California ISO

Resource Adequacy Modeling and Program Design Working Group

June 18, 2024

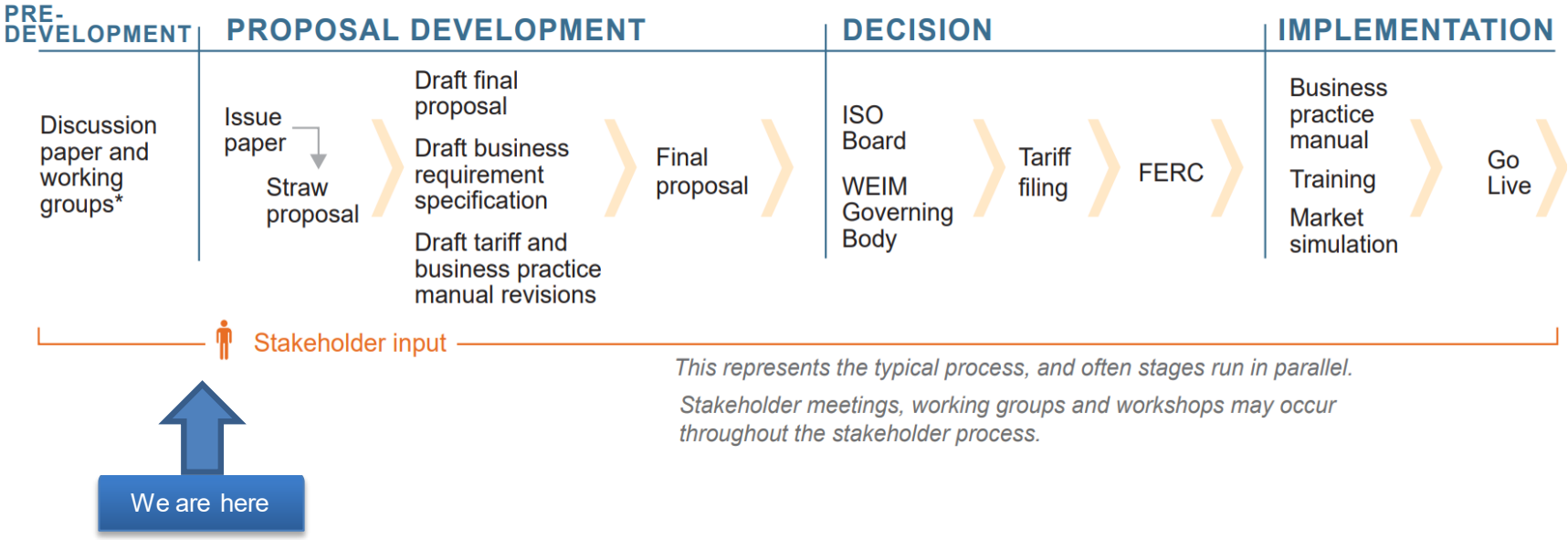
Housekeeping Reminders

- This call is being recorded for informational and convenience purposes only. Any related transcriptions should not be reprinted without ISO's permission.
- 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



This represents the typical process, and often stages run in parallel.

Stakeholder meetings, working groups and workshops may occur throughout the stakeholder process.

Agenda – June 18th

Time	Topic	Speaker
9:00-9:15 AM	Goals and Pathway Forward	Partha Malvadkar
9:15-9:45 AM	Stakeholder Presentation: The Role of CAISO LOLE Modeling in Reliability Planning	Carrie Bentley (WPTF)
9:45-10:30 AM	Track 1: Modeling, Defaults, and Accreditation	Ansel Lundberg Sai Koppolu
10:30-10:45 AM	Break	
10:45-11:30 AM	Track 2: Outage and Substitution & Availability and Incentive Mechanisms	Anja Gilbert
11:30-12:15 PM	Track 3: Backstop Reform	Hilary Staver
12:15-12:25 PM	Remaining Working Group Items	Partha Malvadkar
12:25-12:30 PM	Next Steps	Christina Guimera

