu, and ORDC Sigma) are plotted against the right axis. Mu (μ) is the mean of the reserve-error distribution, and Sigma (σ) is its standard deviation. Prior to 2019, ORDC Mu and Sigma were calculated by first partitioning reserve error data into six blocks according to time of day; there are therefore six Mu and Sigma values for each 2018 season. The 2018 Mu and Sigma values shown in this figure are averages taken across the six time-of-day values for each 2018 season.*

The ORDC continued to evolve during the periods covered by the *2024 ORDC Report*. On November 1, 2022, a multi-step price-adder floor was introduced to be used in the calculation of RTORPA when the RTOLCAP falls below certain on-line reserve thresholds.

- A price floor of $20/MWh was applied to the RTORPA when the calculated RTOLCAP is at or less than 6,500 MW.

© 2026 ERCOT. All rights reserved.

- A price floor of $10/MWh was applied to the calculation of the RTORPA when the calculated RTOLCAP is at or less than 7,000 MW but greater than 6,500 MW.

Another notable change during the previous study period was ERCOT's introduction of the ERCOT Contingency Reserve Service (ECRS) on June 10, 2023, as a new Ancillary Service to help restore and maintain the frequency of the ERCOT System and to help manage net-load ramping.

## 5.2. Real-Time Co-optimization and Ancillary Service Demand Curve Design

RTC+B fundamentally changed ERCOT's Real-Time Market by jointly optimizing energy and Ancillary Services every five minutes. Supporting real-time co-optimization required product-specific Ancillary Service Demand Curves (ASDCs), allowing Security-Constrained Economic Dispatch (SCED) to value and procure each Ancillary Service product within the same dispatch process. The PUCT directed ERCOT to begin developing real-time co-optimization in 2019. ERCOT later expanded the program to incorporate state-of-charge modeling for battery energy storage resources (ESRs), and the program became known as RTC+B. ERCOT implemented RTC+B on December 5, 2025.

Before implementation of real-time co-optimization, ERCOT procured Ancillary Services in the Day-Ahead Market and generally held those awards fixed throughout the operating day. Under real-time co-optimization, SCED jointly optimizes energy and Ancillary Services every five minutes and determines energy dispatch and Ancillary Service awards in the same solution. As part of the RTC+B implementation, ERCOT also replaced the dual generation-and-load representation of battery ESRs with a single-resource model that treats state of charge as a binding constraint on both energy and Ancillary Service feasibility. To preserve historical ORDC pricing outcomes, ERCOT derived the four ASDCs from a single Aggregate Operating Reserve Demand Curve (AORDC). ERCOT constructed the AORDC from historical Real-Time Market pricing data in accordance with PUCT policy direction. Using one aggregate curve as the basis for all four ASDCs helped preserve the intended scarcity-pricing relationships and limit abrupt price changes following implementation of real-time co-optimization.

© 2026 ERCOT. All rights reserved.

### 5.2.1. Scarcity Pricing Under Co-Optimization

Before implementation of real-time co-optimization, Ancillary Service quantities were fixed through the Day-Ahead Market, and SCED first determined the energy dispatch solution. ERCOT then used the resulting reserve levels and the ORDC methodology to calculate the On-Line Reserve Price Adder (RTORPA), which it added to the energy price. The process was sequential: SCED determined energy dispatch first, and ERCOT priced reserve scarcity afterward. Because AS quantities were already fixed, the real-time scarcity-price signal could not affect the AS procurement decision.

Under real-time co-optimization, the ASDCs are direct inputs to the SCED optimization and clear jointly with energy offers in each dispatch interval. Each ASDC represents the price associated with procuring a given quantity of the corresponding AS product. The curves therefore influence the optimization directly rather than being calculated from its output. As a result, the real-time energy price reflects the opportunity cost of reserving capacity for Ancillary Services within the same joint solution. Real-time co-optimization determines energy and Ancillary Service prices simultaneously, whereas the prior methodology determined energy prices first and applied the reserve scarcity adder afterward.

Figure 1 in Section 1.2 illustrates the relationship between the AORDC and the product-specific ASDCs. This following explains how ERCOT constructed the individual curves.

