California ISO

Resource Adequacy Modeling and Program Design Working Group

March 13, 2024

Housekeeping Reminders

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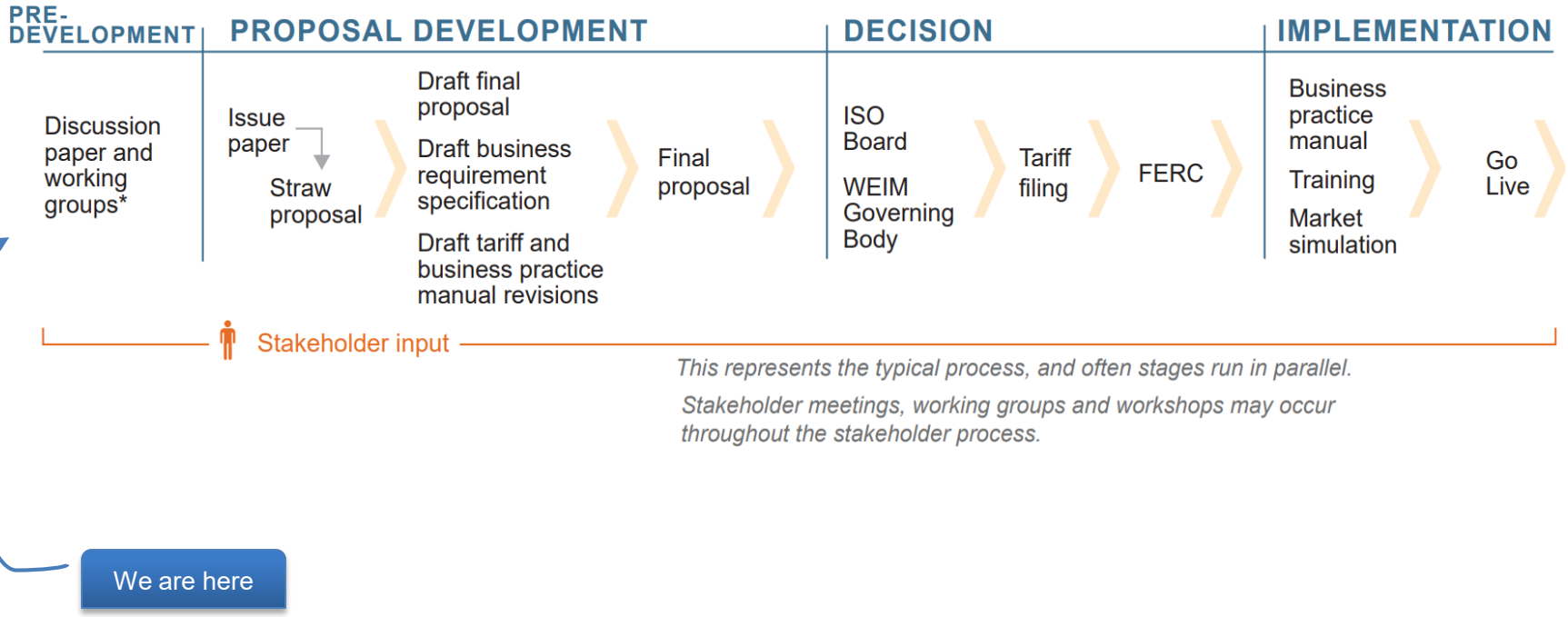
- These collaborative working groups are intended to stimulate open dialogue and engage different perspectives.
- Please keep comments professional and respectful.

Instructions for raising your hand to ask a question

- If you are connected to audio through your computer, select the raise hand icon located on the bottom of your screen.
- If you dialed in to the meeting, press #2 to raise your hand.
- Please remember to state your name and affiliation before making your comment.
- You may also send your question via chat to all panelists.

Working Group in context



Agenda

Time	Topic	Speaker
9:00 - 9:10 AM	Logistics	Isabella Nicosia
9:10 - 9:20 AM	Welcome Danielle Powers Working Group Goals	Danielle Powers
9:20 – 11:15 AM	Outage and Substitution: - Background - Mechanics - Analysis - Planned-to-Forced Outage and PRR 1122	- Partha Malvadkar & Anja Gilbert - Abdul Mohammed-Ali - Abhishek Hundiwale - David Zlotlow
11:15 – 11:30 AM	Break	
11:30 – 12:00 AM	DMM Presentation	Adam Swadley
12:00 - 1:00 PM	Lunch	
1:00 – 2:05 PM	Discussion: Outage and Substitution and Performance and Availability Incentives	City of Anaheim, MRP, Working Group
2:05 - 2:20 PM	Break	
2:20 - 3:00 PM	Review Stakeholder Feedback to 2/13 Meeting	Danielle Powers
3:00 - 3:30 PM	Outage and Substitution: Problem Statement 2 & Possible Recommendations	Partha Malvadkar
3:30 - 4:00 PM	Next Steps & Preview of Survey	Danielle Powers & Partha Malvadkar

WELCOME & GOALS

RAMPD: Working group goals

Stakeholders have the opportunity to present and provide input on key components leading up to proposal development:

1. **Develop principles/goals**
   - Define and illustrate principles for resource adequacy
2. **Form initial problem statements**
   - Form problem statements reflecting stakeholder concerns
3. **Align on priorities and establish meeting cadence**
   - Balance staff & stakeholder bandwidth
4. **Refine problem statements**
   - Explore current ISO operations, functionality, processes meant to address problem statements
   - Develop methodology for analysis, define data needs
5. **Determine action items**
   - Provide a bridge between working groups and proposal development

Meeting Goals

1. ***Facilitator transition***

2. ***Further explore group's understanding and perspectives of outage and substitution issues***
   - Overview of outage and substitution
   - Trends
   - Understand different perspectives on forced and planned outages, reporting, substitution mechanics through DMM's presentation, a stakeholder discussion, and working group feedback

3. ***Review stakeholder comments on the February 13th meeting***

4. ***Next steps for next meeting and process going forward***

CAISO PRESENTATION:
OUTAGE AND SUBSTITUTION

BACKGROUND

Problem Statement 2: Applicable Sub-Issue

- **Planned Outages:** Current rules requiring substitute capacity for all planned outages on RA capacity were designed assuming there was excess capacity available at commercially reasonable prices and may require revisiting. As a result, today planned outages often cannot find substitution which risks the health of the resource if this results in potential delays in performing maintenance. In addition, current substitution rules for planned outages may be overly burdensome.

- **Incentivizing Availability:** In light of current high RA prices, the current CAISO mechanism for incentivizing capacity to be available, the Resource Adequacy Availability Incentive Mechanism (RAAIM), may be insufficient and incentivize less reliable generation to be contracted or not provide sufficient signals for maintenance investments.

- **Requirements for RA Capacity**: It is not clear if the current CAISO requirements for RA capacity are sufficient. For example: 1.) The CAISO does not evaluate the RA fleet for energy sufficiency which could pose a reliability risk to the CAISO BAA…

Feedback to date from Stakeholders: Planned Outages

Working Group	Policy Initiatives Catalog
• Reforms to outage process are a top priority: Middle River Power, Six Cities, and PG&E • Six Cities support consideration of substitution-related topics, and perceive that current substitution requirements are inherently linked to both RAAIM and UCAP • They also support consideration of ways in which LSEs can be incented to show all RA-eligible capacity • General feedback questioning how modified requirements (*e.g.,* PRM and counting rules) could better address planned outage substitution needs	Vistra: Requested improvements to how planned outage substitution obligations are defined, enforced, and addressed. • Existing RA rules that cancel planned outages that do not also show substitution capacity are overly burdensome, disincentives capacity available for most of month that couldn't procure substitution capacity for short outage. Most concerned about outages known after RA monthly supply plan submission (T-45) but before forced outage window (T-8). • Proposed solutions include: (1) Identify necessary rules for advanced notice forced outages. (2) Advanced notice forced outages that generator cannot delay/reschedule should be accepted as planned outages that do not require substitution.