GOALS AND PATHWAY FORWARD

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

RAMPD: June 18th Meeting Goal

1. ***Hear stakeholder perspectives on the pathway forward for each of the tracks***

2. ***Level set on discussion paper feedback***

3. ***Discuss the future stakeholder process for the working group and initiative tracks***

RA Working Group Policy Recommendations

Track 1: Modeling, Defaults and Accreditation

- LOLE modeling
- Default PRM and default counting rules
- Development of UCAP mechanism, in collaboration with the CPUC and other LRAs
- Ambient derates due to temperature

Track 2: Outage and Substitution & Availability and Incentive Mechanisms

- Outage and substitution processes
- Availability and performance Incentives
- Overlapping existing MOO and bid insertion rules

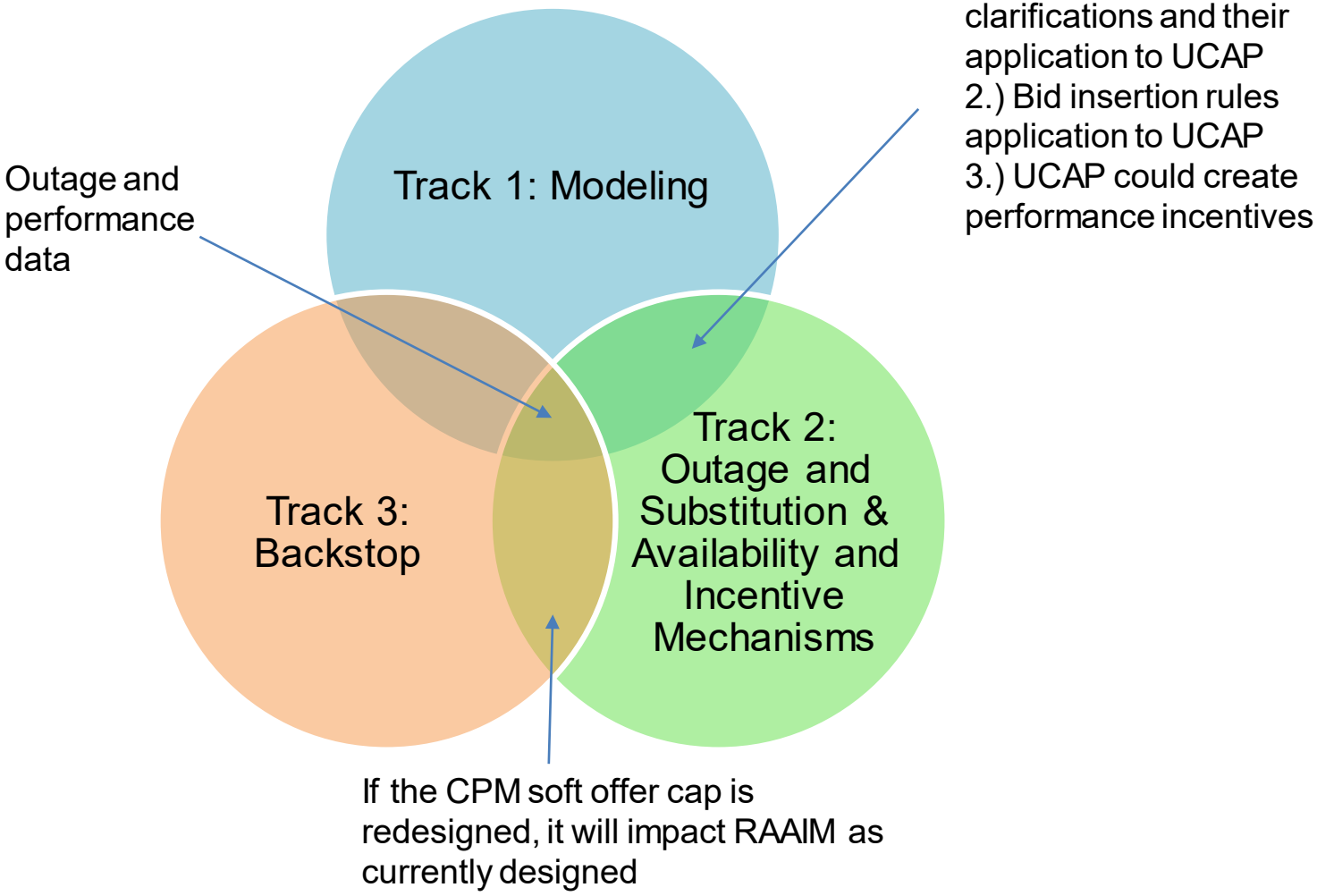
Track 3: Backstop Reform

- ISO's visibility into available backstop capacity
- Transparency to stakeholders on backstop decision making
- Enhanced backstop product and processes
- Longer term solutions to the ISO BAA RSE in curing deficiencies and assigning costs

Continued Working Group Topics

- Requirements for RA Capacity (energy sufficiency, Flex RA)
- Deliverability
- Continued assessment of interoperability with existing and emerging RA programs