### 5.2.2. Construction of Product-Specific ASDCs

ERCOT derives each ASDC from the AORDC rather than constructing the product curves independently. Under the original vertical-slice disaggregation methodology, ERCOT assigned successive portions of the aggregate curve in a fixed priority order. Regulation Up (Reg-Up) receives the highest-priced megawatts, followed by Responsive Reserve Service (RRS), ERCOT Contingency Reserve Service (ECRS), and Non-Spinning Reserve Service (Non-Spin). Any remaining megawatts priced at or above $0.01/MWh are assigned to Non-Spin. This structure preserves the intended hierarchy, with Reg-Up receiving the highest-priced portion of the curve and Non-Spin the lowest-priced portion.

Nodal Protocols Revision Request (NPRR) 1268, proposed by the Independent Market Monitor (IMM) and approved by the PUCT in May 2025, replaced the original sequential

© 2026 ERCOT. All rights reserved.

disaggregation with a blended methodology. The revised methodology allows the product curves to overlap rather than occupy strictly separate portions of the AORDC. It maintains the relative pricing order among the products while reducing the rigidity of the original hierarchy.

Under the original vertical-slice methodology, each product received a separate, contiguous portion of the AORDC after the portions assigned to higher-priority products had been removed. The quantity assigned to each product depended on that hour's AS Plan, so the exact portion of the aggregate curve assigned to each product could vary by hour. Because each AORDC segment was assigned to only one product, the resulting curves preserved a strict sequence: Reg-Up first, followed by RRS, ECRS, and Non-Spin.

The IMM identified two concerns with the original construction. First, the strict hierarchy limited SCED's ability to make efficient tradeoffs among AS products. Second, assigning Non-Spin the residual, lowest-priced portion of the AORDC tended to underprice Non-Spin during shortage conditions. As Figure 1 illustrates, the original construction could assign much of the meaningful declining portion to ECRS while leaving Non-Spin primarily with the low-priced tail.

NPRR1268 addressed these concerns through a blended disaggregation methodology. For quantities included within the Minimum Contingency Level, ERCOT assigns product-specific quantities and maximum demand prices that preserve the relative pricing order among the AS products. Beyond the MCL, ERCOT selects evenly spaced AORDC segments for Reg-Up down to a defined minimum price and then does the same for RRS. ERCOT assigns the remaining segments alternately to ECRS and Non-Spin and assigns any residual segments priced above $0.01/MWh to Non-Spin. This methodology produces overlapping ASDCs, improves SCED's ability to make tradeoffs among AS products, and strengthens the Non-Spin price signal during shortage conditions.

### 5.2.3. ASDC Shortage and Proxy-Offer Floors

NPRR1269 established two additional ASDC pricing mechanisms evaluated in this report: a $15 per MW per hour shortage floor price for the ECRS and Non-Spin demand curves and a proxy offer floor for resources that do not submit their own AS offers.

© 2026 ERCOT. All rights reserved.

First, NPRR1269 added a $15 per MW per hour shortage floor price to the ECRS and Non-Spin ASDCs used in the Real-Time Market and Reliability Unit Commitment (RUC). The floor provides RUC with a meaningful commitment signal when the AS Plan extends beyond the portion of the demand curves that would otherwise produce a material price. ERCOT found that a lower floor ($10-$15) achieved the intended effect without materially increasing total committed capacity, resulting in the $15 proposal. The floor affects the shape of the demand curves, but market offers determine the clearing price when sufficient resources are available.

Second, the proxy offer floor applies when a resource does not submit an offer for an AS product and ERCOT assigns an administrative proxy offer. The floor equals the lesser of $2,000 per MW per hour or the applicable ASDC price at the quantity corresponding to 95% of the product's AS Plan requirement. The mechanism prevents a low administrative proxy offer from understating the resource's opportunity cost and suppressing the clearing price. Linking the floor to the ASDC price near full procurement aligns the proxy offer with the value reflected in the demand curve rather than with an arbitrary administrative amount. The $2,000 per MW per hour cap limits the floor when the referenced ASDC price is unusually high.

© 2026 ERCOT. All rights reserved.