RA Enhancements former proposals

Enhancement	Purpose	Description
Portfolio Assessment of System RA Showings and Sufficiency Testing with Backstop	Ensure the shown RA capacity is collectively adequate to meet the CAISO's operational needs in all hours – using a stochastic production simulation model.	Two tests for system capacity 1. Individual deficiency test 2. Portfolio deficiency test Tests for flexible and local needs.
Planned Outage Pool	An available pool of resources for substitute capacity– which would allow other resources to take planned outage without providing substitute capacity	A monthly planned outage resource pool and a calendar that would show in advance on a daily basis the potential availability of additional system RA headroom

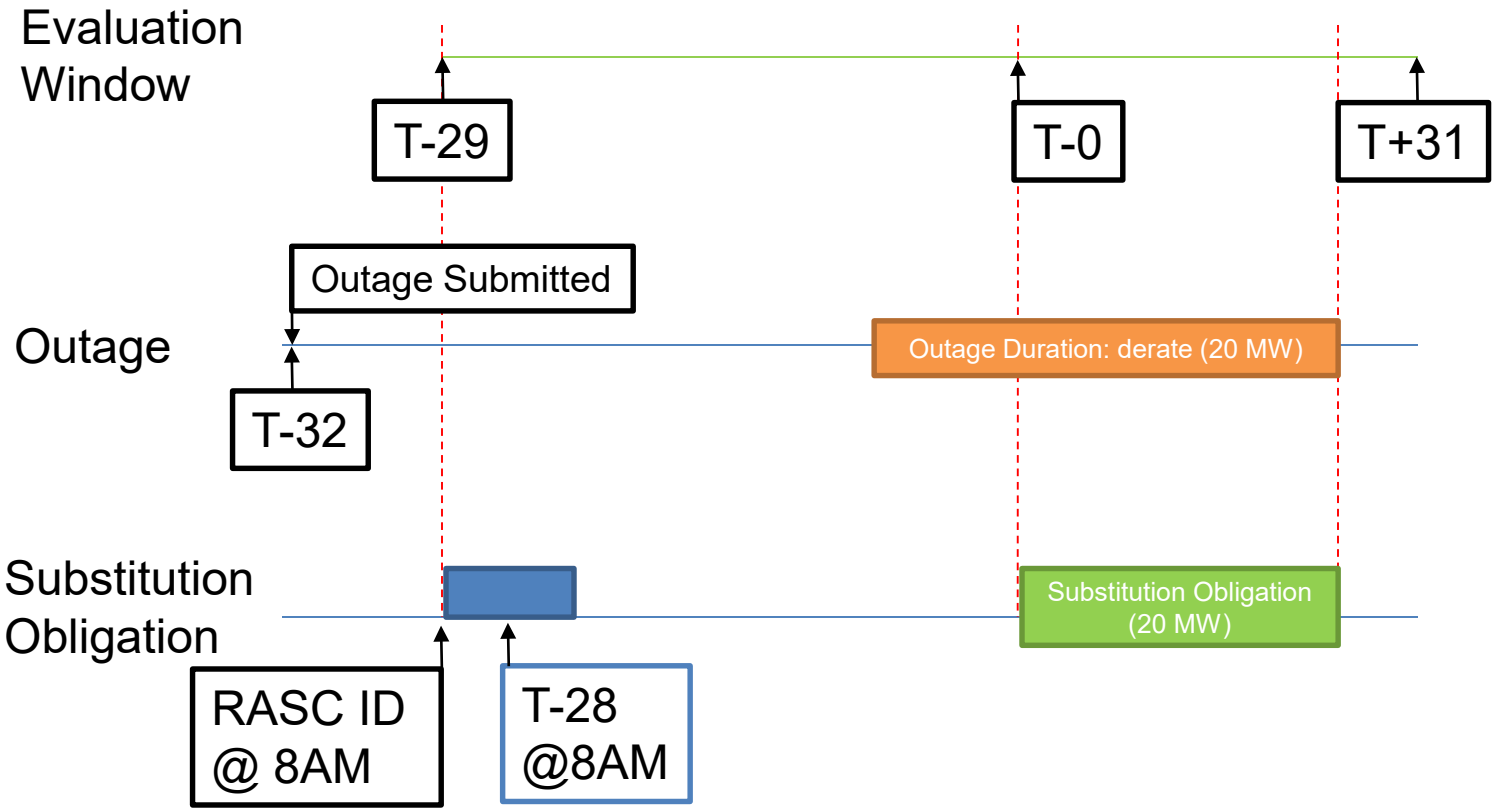
MECHANICS

PLANNED OUTAGE SUBSTITUTION

- All planned outages impacting RA resources' capacity must be fully substituted for or get denied
  - Transmission induced generation outages and off peak opportunity outages are exempt
- The CIRA Resource Adequacy Substitute Capacity (RASC) module runs every day at 8 am in CIRA from T-29 to T+31 to calculate and assign the substitution obligation
- SCs have 24 hours to provide full substitution or their outage would get denied