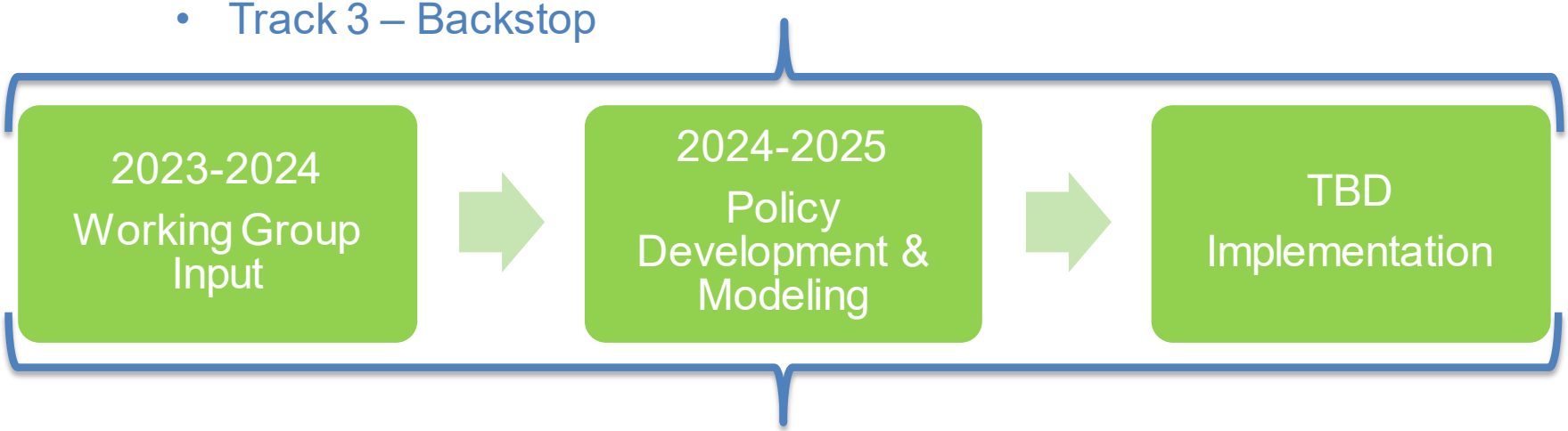
Interdependencies



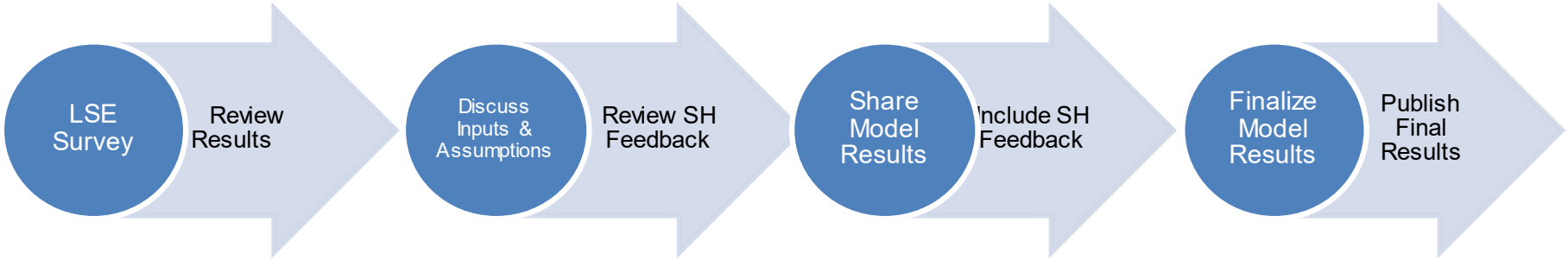
Draft Timeline

Policy Development

- Track 1 – UCAP for default counting and addressing ambient derates
- Track 2 – Outage and Substitution & RAAIM
- Track 3 – Backstop



Modeling



Carrie Bentley, WPTF

THE ROLE OF CAISO LOLE MODELING IN RELIABILITY PLANNING

TRACK 1 – MODELING, DEFAULTS & ACCREDITATION

Track 1 – Problem Statement for Policy Development

Current processes and procedures do not provide sufficient visibility into the generation fleet to enable CAISO to ensure system reliability. There is a need for additional consistent, transparent, and timely information on the sufficiency of the RA fleet in the CAISO Balancing Authority Area (BAA).

Without this, there are challenges in:

- Assessing and communicating the system-wide sufficiency of the CAISO BAA in light of the contracted RA fleet
- Anticipating the amount of RA imports that the CAISO can expect and the amount of RA-eligible resources within CAISO that will be contracted to entities outside the state.
- Addressing such concerns around CAISO BAA system-wide RA sufficiency in a timely and efficient manner

Sub-issues:

- A comprehensive evaluation of the sufficiency of the current or expected CAISO RA portfolio in forward time frames (e.g., monthly, yearly, multi-year) does not exist today
- There is a need for additional information regarding the sufficiency of the LRA RA programs to meet 0.1 LOLE
