



Evaluation of Sub-Annual Designs for PJM's RPM

Education on California Slice of Day

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Resource Adequacy in California

Resource adequacy (RA) is achieved through bilateral contracts

- Previously, we discussed seasonal components of capacity markets in MISO, NYISO and ISO-NE
- California ISO (CAISO) is not primarily responsible for resource adequacy and **does not operate a centralised capacity market**
- Instead, California relies on self-supply and bilateral contracting between Load-Serving Entities (LSEs) and resources to achieve RA
- Established in the 2000's, California's RA program requires each LSE to independently procure enough generation resources to meet capacity requirements and **to demonstrate compliance with this requirement** (see next slide)

ISO/RTO	Capacity Market Construct
PJM	Annual auction
NYISO	Monthly auctions, two capability periods
MISO	Four seasonal products
ISO-NE	Biannual construct proposed
CAISO	No centralized capacity market



Source: [1] CAISO, "CAISO RA Workshop", June 6, 2023, available at <https://www.caiso.com/Documents/Presentation-CAISO-RA-Workshop-Current-Processes-and-Interoperability-Jun6-2023.pdf>. [2] FERC, "Understanding and Participating in California ISO (CAISO) Processes", April 7, 2025, available at <https://www.ferc.gov/understanding-and-participating-california-iso-caiso-processes>.

Resource Adequacy in California (cont.)

Resource adequacy (RA) is achieved through bilateral contracts

- Capacity requirements:**

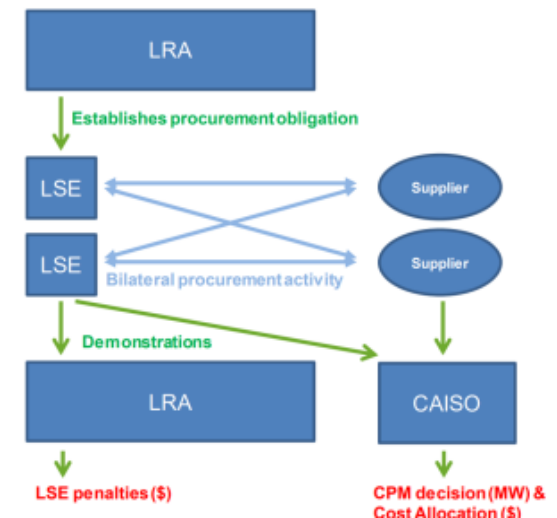
- LSEs must contract enough capability to meet requirements: forecasted peak load + an annual planning reserve margin (PRM)
- Targets are set by Local Regulatory Agencies (LRAs). For example, the California Public Utilities Commission (CPUC) for the system^[A]
- CAISO only allocates certain operational (flex) requirements. LSEs must comply with system, local and flexible requirements

- Procurement:**

- LSEs bilaterally contract with resources to meet RA obligations
- Resources commit through must-offer obligations to have capacity available at specific times and to bid into the electricity market at those times^[B]

- Compliance:**

- All LSEs must demonstrate compliance with their requirement



Notes: [A] The majority of LSEs are governed by the CPUC (90% of 2023 peak load). [B] Resources can also participate in competitive solicitations held by CAISO to address any capacity deficits.

Sources: [1] CAISO, "CAISO RA Workshop", June 6, 2023, available at <https://www.caiso.com/Documents/Presentation-CAISO-RA-Workshop-Current-Processes-and-Interoperability-Jun6-2023.pdf>. [2] CPUC, "2023 RA Report", August 2025, available at <https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/resource-adequacy-homepage/2023-resource-adequacy-reportv2.pdf>, p. 3.