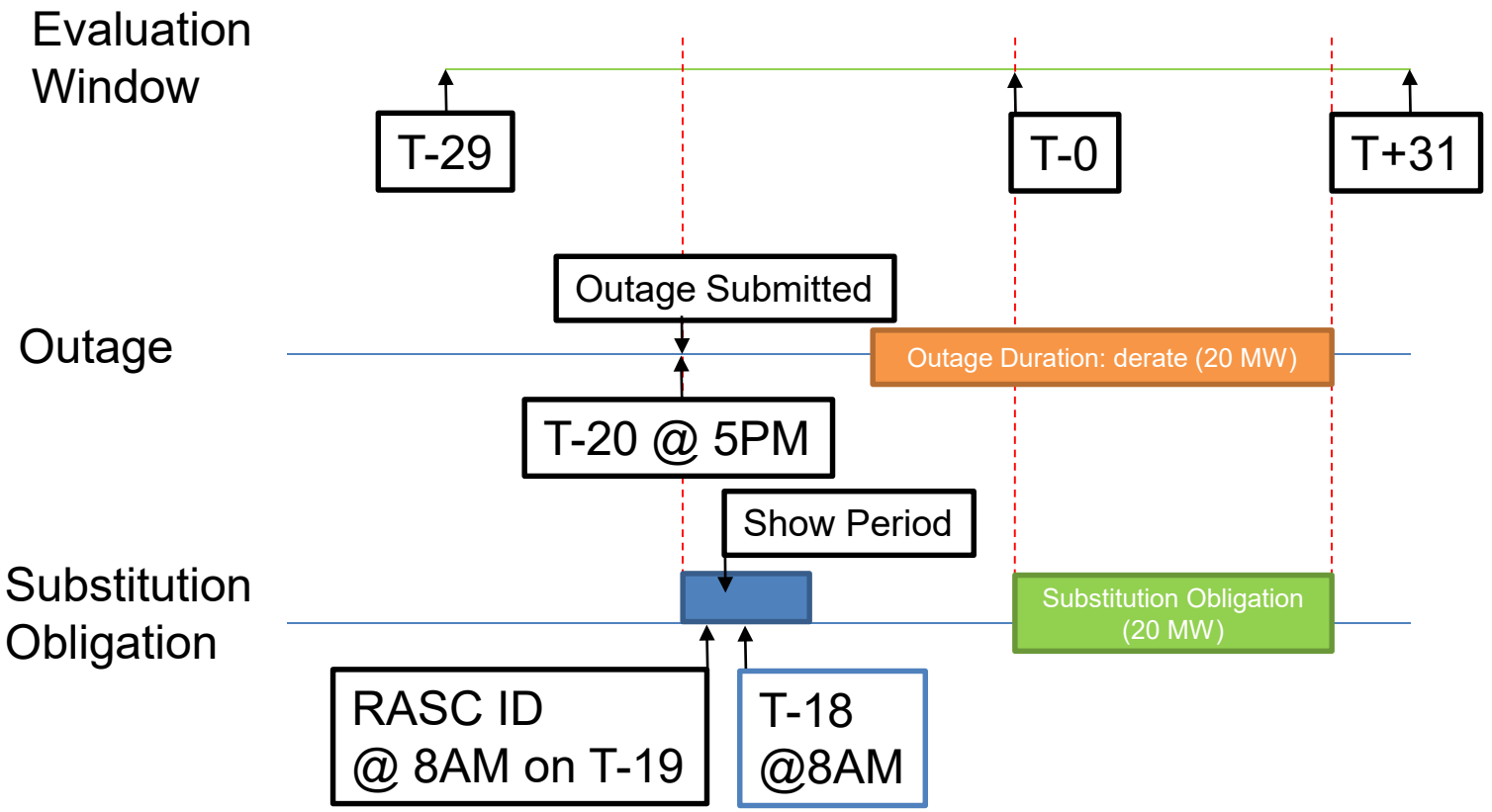
EXAMPLE: TIMELINE BEFORE T-29

An outage is submitted at T-32. RASC will run at 8AM at T-29.
If full substitution is not provided by 8AM at T-28 the outage will be denied.



EXAMPLE: TIMELINE AFTER T-29

For outages submitted on/after T-29, substitution has to be provided within 24 hours after the daily RASC run identifies the RASC obligation.



FORCED OUTAGE SUBSTITUTION

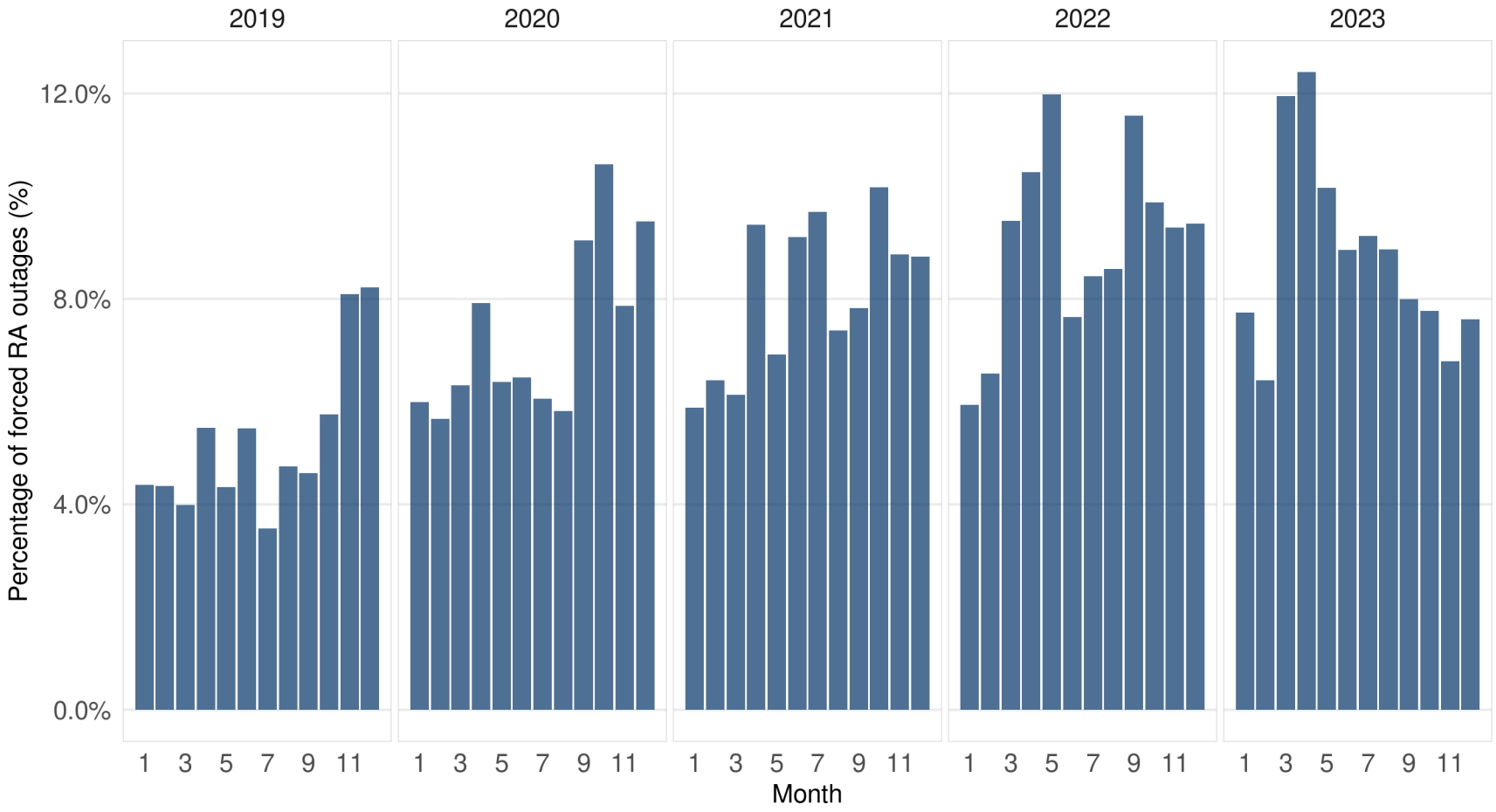
- Forced outages have an opportunity to substitute RA to mitigate exposure to RAAIM penalties
- RAAIM penalizes low performers at a $3.79/kW-month (60 percent of the CPM Soft-Cap Price)
- Many exemptions due to resource types and outage types

