



California ISO

**2023-2025 Ancillary Service Scarcity Event
Report**

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Table of Contents

INTRODUCTION.....	3
FREQUENCY OF SCARCITY EVENTS.....	3
CAUSES AND TRENDS IN SCARCITY EVENTS.....	5
CONCLUSION.....	6

Introduction

Through its markets, the California Independent System Operator Corporation (ISO) procures ancillary services (A/S), including regulation services (regulation up and regulation down) and operating reserves (spinning and non-spinning reserves), to meet NERC and WECC reliability standards and to support reliable electric system operations. In addition to the ISO system-wide procurement requirements, the ISO establishes minimum A/S procurement requirements in some of the A/S sub-regions, such as the ISO system (the entire CAISO excluding the interties), SP26, NP26 and expanded sub-regions.

On December 1, 2010, the ISO implemented an A/S scarcity pricing mechanism in its markets. The scarcity pricing mechanism triggers when there is insufficient A/S supply to meet the requirement. Under this mechanism, the price of the scarce A/S will automatically rise to a pre-determined scarcity price, as described in the ISO Tariff. This report presents the details and impacts of the scarcity events that occurred in 2023, 2024 and 2025 and fulfills the requirement in Tariff Section 27.1.2.3 that ISO review the scarcity pricing mechanism every three years.¹

Frequency of Scarcity Events

Table 1 below shows the frequency of the 2023, 2024 and 2025 scarcity events by year, A/S region and A/S type. All scarcity events occurred in the real-time market (RTM) and no events occurred in the integrated forward market (IFM).

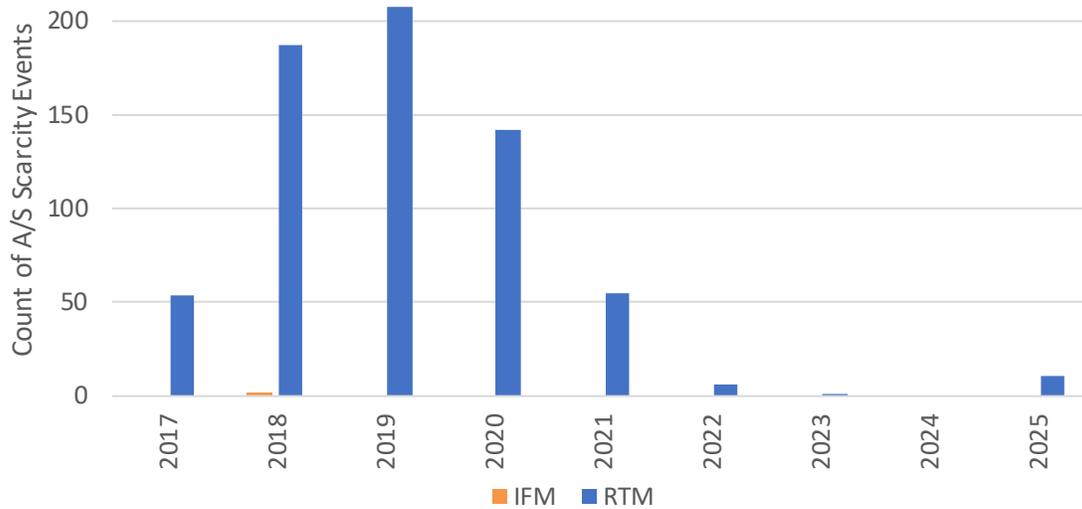
Table 1: Count of Scarcity Events by Year, A/S region and Service

A/S Region and Service	2023	2024	2025
NP26 Expanded			
Non-Spin	1		
SP26 Expanded			
Regulation Down			11

A/S scarcity events are infrequent in recent years due to large amounts of battery energy storage resources now offering A/S. Figure 1 shows the total count of A/S scarcity events from 2017 to 2025.

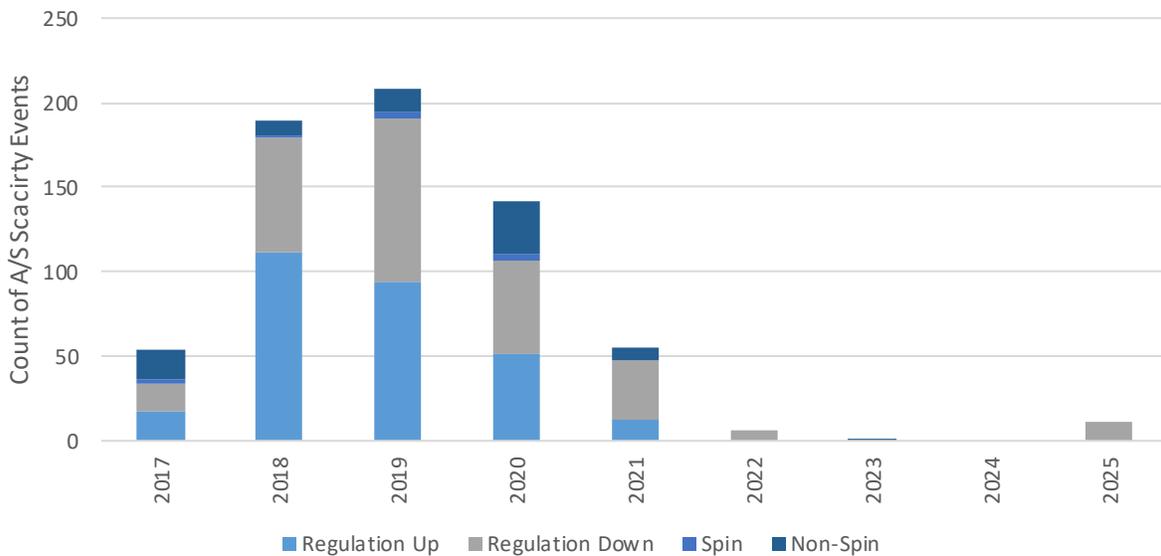
¹ Past reports are located at: <https://www.caiso.com/library/ancillary-services-scarcity>

