



California ISO

Resource adequacy modeling and program design working group discussion

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Market Surveillance Committee Meeting

General Session

February 23, 2024

Context

The resource adequacy modeling and program design (RAMPD) working group has provided significant feedback around the need to reform the following issues as well as the inter-related nature of:

- Resource counting
 - An interest in revisiting unforced capacity (UCAP) in light of the CPUC's scoping of UCAP into their proceeding
 - Questions on what it means to move to UCAP as local regulatory authority (LRA) establish resource counting
- Availability and performance incentives
 - Debate on if resource adequacy availability incentive mechanism (RAAIM) could be entirely or partially removed if there was a UCAP approach to resource counting
- Outage and substitution rules

Problem statement 2

Requirements for RA capacity and program tools

The ISO's current requirements and tools (e.g., outage, must-offer, bid-insertion, and resource performance and availability rules) have not been updated recently in light of evolving market and regulatory structures, and could result in:

- RA supply not available when and where needed;
- **Inefficient procurement and investment (e.g. maintenance and capital upgrade) decisions; and**
- Implementation challenges for the ISO and market participants

Sub-issues:

- Current requirements for RA capacity
- **RAAIM**
- **Lack of a tool to incentivize performance**
- **Rules for substitution and planned outages**
- The need for a comprehensive review of the CPUC's Slice-of-Day reform and the translatability and transactability of western resource adequacy program (WRAP)

Problem statement 3

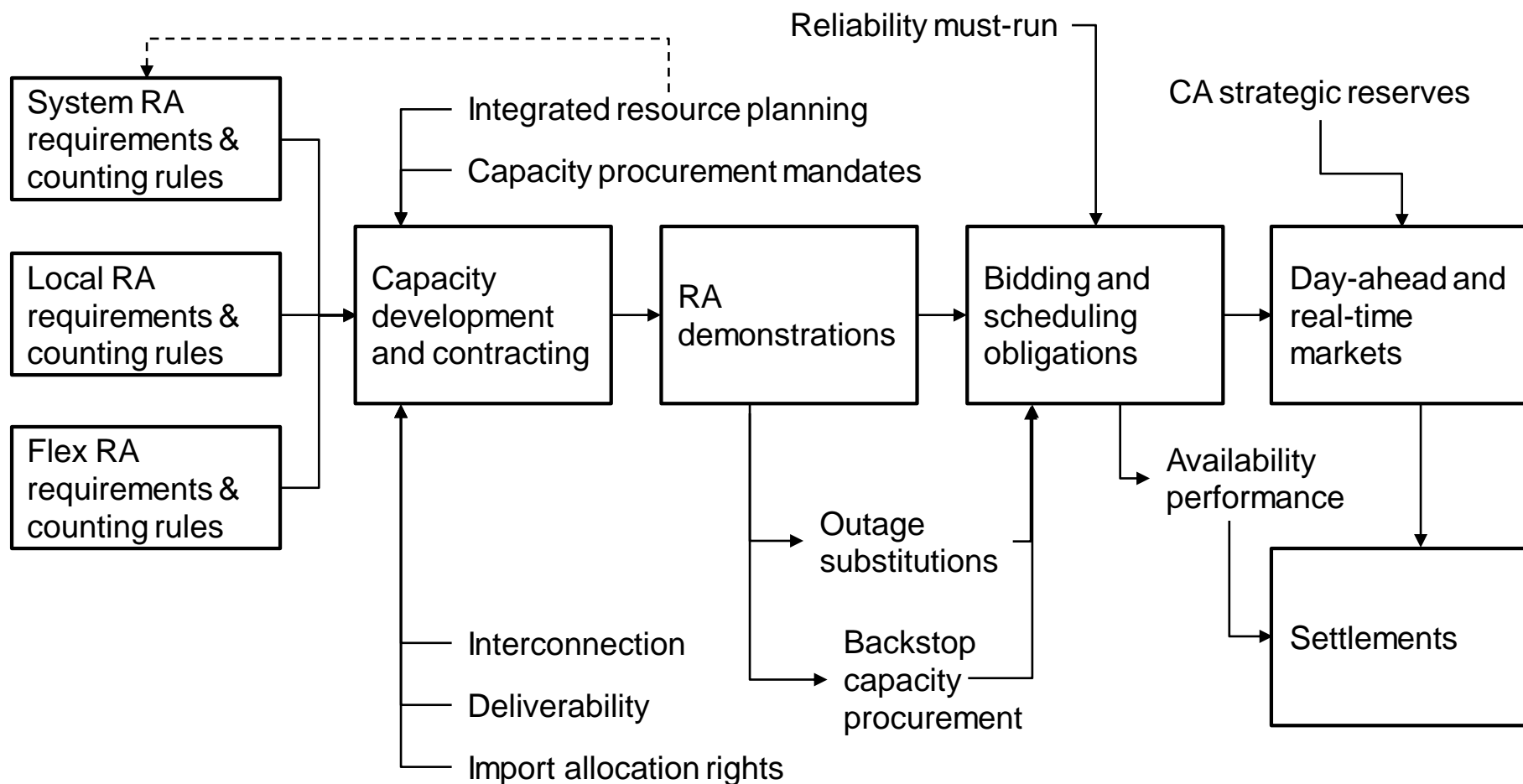
LRA RA responsibility & cost allocation

Market participants are concerned about inequitable costs and cost allocation. Stakeholders have expressed a need for a transparent and common framework for evaluating reserve margins and counting rules, and understanding of an LRA RA program's contribution to overall system reliability