OPERATIONAL ISSUES

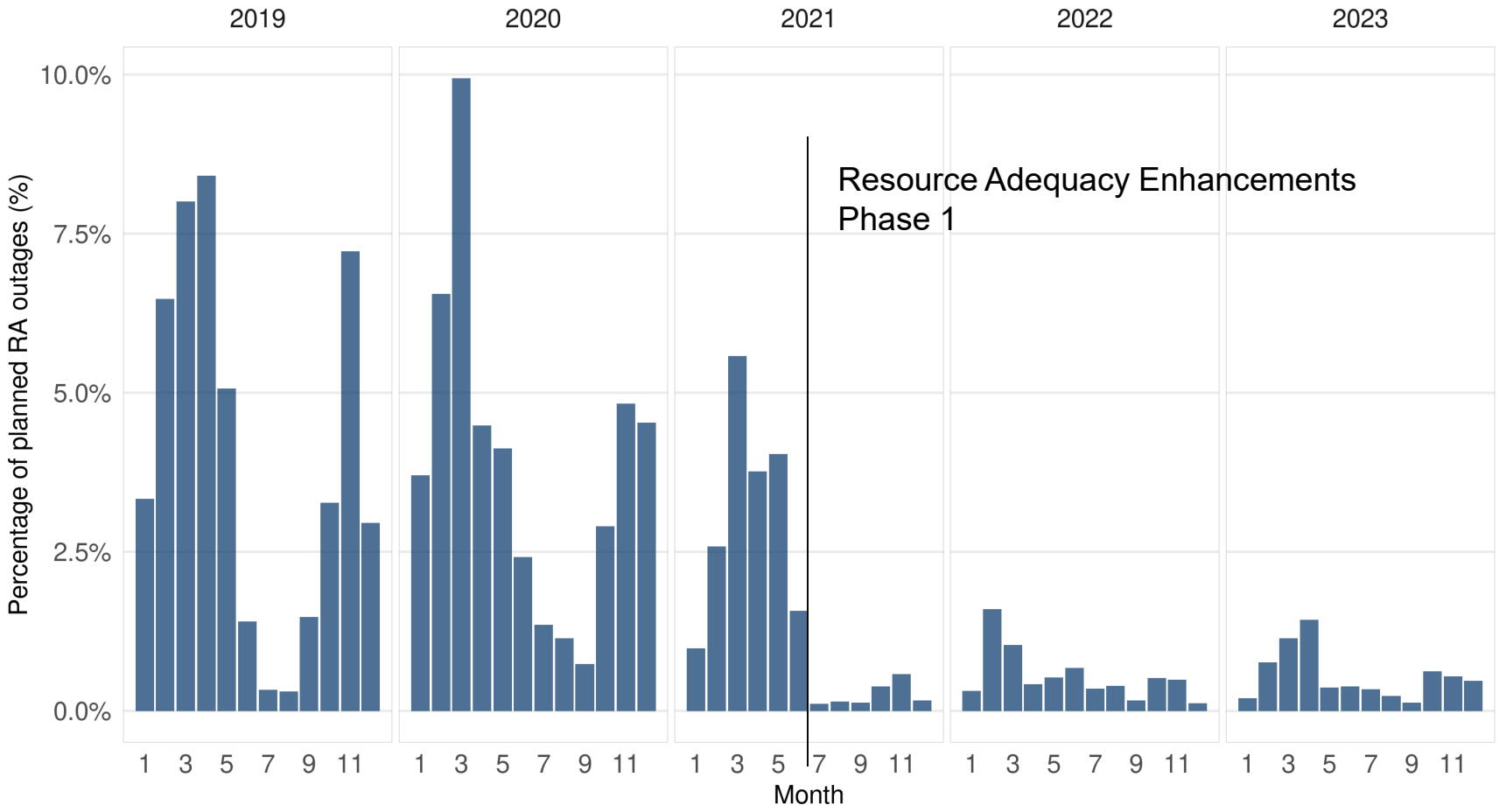
- Drivers of a lack of substitute capacity:
  - A tight RA capacity market makes it very hard to find substitution
  - Current high RA capacity prices coupled with a comparatively low RAAIM penalty price affects the incentive to substitute RA due to forced outages
  - The numerous RAAIM exemptions for forced outages increases the problem of lack of substitution
- Operational concerns:
  - Challenge in finding substitute RA capacity may affect the ability of generators to take maintenance outages
  - An increase in forced outages could create reliability challenges for the ISO

ANALYSIS

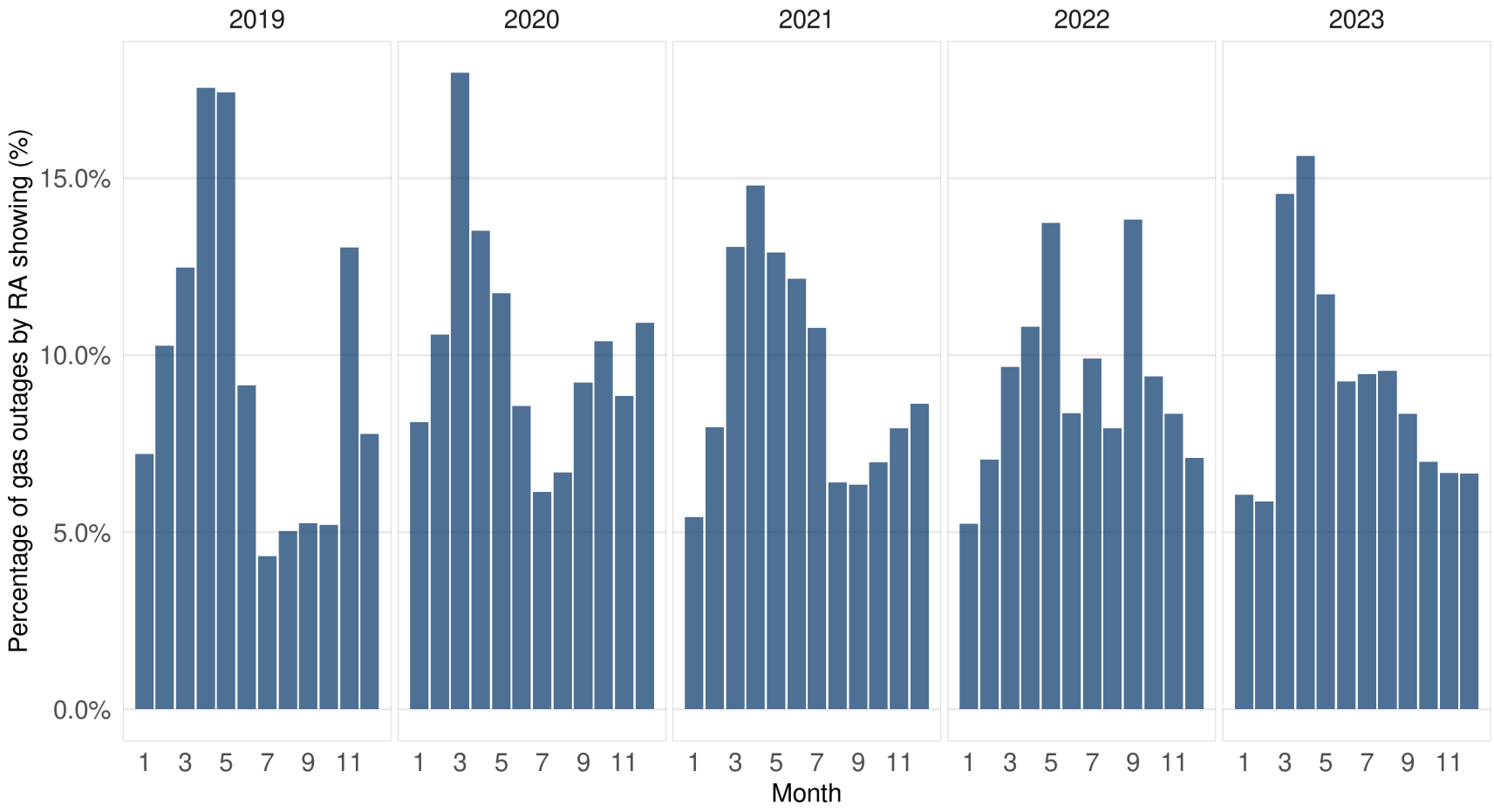
Forced Outages for RA resources across 5 years have seen an increase in percentage