- The ISO's default PRM and default counting rules should meet at least a 0.1 LOLE at the ISO BAA level
- There is a need to evaluate the extent to which counting rules incorporate forced outage rates, performance, and availability

Track 1 – Modeling, Defaults, and Accreditation: Stakeholder Feedback

Modeling

- Overall support for modeling efforts
- NCPA, CMUA, and Six Cities: too soon to determine that a 0.1 LOLE standard should be the basis for default PRM update
- LSE survey of year-ahead RA procurement: detailed responses from over 70% of CAISO load (including PG&E, SCE, SDG&E)
- Requests from several stakeholders for "backcast" analysis

Related Policies

- Overall support for the need to update CAISO default PRM and counting rules
- MRP, other suppliers advocating for minimum planning reserve margin based on 0.1 LOLE standard
- CPUC Energy Division, CAISO Dept of Market Monitoring, CalCCA and PG&E support exploring UCAP construct

Track 1 – Modeling, Defaults, and Accreditation: Objectives

Current Objectives
Conduct a probabilistic assessment to provide a comprehensive evaluation of the sufficiency of the current or expected CAISO BAA RA portfolio in forward time frames to meet reliability objectives
Update CAISO default resource counting rules and PRM to reflect reliability contribution of different resource types and achieve a 0.1 LOLE
Address ambient derates and consider development of a UCAP mechanism