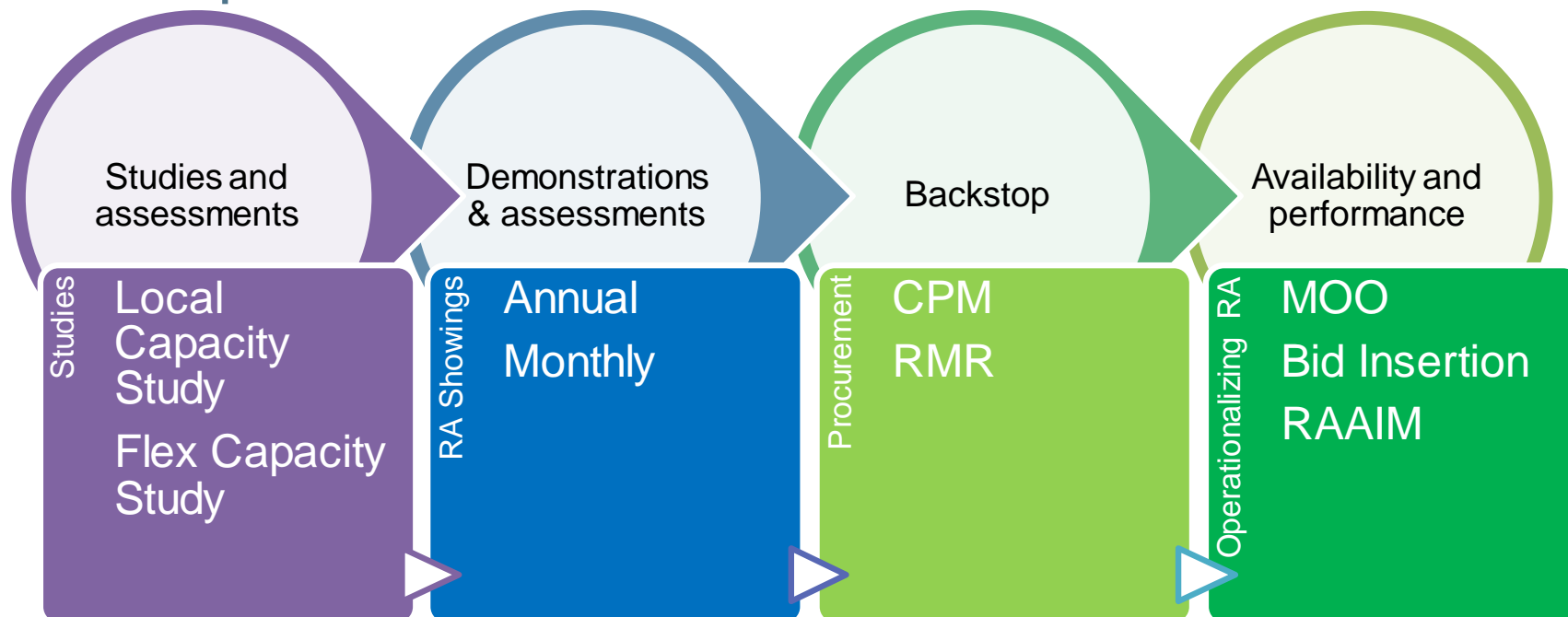
Sub-issues:

- ***Definitions and requirements:*** The ISO lacks a common definition, method of measurement, or standard to ensure that various LRAs bring a portfolio of resources that are accessible in the right place, available at right time, and provide the right attributes needed to evaluate if LRA programs are reliable
- ***EDAM resource sufficiency evaluation (RSE) cost causation:*** Aligning cost and benefit allocation with causation associated with the extended day-ahead market (EDAM) RSE, as a result of a deficiency or procurement of cure capacity