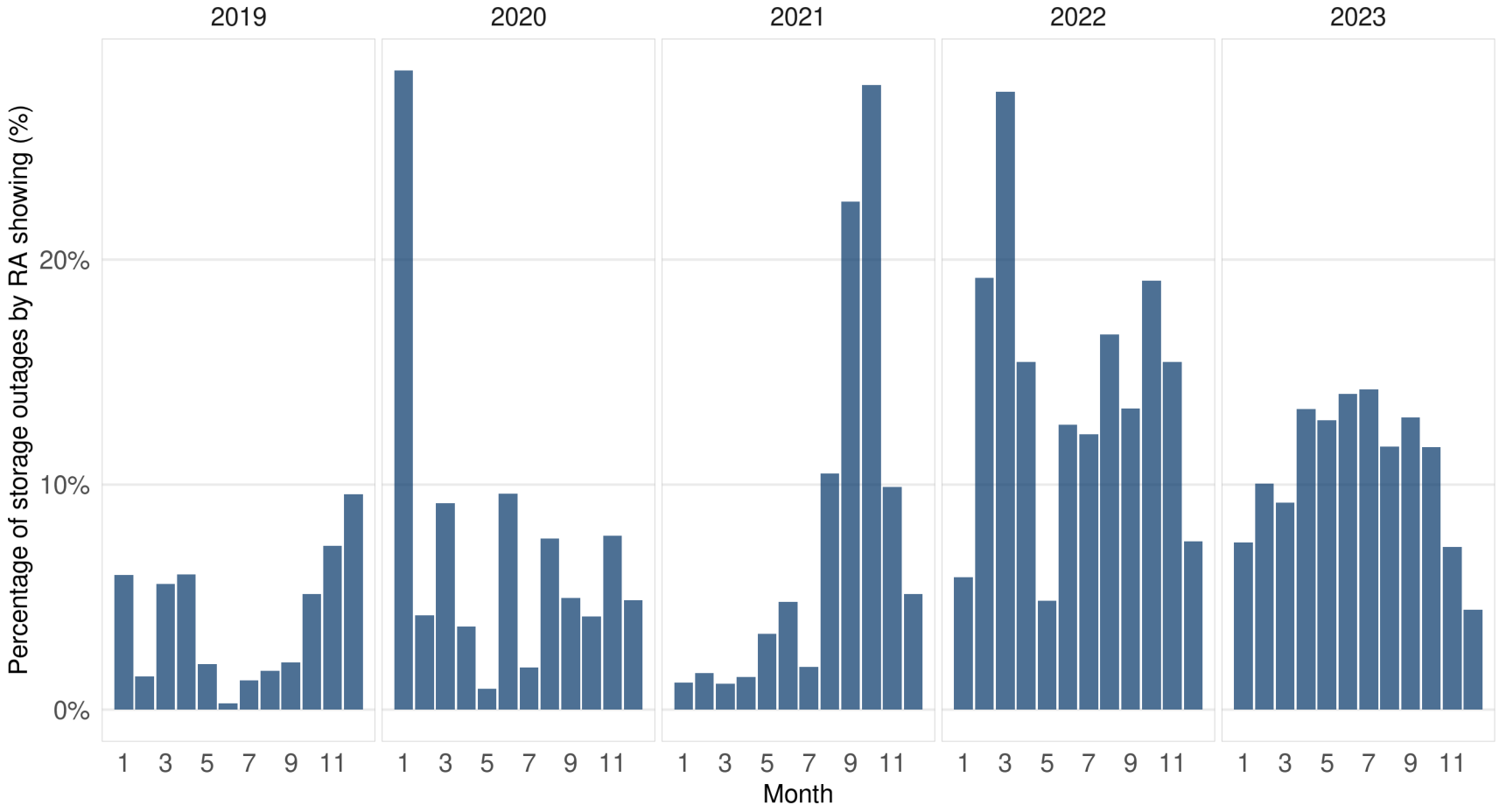
Unsubstituted planned outages for RA resources have significantly reduced since June 2021



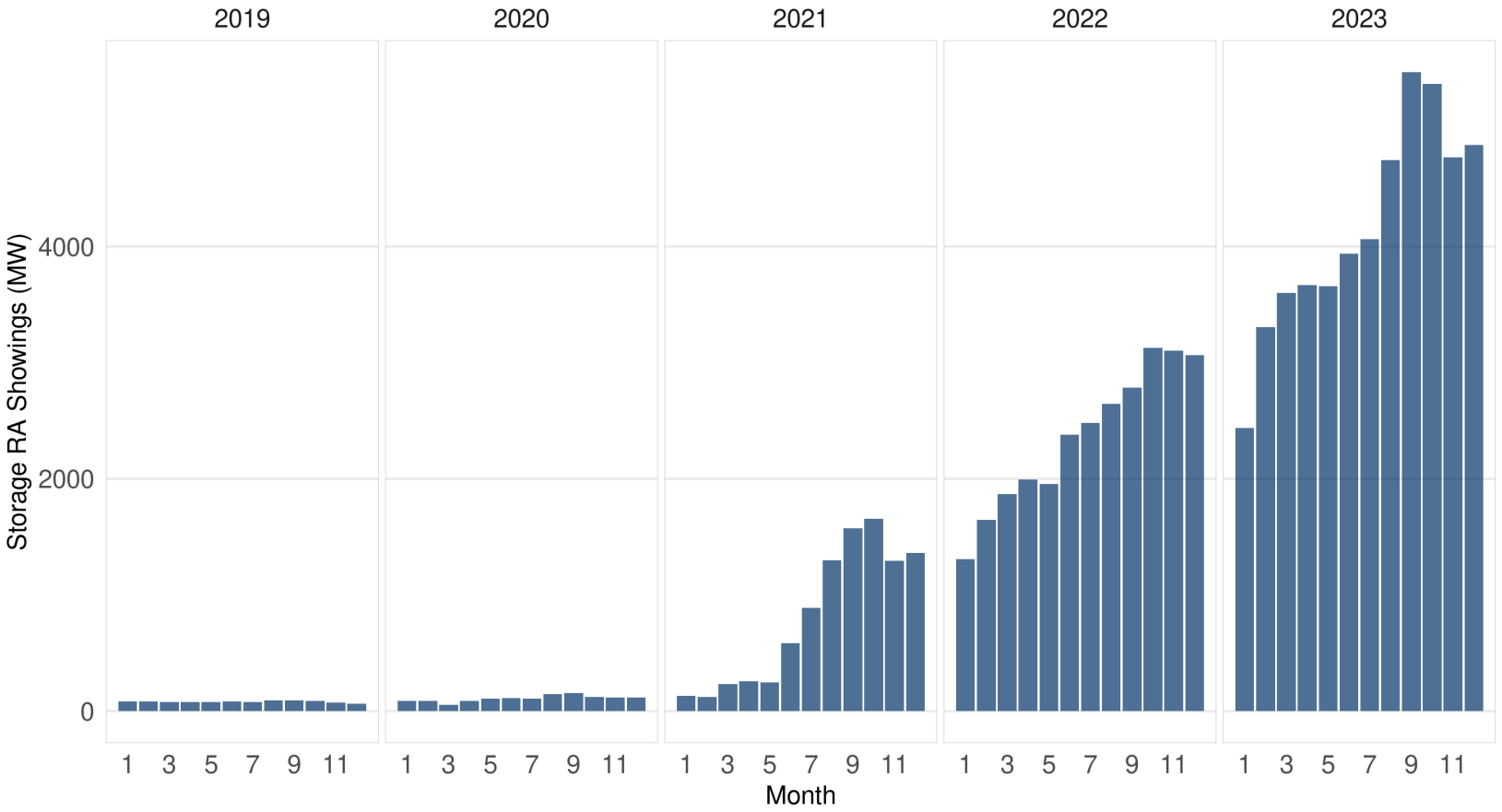
Percentage of outages for gas resources as compared to RA showings