Figure 1: Count of Scarcity Events by Year



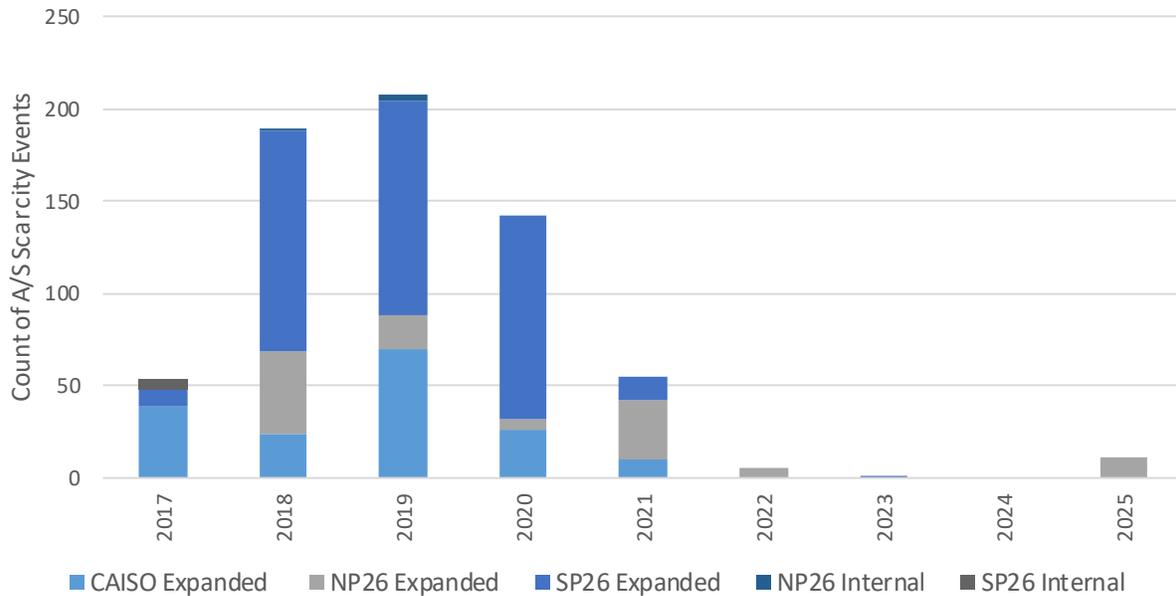
Regulation Up and Regulation Down scarcity events are the most common A/S scarcity event. Figure 2 shows the A/S scarcity by type of service.

Figure 2: A/S Scarcity Events by Service Type



A/S scarcity events mainly occurred in the SP26 Expanded Region from 2017 to 2021 but more recent events in 2023 and 2025 occurred in NP26 Expanded Region.

Figure 3: A/S Scarcity Events by Region



Causes of Scarcity Events

Table 2 below shows the frequency of the 2023, 2024 and 2025 scarcity events by year and primary reason.

Table 2: A/S Scarcity by Issue

Issue Impacting A/S Procurement	2023	2024	2025
Telemetered limits reduce resource capacity			8
Resource Outage			3
System Conditions	1		
Totals	1		11

The ISO’s RTM experiences changing conditions with respect to the IFM such as load forecast changes, resource outages or transmission congestion, making supply conditions in RTM generally more constrained than IFM for both energy and A/S. The main categories leading to RTM A/S scarcity include:

- Telemetered limits reflect reduced resource capacity - Resources may bid up to their certified amounts in the IFM for A/S. Resources with a must offer obligation

have a requirement to bid their certified range in the IFM. The RTM uses the plant operating limits that are sent from the resource to the ISO's Energy Management System to determine how much capacity is available on the resource. If the resource sends an upper limit that constrains its ability to provide the IFM A/S award then that A/S is unavailable and the RTM has to procure incremental A/S from other resources.

- Resource Outage – Resource outages, de-rates, re-rates on minimum operating level or outages on the ability to provide A/S.
- System Conditions – If the system needs large amounts of energy to maintain a power balance, the market may dispatch spinning reserve and non-spinning reserve to a level where the A/S requirements cannot be met.

Conclusion

From the 2020-2022 A/S Scarcity Report, the amount of scarcity events totaled 203 events whereas in this three-year report, there are only twelve events. The low level of scarcity events in the past three years reflects that there is sufficient resources available and bidding A/S in the ISO markets. In particular, battery energy storage resources have saturated the A/S market. The current Scarcity Reserve Demand Curves in Tariff Section 27.1.2.3 will remain in place at this time. The ISO has a new policy initiative on Price Formation Enhancements that is further evaluating price formation during conditions of energy shortages and scarcity. This new initiative may consider A/S pricing parameters.