High-Level Overview of California Resource Adequacy



ISO RA processes

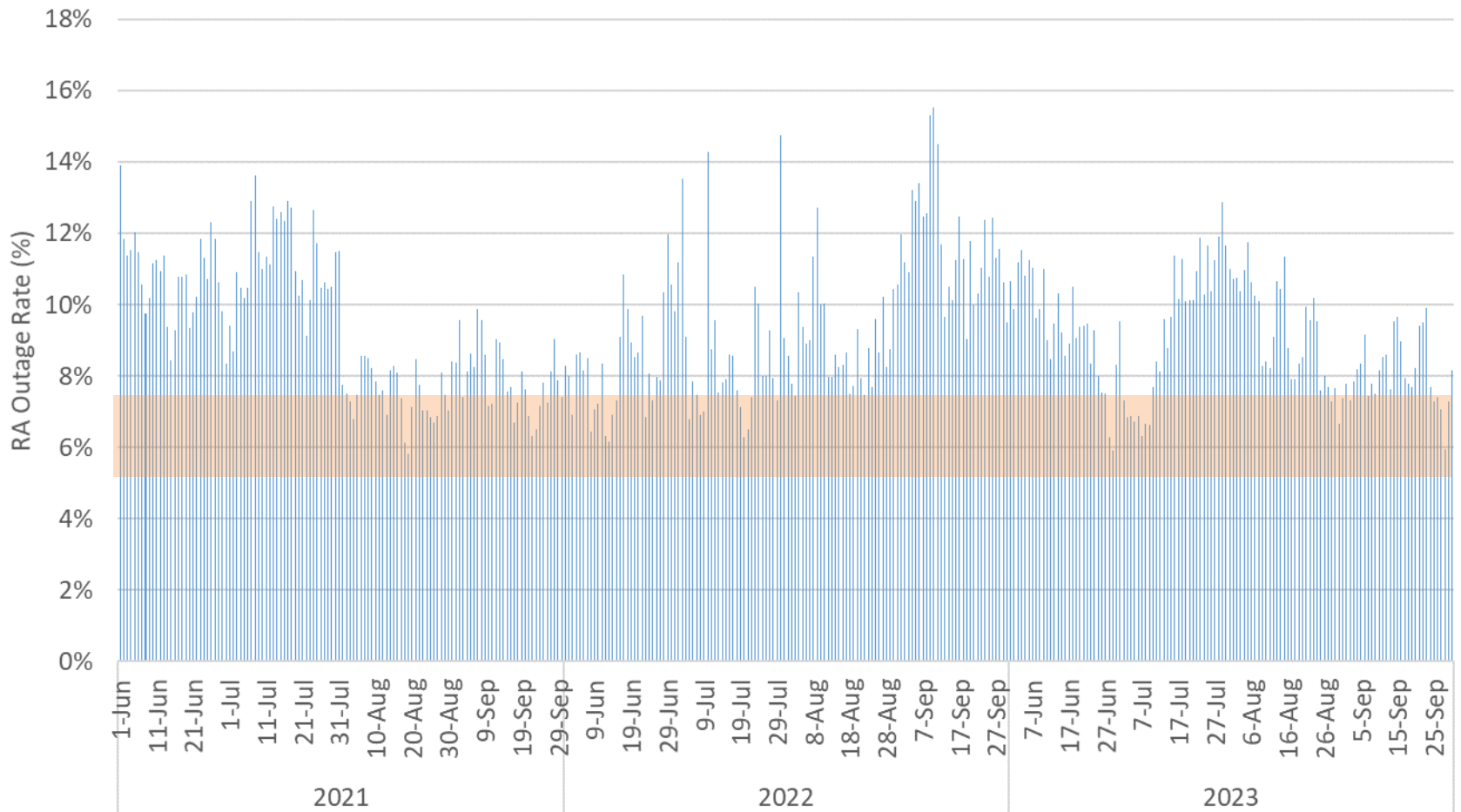


Key ISO Process:

1. Capacity procurement mechanism (CPM) – allows the ISO to backstop for LRA deficiencies and significant events
2. Planned outage substitution obligation – requires resources on planned outage to substitute resources to maintain reliability margins
3. Resource Adequacy Availability Incentive Mechanism (RAAIM) – incentivizes resources to be available to the ISO market
4. Must offer obligation (MOO) – places bid/offer requirements on RA resources

OUTAGE DATA

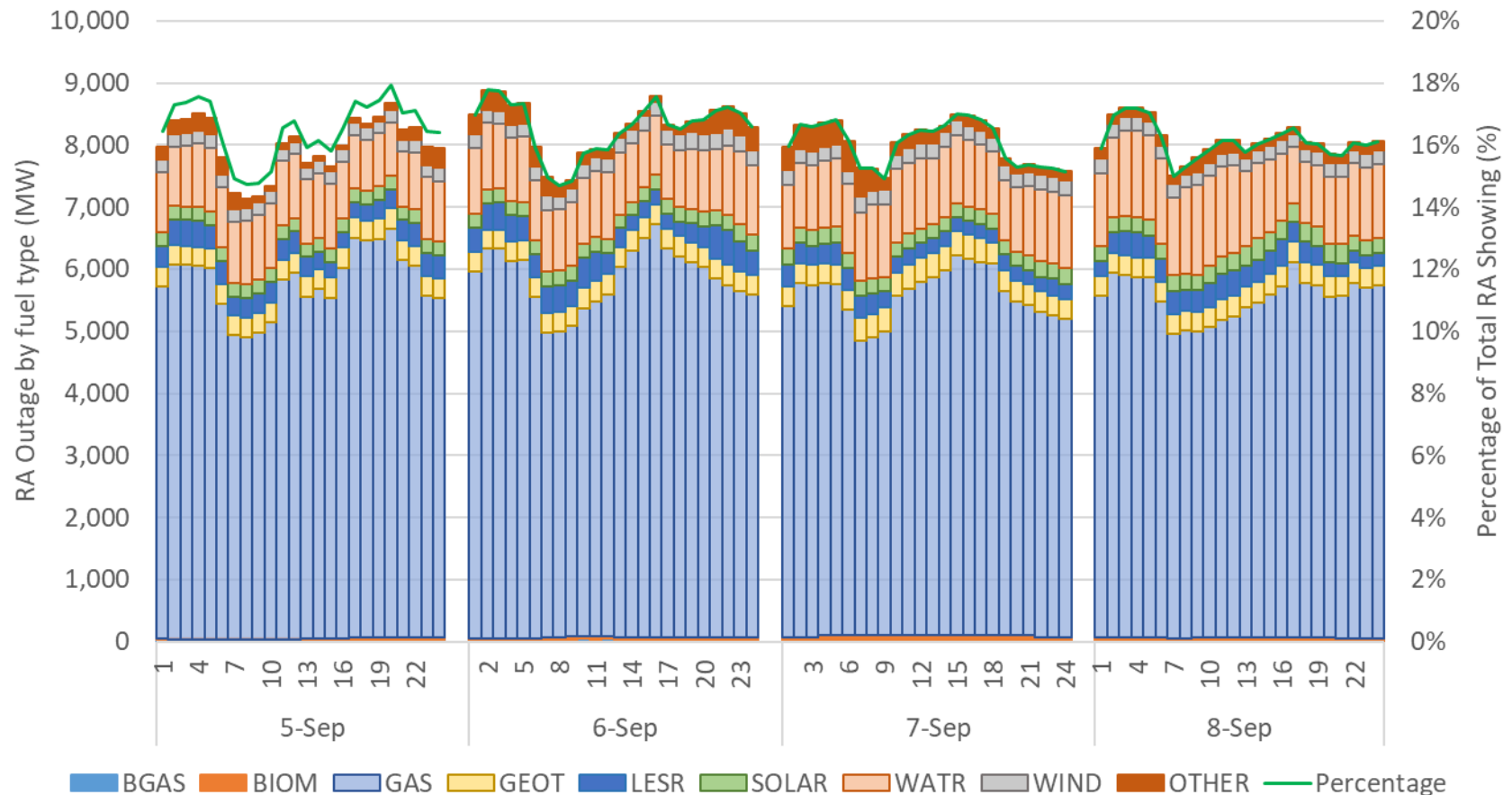
System RA outages for summer months for 2021 - 2023