Slice of Day Framework

System targets shifted from monthly peak load to monthly slice of day for CPUC-jurisdictional LSEs

- LSEs must comply with three types of requirements:

Resource Adequacy Targets		Slice of Day	
System	Historically, capacity required to meet 1-in-2 system peak demand forecast in each month of the year (plus PRM)	 In the 2025 compliance year, the CPUC implemented the Slice of Day RA framework System requirements are now based on hourly load forecasts on CAISO's 'worst' day each month of the year 'Worst' day → day of the month that contains the hour with the highest coincident peak load forecast	
Local	Capacity from resource located within a Local Capacity Area (LCA) → local requirement set by annual CAISO study using 1-in10 weather year and N-1-1 contingency (plus PRM)		
Flexible	- Capacity from a resource operationally able to meet variations in load → requirement set to meet highest expected three-hour net load ramp each month (plus PRM) - Set by annual CAISO study		

Sources: [1] CAISO, "CAISO RA Workshop", June 6, 2023, available at <https://www.caiso.com/Documents/Presentation-CAISO-RA-Workshop-Current-Processes-and-Interoperability-Jun6-2023.pdf>. [2] CAISO, "CAISO/MISO RA Discussion", June 27, 2023, available at <https://cdn.misoenergy.org/20230711-12%20RASC%20Item%2008aii%20CAISO%20Presentation629480.pdf>. [3] CPUC, "Report on Resource Adequacy Slice of Day Implementation and Year Ahead Showings", February 5, 2024, p. 3.

Slice of Day Framework (cont.)

LSEs must show portfolio of resources that meets load shape

Motivation



Rolling blackouts in 2021



Penetration of variable energy and intermittent resources

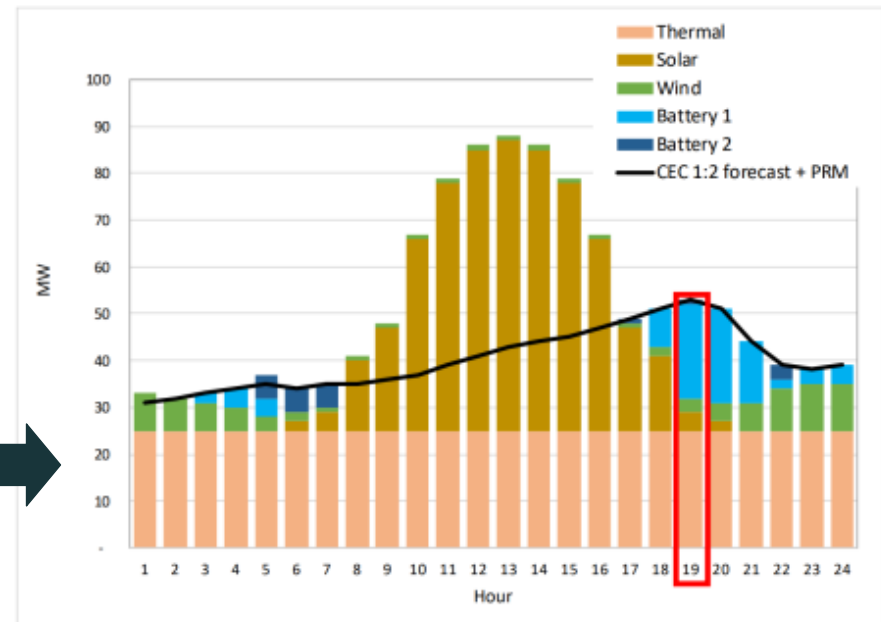


Reliability concerns outside of historic peak hours
→ LSEs to procure capacity to meet periods of system stress, rather than only peak load

In 2021, the CPUC launched a multi-year reform process → finalised in 2023, implemented in 2025