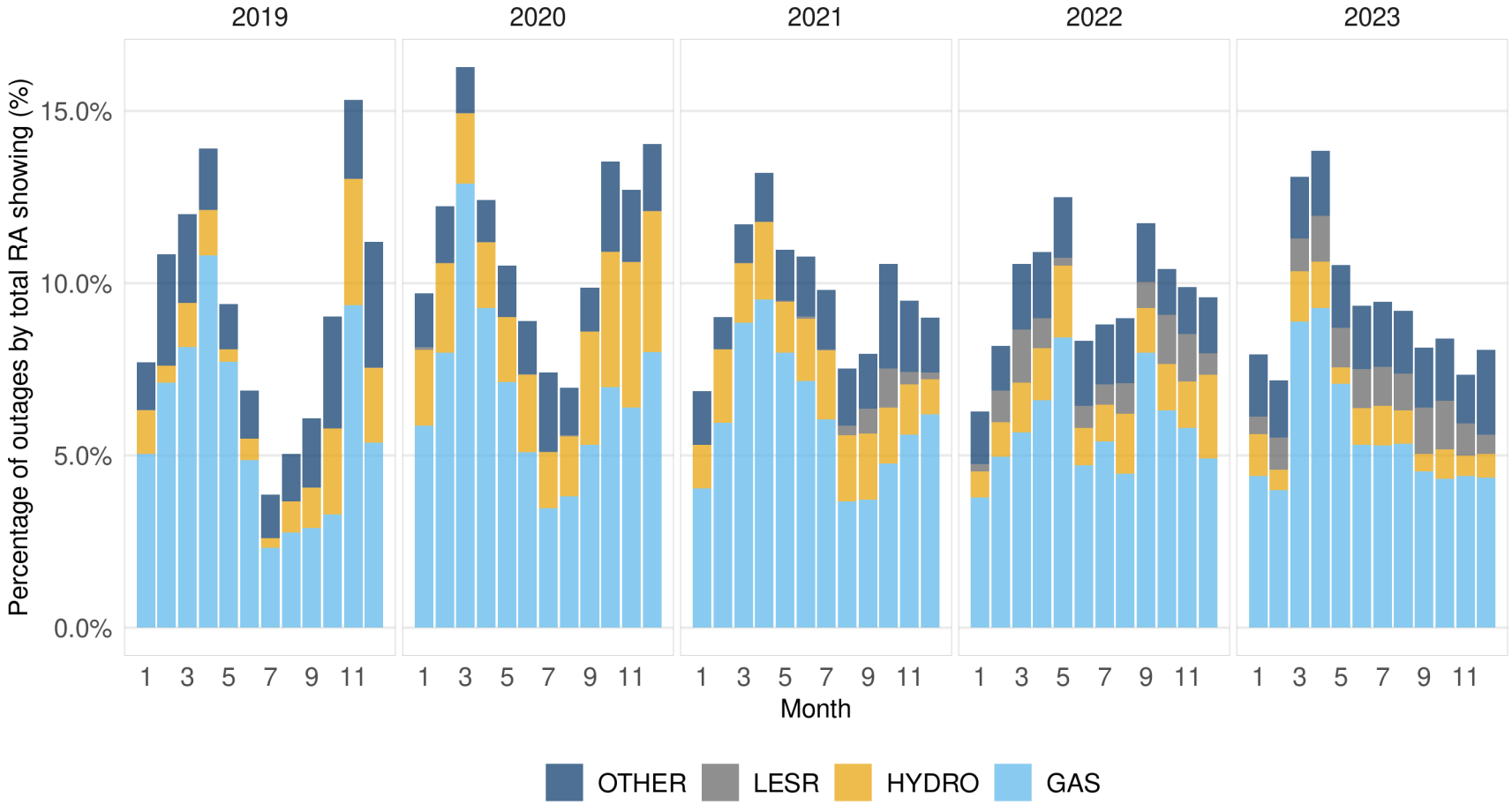
Percentage of outages for storage resources as compared to RA showing



Storage RA showings over the years



Percentages of RA outages breakdown by fuel type



PLANNED-TO-FORCED OUTAGE AND PRR 1122

Reminder on Tariff Definitions of Key Outage Terms

- ***Outage*** = Disconnection, separation or reduction in capacity, planned or forced, of one or more elements of an electric system.
- ***Maintenance Outage*** = A period of time during which an Operator . . . limits the capability of or takes its Generating Unit or System Unit out of service for the purposes of carrying out routine planned maintenance, or for the purposes of new construction work
- ***Forced Outage*** = An Outage for which sufficient notice cannot be given to allow the Outage to be factored into the Day-Ahead Market or RTM bidding processes

What is Planned-to-Forced Outage reporting?

- Submitting a forced outage after the ISO has rejected the same (or substantially similar) outage when submitted as a maintenance outage

Why are Planned-to-Forced Outages Problematic?

- Creates operational concerns because:
  - ISO cancelled the maintenance outage for a reason yet outage happened anyways.
  - Undermine ISO authority as grid operator when not done for bona fide reasons
- Can undermine RA rules because:
  - Before June 2021, planned outages typically required substitution; under current tariff always required
  - Intentionally waiting to report planned maintenance as a forced outage is a way to get around those requirements

ISO View on Permissibility of Planned-to-Forced Outages

- Planned-to-forced outage reporting potentially violates ISO tariff and FERC rules, depending on circumstances:
  - Taking outage for planned maintenance without ISO approval
  - Providing false information by reporting forced outage that doesn't meet definition of forced outage
  - For RA resources, evading obligation to provide substitute capacity

PRR 1122 Addressed Planned-to-Forced Outages

- ISO submitted PRR 1122 in January 2019 to amend Outage Management BPM
- Stated planned-to-forced outages are generally inappropriate; may result in FERC referral
- Also noted it maybe be appropriate if, for example, delaying outage poses operational risks or if circumstances changed
- Key question
  - At time forced outage is submitted, is there a reason it could not have been submitted with more than seven days' notice

PRR 1122 Appeals and Resolution

- Several stakeholders appealed the BPM amendment
- Executive Appeals Committee granted the appeals in March 2020
  - Proposed revisions did not add implementation detail, which is the general purpose of BPMs
  - BPM revisions are not necessary to report issues of note to FERC
  - Consider clarifying tariff in ongoing RA stakeholder initiatives

BREAK

Planned-to-forced outages
Issue overview and discussion

Department of Market Monitoring

Resource Adequacy Modeling and Program Design (RAMPD)
Working Group Meeting
March 13, 2024