Key takeaway: The planned and forced outage rate exceeds assumptions used in state analysis (ISO 2023 Summer Assessment; CEC 2023 Summer Reliability Outlook)

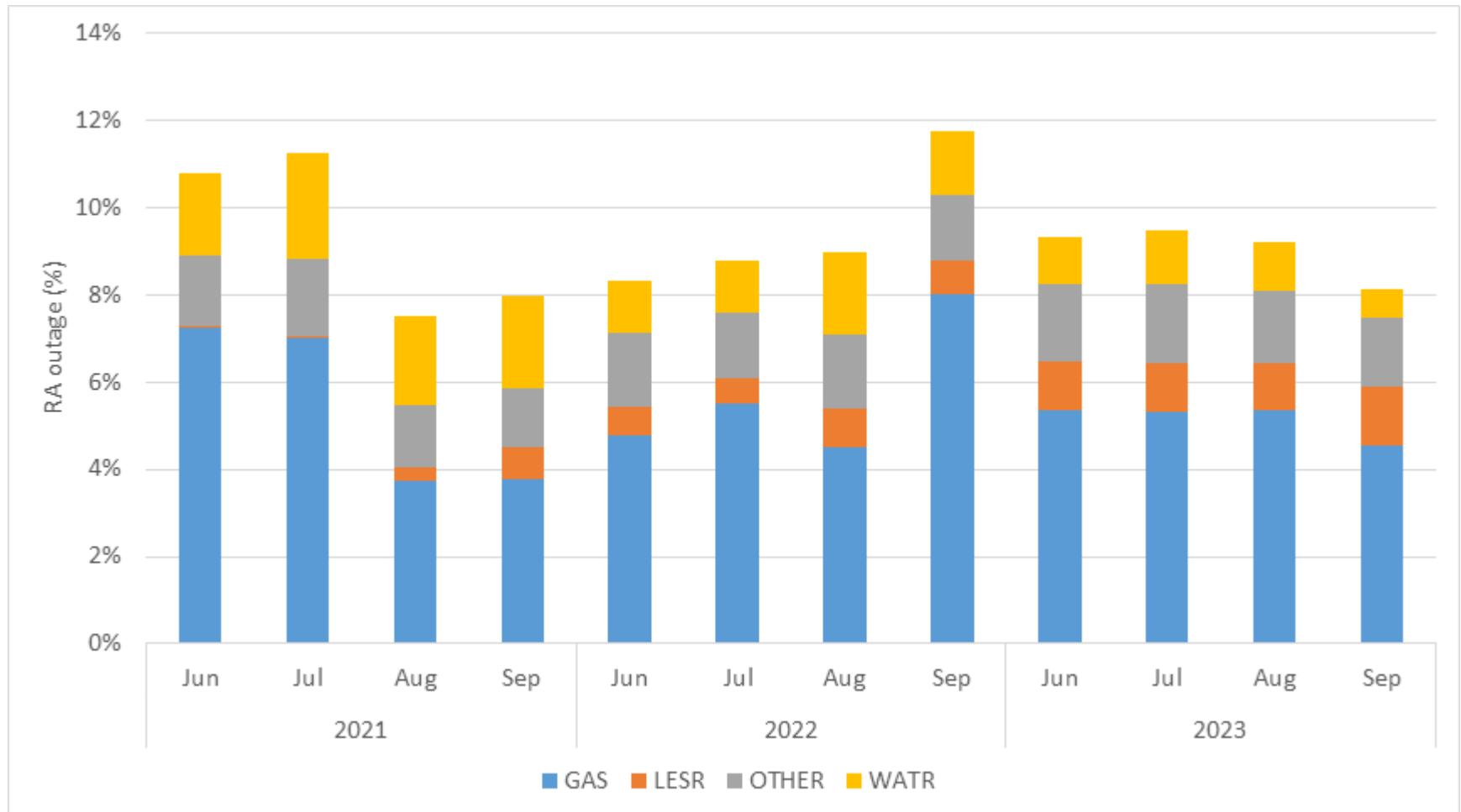
Note: The forced outages above represent ~97-98% of outages.