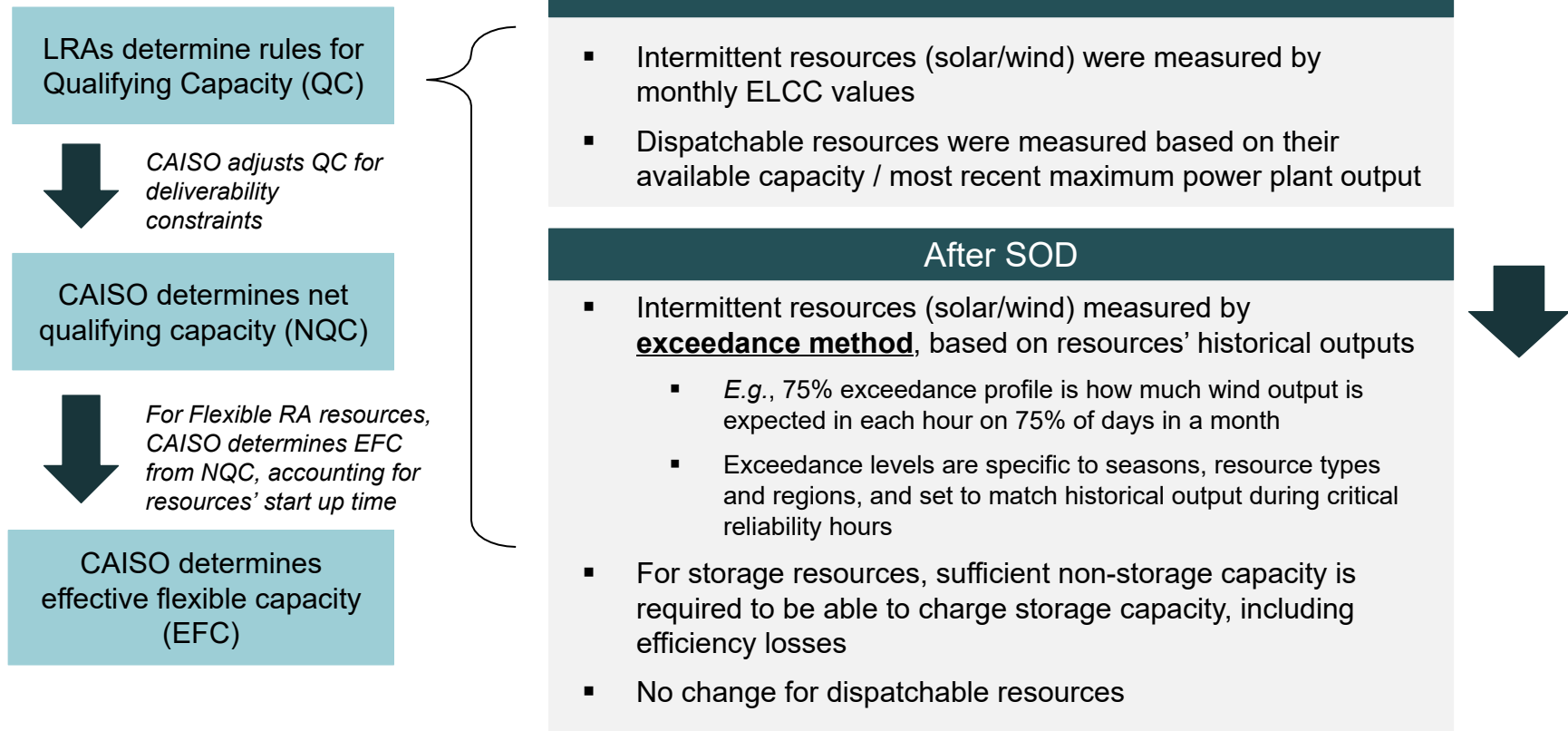
LSEs must show a portfolio of resources sufficient to meet individual load shape, i.e., their individual load forecasts during all 24 hours of CAISO's forecasted 'worst' day each month, plus a PRM



Sources: [1] CPUC, "2026 Resource Adequacy and Slice of Day Guide", September 23, 2025, available at <https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/resource-adequacy-homepage/resource-adequacy-compliance-materials/guides-and-resources/2026-ra-slice-of-day-filing-guide.pdf>, p 12. [2] CAISO, "CAISO RA Processes and CPUC's SOD", January 2024, available at <https://www.caiso.com/notices/resource-adequacy-modeling-and-program-design-updated-california-public-utility-commissions-slice-of-day-white-paper-posted>, p. 7.

Resource Accreditation under SOD

Updated approach to qualifying capacity for intermittent resources and storage



Sources: [1] CAISO, "2025 Resource Adequacy and Slice of Day Guide", September 25, 2024, available at <https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/resource-adequacy-homepage/resource-adequacy-compliance-materials/guides-and-resources/2025-ra-slice-of-day-filing-guide.pdf>, p. 14., [2] Pooja Agarwal and David Wooley, "Resource Adequacy Primer", June 2025, available at https://gspp.berkeley.edu/assets/uploads/page/Draft_Resource_Adequacy_Primer.pdf, p. 11.



Thank You

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