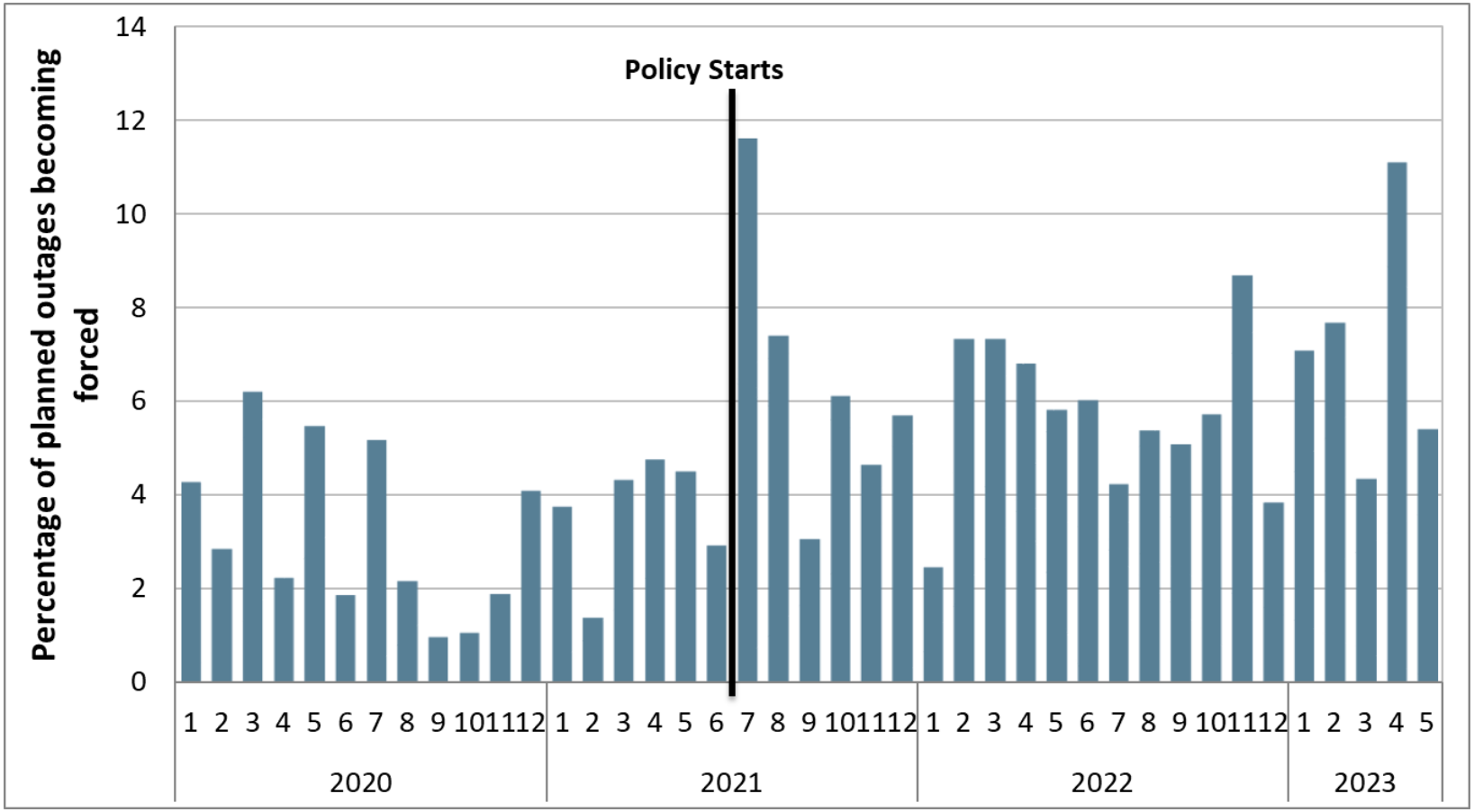
History of planned-to-forced outages

- **Early 2018:** DMM identifies multiple entities taking forced outages previously submitted as planned outages.
- **Late 2019 / Early 2020:** CAISO BPM Revisions in PRR 1122.
  - ISO revises BPM to state that it is not appropriate for a generator to submit a forced outage after the ISO has rejected the same outage as a maintenance outage.
  - Revisions are appealed by multiple entities. CAISO Appeals Committee rules on appeals:
    - Directs ISO staff to make tariff clarifications and market design changes to address planned-to-forced outage reporting
    - Acknowledges that planned-to-forced outage may be necessary sometimes, but that it could be viewed as submitting false or misleading information
- **March 2021:** Resource Adequacy Enhancements – Phase 1 approved by CAISO Board
  - Specifies that CAISO will reject any planned maintenance RA maintenance outages without substitute capacity

Resource Adequacy Enhancements – Phase 1

- Interim changes to planned outage processes approved by Board in March 2021
  - CAISO will reject any planned RA Maintenance Outages without substitute capacity
- DMM and other stakeholders warn that planned outage proposals do not adequately address, and could exacerbate, complex planned-to-forced outage issue
  - In FERC transmittal letter, CAISO states that concerns are addressed through existing tariff provisions and the CAISO already has monitoring measures in place to review such conduct, and will keep those measures in place
- Final proposal and transmittal letter to FERC state that CAISO will design longer term planned outage enhancements to better address planned-to-forced outage issue as part of Phase 2

Existing tariff provisions did not address planned-to-forced issue



Current tariff

- 9.3.1.3.1 – [CAISO will deny maintenance outages requested by RA resources without substitute capacity.]
- 9.3.1.3.7 – Short-Notice Opportunity RA Outage
- 9.3.2 – “An Operator…shall not take…Generators out of service for…planned maintenance…except as approved by the CAISO”
- 9.3.6.3 – “Generator…may submit changes to its planned Maintenance Outage schedule at any time..[CAISO] approval may be withheld only for reasons of System Reliability or security.”
- 9.3.6.4.1(c) – “A request for a Maintenance Outage that is submitted seven days or less prior to the start date for the Outage shall be classified as a Forced Outage.”
- 9.3.6.11 – “Any request to consider maintenance that does not meet the notification requirements contained in Section 9.3.8.2 will be rejected, unless Section 9.3.10 applies”
- 9.3.10 Forced Outages

Potential policy enhancement

- Current definition of Forced Outage focused on timing of submission
  - Does not convey information about necessary repairs that need to be completed urgently
  - Reliability implications of previously denied planned outages that become forced
- **Recommendation:** enhance reporting of Forced Outages to indicate outages for which repairs are immediately necessary
  - If not, gives clear declaration that CAISO operations has the option to NOT APPROVE the forced maintenance outage if they think it could jeopardize reliability or security
  - CAISO can still approve if outage won't impact reliability
- Greatly reduces reliability implications of planned-to-forced outages that do not have replacement capacity

Resources must accurately report outage information

- Enhancements to Forced Outage reporting could reduce reliability implications of planned-to-forced outages, but depend on accurate information

- Resources are obligated to submit accurate outage information
  - Correctly convey the nature and urgency of an outage in the 'Nature of Work' field, and the newly proposed field indicating when the need for repairs is immediate

- Submitting inaccurate outage information may be considered provision of false information and potentially subject to enforcement action

LUNCH

REVIEW STAKEHOLDER FEEDBACK TO 2/13 MEETING

Participant Comments on Feb 13, 2024 Meeting

Theme	Comments
Problem Statements	• Unclear where Problem Statements stand and process to finalize • Need to post current Problem Statement drafts • Little discussion of Problem Statement 3 • Where does the issue on discrepancy between CPUC and CAISO on treatment of DR stand? • Polls should be clear that opposition refers to opposition on merits of a scope change and not feedback on issue prioritization
Deliverability	• Supportive of changes, but recommends close monitoring of next Deliverability Assessment to gauge their effectiveness • Need to understand the enhanced methodology's impact on deliverability of existing resources • Need assessment of the results of the enhanced methodology in terms of increased deliverability • Balancing reliability and cost containment is not the role of CAISO; deliverability requirements should be focused on ensuring energy from RA resources can be dependably delivered
2021 UCAP Refresher	• Leverage elements of CAISO 2021 UCAP proposal ➢ Dynamic capture of forced outage rates ➢ Resource specific UCAP ➢ Seasonal UCAP ratings ➢ Assessing outages during stressed system conditions or all hours ➢ Setting energy offer requirement at deliverable QC (aka like the "ICE Offer" requirement in NYISO).