Analysis done during the September 5 – 8, 2022 Outages for **shown** RA resources

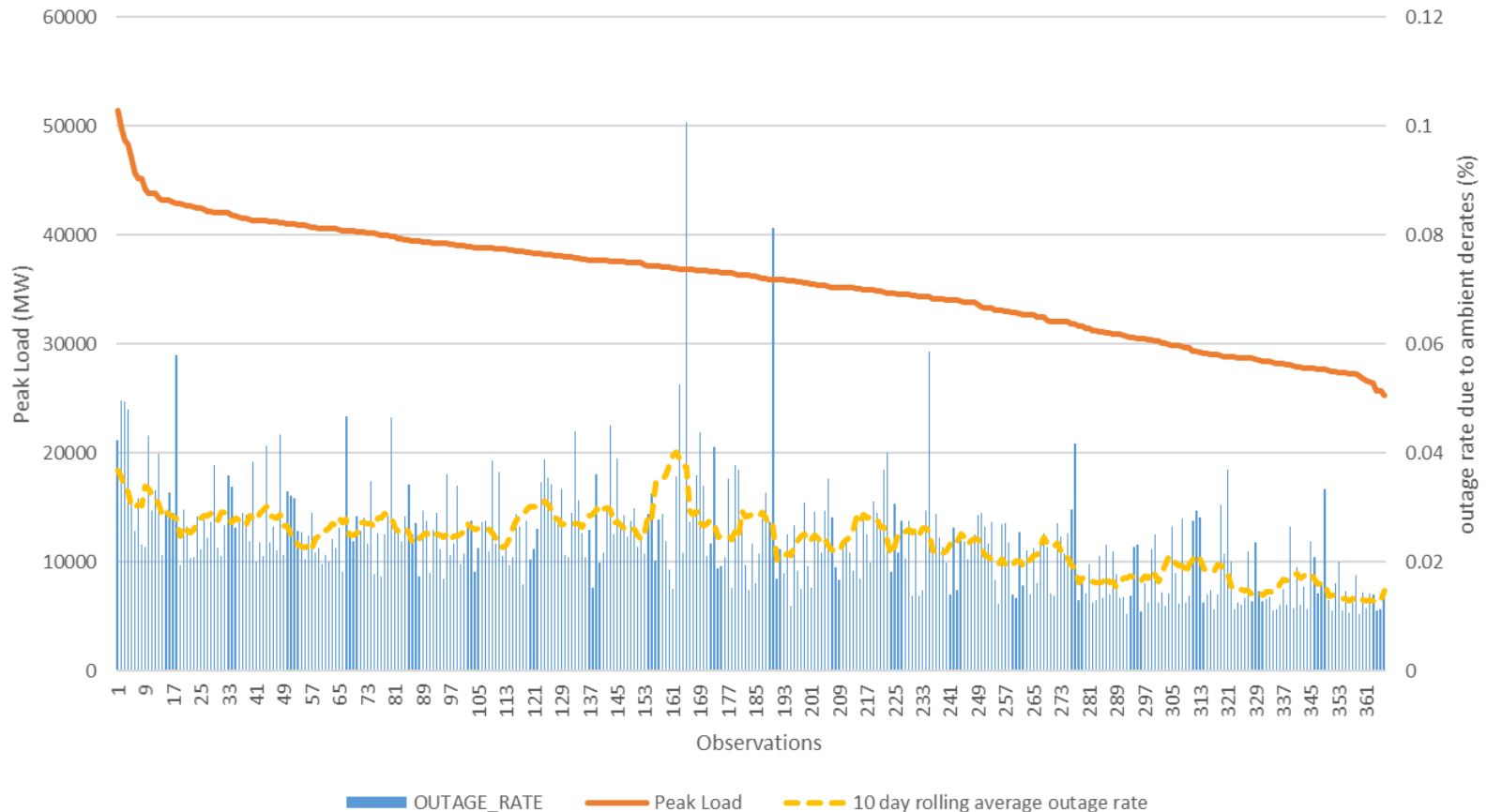


Key takeaway: Outages during extreme events exceed planned assumptions.

Outage rates as a percent of RA showing of each type of resources

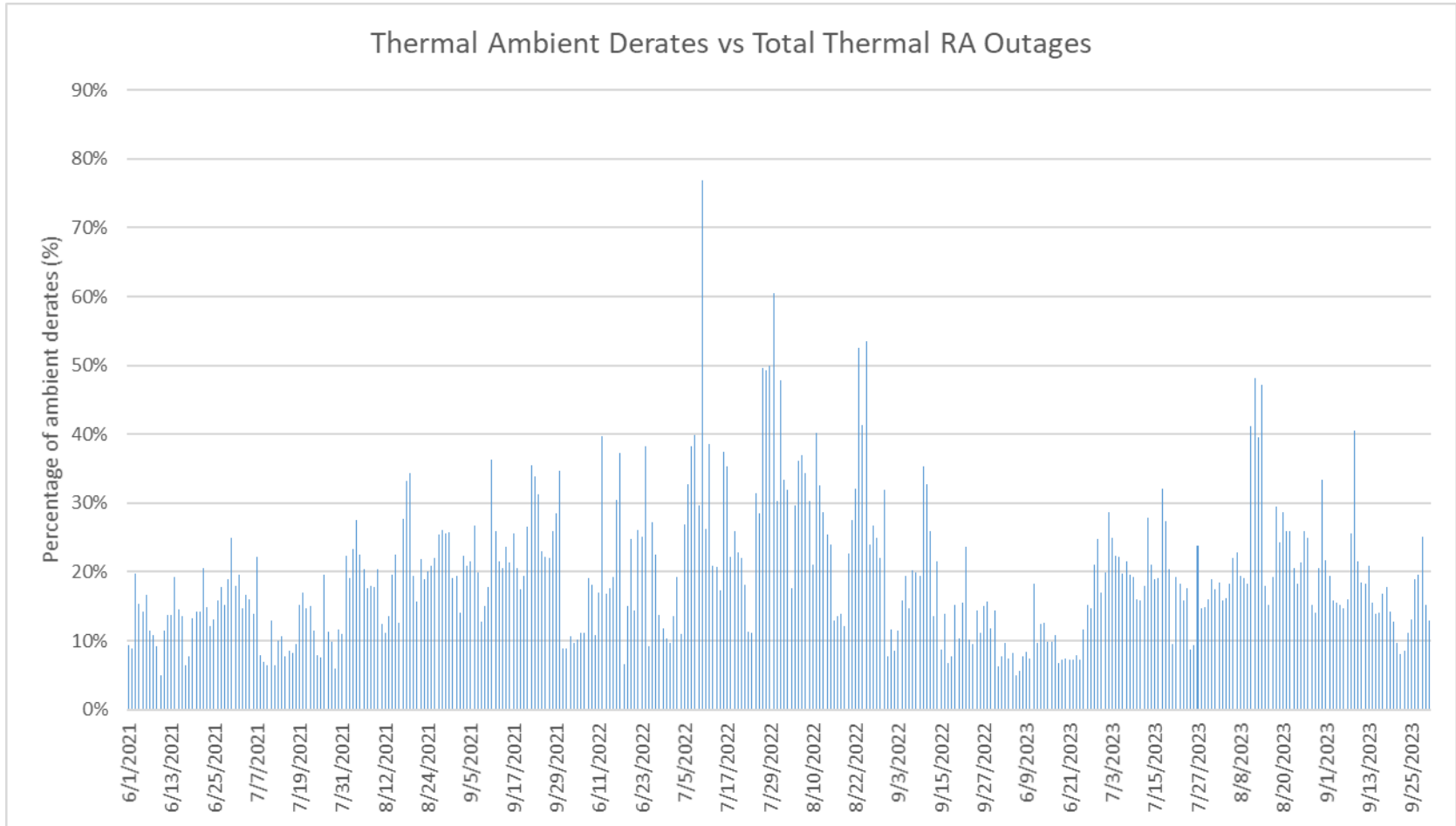


RA outages due to ambient derates and comparing against peak load



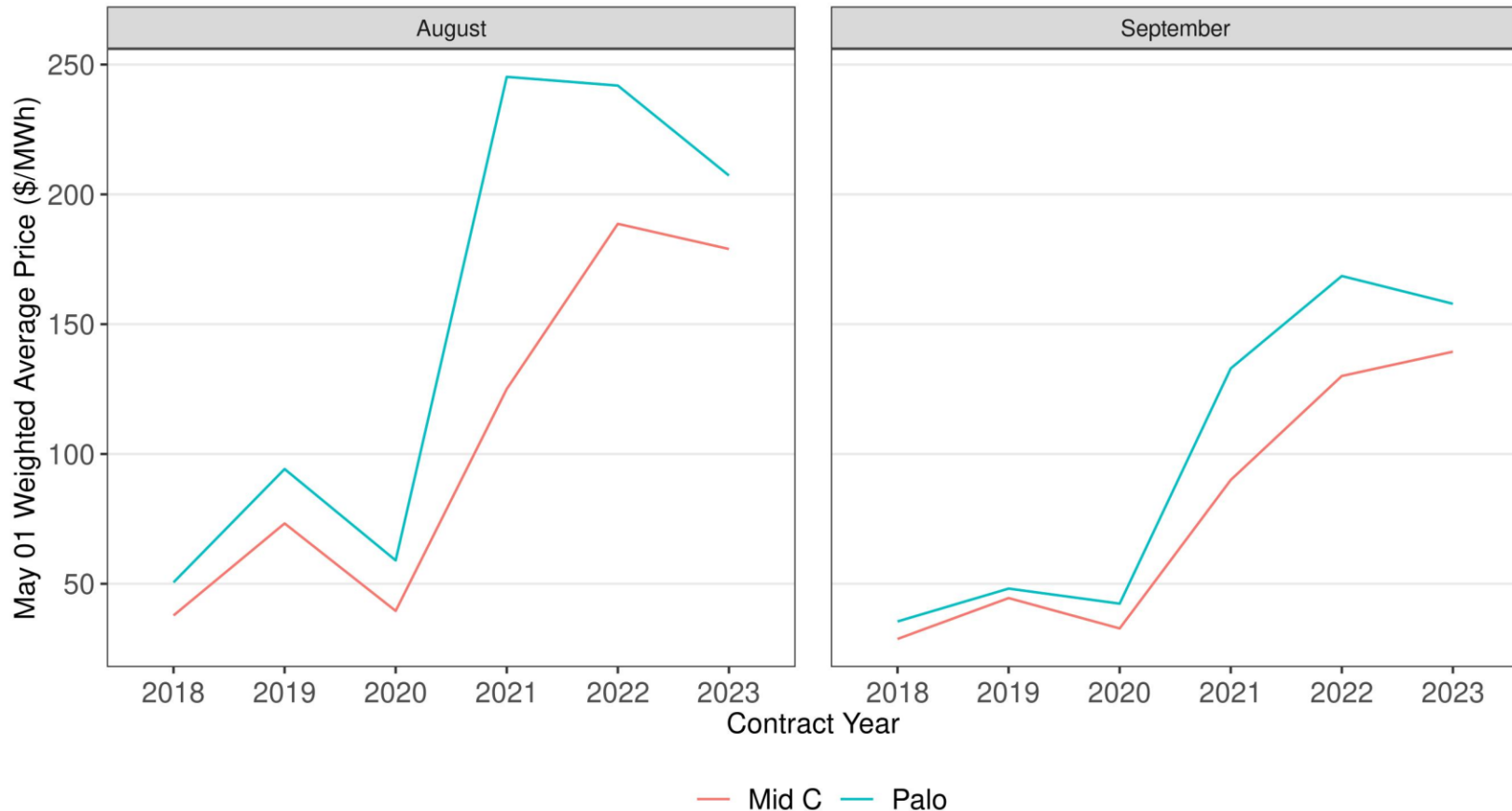
Key takeaway: Data suggests a correlation between peak load and ambient derates. A ~50,000 MW peak load has a ~4% ambient derate, whereas a ~20,000 MW peak load has a ~2% ambient derate.