Participant Comments on Feb 13, 2024 Meeting

Theme	Comments
2021 UCAP Refresher (cont'd)	• Performance incentives under RAAIM or UCAP do not belong under Resource Adequacy; more appropriate in Energy Markets
UCAP	• More analysis needs to be done before substituting RAAIM with UCAP ➢ Has RAAIM incented resource availability? ➢ Could UCAP and RAAIM be complementary? • Preference for unit specific instead of technology specific UCAP with forecasts as opposed to historical ➢ Suggests both CAISO and CPUC use outage management system unit specific data rather than GADS • Differences between CAISO and CPUC proposals should be resolved in favor of a uniform approach to UCAP • CAISO should not be bound by CPUC decision to adopt UCAP • Coordination between CAISO and LRAs is essential, but LRAs should maintain their ability to establish policies for procurement by their LSEs • PRM should be adjusted in tandem with UCAP/RAAIM changes • CAISO should encourage all LRAS to adopt the same resource counting and availability incentive methodologies • Alternatively, ensure that the PRM is set in a manner that ensures the same reliability target across LRAs • CAISO should measure UCAP for all deliverable generators at all times • No replacement/substitution • UCAP values should be publicly available • UCAP should be set annually the June prior to the annual showings • Need to consider ambient derates

Participant Comments on Feb 13, 2024 Meeting

Theme	Comments
UCAP (cont'd)	• More information requested on Six Cities presentation on current challenges in resource procurement • Working group should consider both short term changes and longer term fixes
Outages and Substitution	• Preference for more granular approach (hourly?) to allow non-RA resources to substitute • CAISO should prepare an analysis of the use of forced and planned outages • Need enhanced forced outage reporting
Modeling Frameworks	• CAISO should consider stack analyses to accompany probabilistic modeling • CAISO should leverage information that it already has available and which is available through the CPUC • RA showings should be monthly and annual and should be non-binding • Need to revisit monthly program design • Clarity needed on how CAISO intends for stakeholders to use the information provided

DISCUSSION: BALANCING OUTAGE AND SUBSTITUTION WITH AVAILABILITY & PERFORMANCE INCENTIVES

Discussion: Balancing Outage and Substitution with Availability & Performance Incentives

- Nick Burki, City of Anaheim
- Nuo Tang, Middle River Power
- Working Group

Problem Statement 2: Planned Outage Substitution: Applicable Sub-Issues

Problem Statement: Current rules requiring substitute capacity for all planned outages on RA capacity were designed assuming there was excess capacity available at commercially reasonable prices and may require revisiting.

As a result, today planned outages often cannot find substitution which risks the health of the resource if this results in potential delays in performing maintenance.

In addition, current substitution rules for planned outages may be overly burdensome.

Problem Statement 2: Planned Outage Substitution: Possible Recommendations

Through a stakeholder policy development process the ISO should consider the following options as a part of a holistic solution to outage and substitution issues:

- Address outages up front
  - PRM
  - Resource counting (e.g., UCAP)
- Replace RASC with a pool of RA resources for substitution
- Portfolio assessment with backstop

NEXT STEPS

Proposal for Path Forward

1. ***Maturity of an issue***
   - The issue has been presented and discussed, comments and edits to the problem statement by participants received, presentations provided from CAISO staff and others, and discussion has occurred.
   - The final problem statement is clearly defined with discussion supporting the source and impact of the problem.
2. ***Survey to move the problem statement forward***
   - Informal survey through comments received on the problem statement, sub-issues, and possible recommendations
   - Understand any opposition and rationale for opposition
3. ***Discussion Paper for Promoted Problem***
   - A discussion paper will be drafted for problems that will advance, with opportunity for members to provide input on the draft.

Note: The working group process is the first stage of a potential market development. There are many opportunities in the initiative process for stakeholders to provide input on any issue under consideration.

Proposed Schedule Process

Working Group: April 25
- Deep dive: backstop processes
- Panel discussion: backstop measures
- Modeling next steps
- Continued discussion of problem statements
- Tangential EDAM RSE Issues

Policy Development Possible Topics:
- Modeling
- Default PRM
- Default Counting
- Exploration of UCAP
- Availability and Incentive Mechanisms
- Outage and Substitution
- Tangential EDAM RSE Issues

Working Groups Cont: Possible Topics:
- Backstop
- Requirements for RA Capacity (e.g., energy sufficiency, Flex RA)
- Continued Interoperability: Slice of Day/WRAP

Topics: Forced Outages, Resource Counting, the Default PRM, and Availability and Performance Incentives

REVIEW AND PREVIEW OF PROBLEM STATEMENT EDITS AND RECOMMENDATIONS

Default PRM and Counting

Problem Statement Edit:

- Updating the CAISO's Default Planning Reserve Margin: The CAISO's default PRM is outdated and has not kept pace with changes in the RA ~~landscape~~ resource mix and reliability needs.
- Updating the CAISO's Default Counting Rules: The CAISO's default counting rules have not kept pace with changes in the RA resource mix and reliability needs.

Recommendations:

- The ISO's default PRM and default counting rules should meet a 0.1 LOLE at the ISO BAA level.

Availability and Performance Incentives

Problem Statement Edits: In light of a tight RA market, high RA prices, and market incentives -- the current CAISO mechanism for incentivizing capacity to be available, the Resource Adequacy Availability Incentive Mechanism (RAAIM), may be: insufficient and incentivize less reliable generation to be contracted, discourage showing of all RA resources, not reflect/incentivize real time performance/availability and/or actions to increase availability particularly during critical periods. Additionally, it creates operational backstop challenges for the ISO resulting in reliability risks.

Recommendation: RAAIM should be assessed to see if it is meeting its intended objectives, if its objectives should be revisited, or if a new mechanism is needed to incent availability and/or performance. The need for either RAAIM reform or RAAIM elimination as well as any exploration of a new availability and performance mechanism should be done in concert/consideration of any counting rule changes to encourage all RA-eligible resources to be shown.

Resource Accreditation

Problem Statement Update:

•Current PRMs and counting rules may not accurately reflect forced outage rates or performance and availability which has the potential to result in a less efficient system.

•In light of changing regulatory structures at the CPUC (including the scoping of UCAP), the ISO has an opportunity to partner with the CPUC, other LRAs and stakeholders to create a more effective counting design and eliminate/redefine availability and performance incentives.

Forced Outage Rates and Resource Accreditation Cont.

Recommendations:

- The ISO should prioritize data transparency and reporting on forced outage rates and resource availability required to calculate PRMs and resource accreditation.
- The ISO should explore an updated default PRM and counting to reflect reliability needs and resource contribution to reliability in coordination with the CPUC, CEC, other LRAS and stakeholders (see edits to PS 1)
- The ISO should explore a UCAP mechanism to reflect resource availability, in collaboration with the CPUC and with other LRAs, seeking alignment between all resources and LRAs within the ISO BAA.
- The ISO should explore resource counting or tariff changes that directly measures/limits accreditation (e.g. ambient derates).

Next steps

- Next working group meeting: April 25 (hybrid)
- Please submit written comments on the March 13th working group meeting along with your feedback on the edited problem statements and recommendations by Wednesday, March 27th, through the ISO's commenting tool using the link on the working group webpage: https//stakeholdercenter.caiso.com/Comments/MyOrgComments
- Please contact Danielle Powers (dpowers@ceadvisors.com) to indicate if you would like to present, the topic you would like to present on and, how this topic relates to your proposed problem statement.