Ambient derates for thermal resources as compared to total thermal RA outages

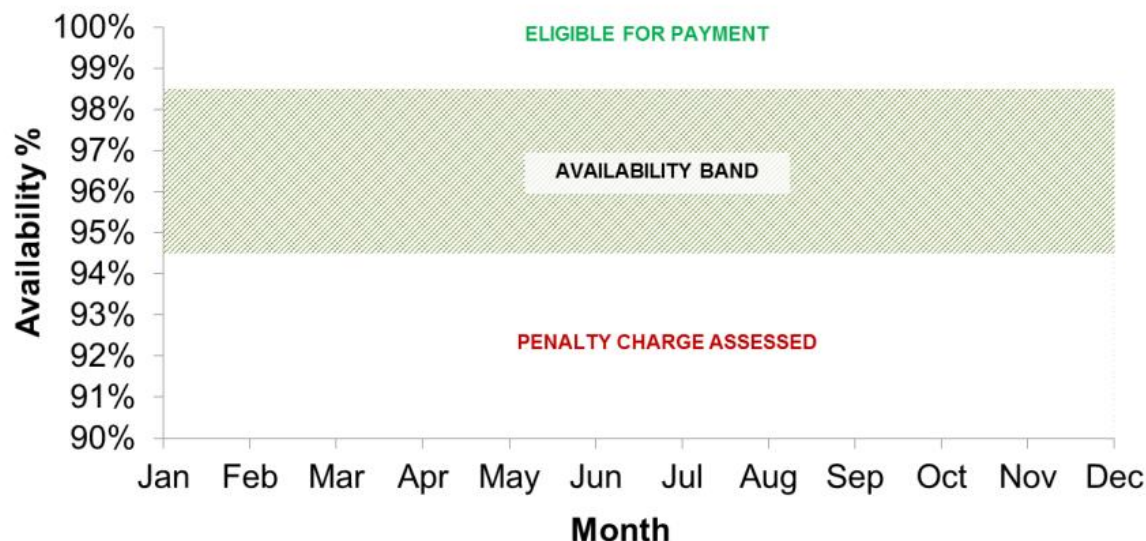


INCENTIVIZING AVAILABILITY AND PERFORMANCE

Prices at major hubs external to the ISO increased after 2020. Implied capacity prices are significantly above the CPM soft offer cap of \$6.31/kW-month



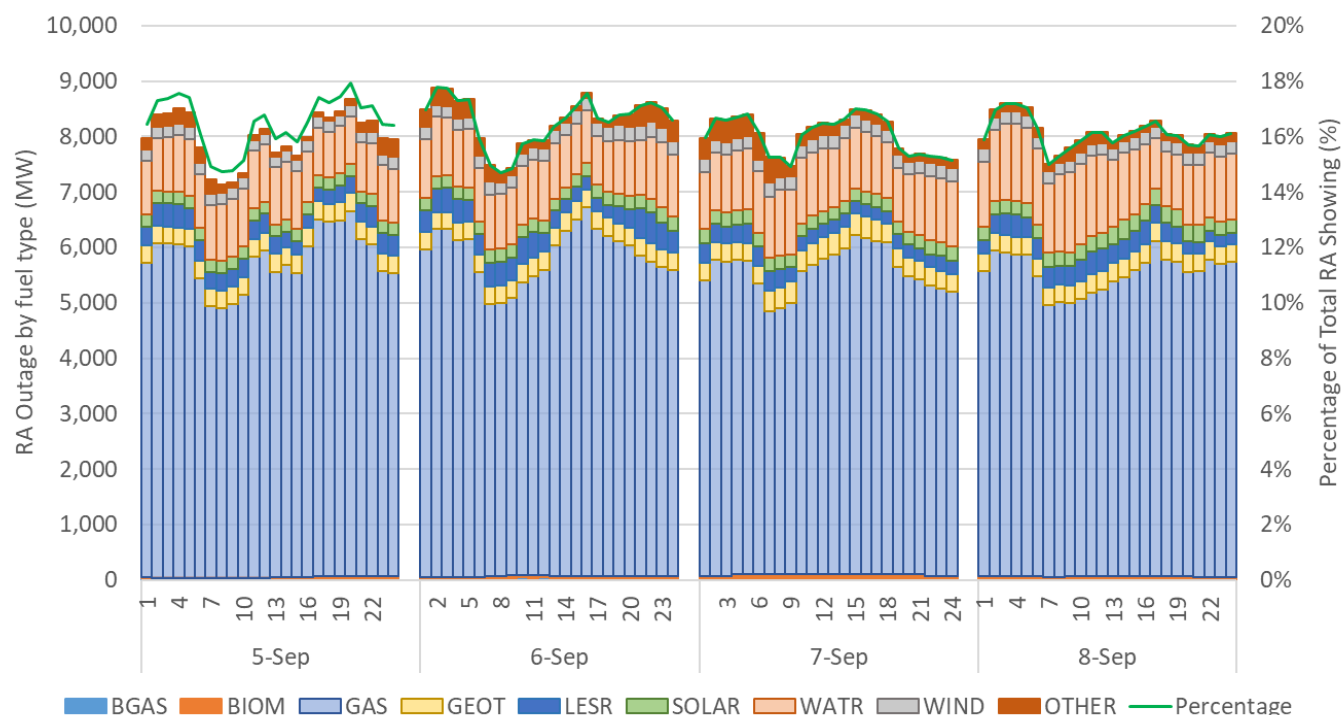
RAAIM incentive and penalty



If the average falls below 94.5% the resource is subject to a \$3.79/kW-month penalty. If the average is above 98.5% it is eligible for a payment from the pool of penalties assessed

RAAIM impact:

- The RA non-availability charge for September 2022 amounted to \$3.5 M



Other RAIM Considerations

- RAIM may not be sending the signal needed to incent generation to make capacity available. The following aspects of the RAIM design may warrant revisiting to improve RAIM's effectiveness:
 - The current deadband (i.e. 94.5-98.5 %)
 - The monthly netting process
 - The carry-forward provisions
 - Resources excluded from RAIM

PLANNING RESERVE MARGIN

Planning reserve margin (PRM)

- Each LRA sets their own PRM and counting rules
- If an LRA does not provide a PRM or counting rule methodology, the ISO's default tariff rules apply
 - The ISO default PRM (15%) was set in 2006
 - There is an interplay between the PRM and counting rules
- Most LRAs set a PRM at 15% above forecasted monthly peak demand while some LRAs have set lower planning reserve margins

# LRAs	2023 PRM
6	≤7%
20	15%
1	16%

Key takeaway: The ISO's default PRM warrants revisiting in light of changes in the RA landscape

RESOURCE COUNTING: UCAP

The ISO's prior UCAP design

Attributes:

- Resource specific: Base methodology for thermal and storage, alternative methods for other resources
- Accounted for non-availability by looking at resource availability during the top 20% of RA supply cushion hours on a weighted (last three years) and seasonal basis looking at peak/non-peak hours
- Recognized the need to eliminate RAIM once an alternative solution was in place
- Recognized the PRM could be adjusted to only need to cover operating reserves and forecast error to the extent that resource counting sufficiently accounted for forced outages

Past ISO proposal – past rationale for UCAP

- Can promote the procurement of the most dependable and reliable resources up front by accounting for historical unavailability in their capacity value
 - Current PRM, forced outage substitution rules, and RAAIM have proven inadequate to replace capacity on forced outage
- Dynamically changes with the fleet's forced outage rate
 - Relying solely on the PRM, which has been a static value, may lead to over/under procurement if future outage rates change
 - The PRM would now only need to cover operating reserves and forecast error to the extent that resource counting sufficiently accounts for forced outages

ISO-NE capacity reforms

- Considering prompt year auction
- Capacity accreditation
 - Considering marginal effective load carrying capacity (ELCC) accreditation approach
 - Will address use limitations
 - Correlation of outages due to fuel
 - Seasonal values
- Currently using installed capacity (ICAP) for thermals, with seasonal values addressing different ambient derates

PJM capacity reforms

- Wanted capacity program modeling, program design and incentives to address the risks leading to outages
 - Including correlations between outage types and outages with weather
- Adopted marginal ELCC counting based on historical events, performance and scenarios
- PJM current testing – Binding test for summer season (June-August)
 - FERC accepted additional test in both summer and winter – addressing operational factors
 - Ambient derates also captured in ELCC modeling

ISO-NE and PJM pay for performance

- High performance payment rate paid by resources underperforming to resources over performing
 - Higher rates in ISO-NE than PJM
- Triggered by insufficient reserves – reserve/energy based on penalty factors
- Example: If a resource has 1% position of total RA, ISO measures if providing 1% of the need
- Transfer among capacity providers, including resources that do not have capacity obligation
- Few exemptions
- Stop loss provision – capped losses on a percent basis