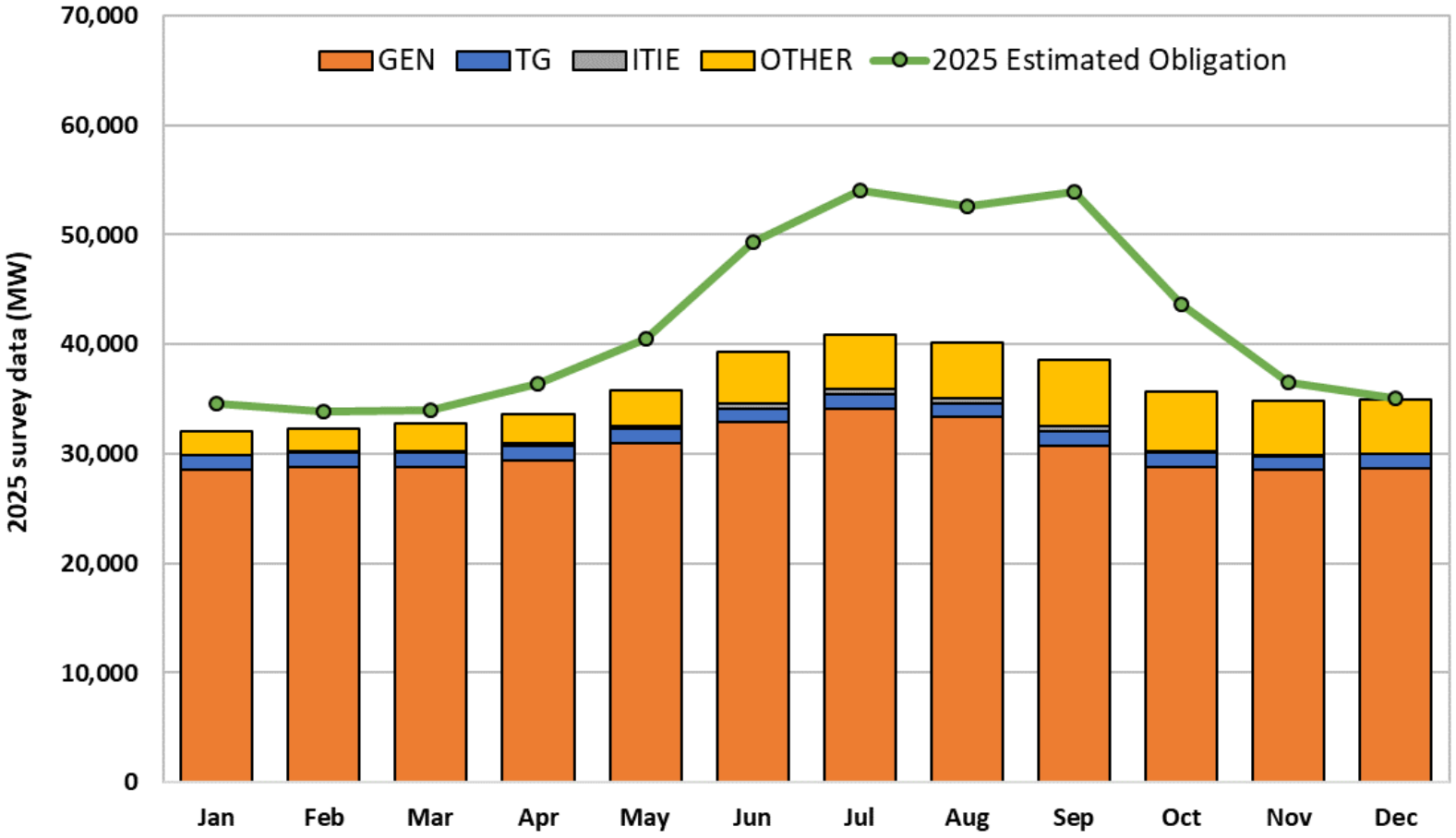
Modeling
- Stakeholder involvement throughout on inputs, assumptions, results

Related Policies
- "Traditional" policy development process (issue paper, straw proposal, etc.)

TRACK 1 NEXT STEPS:
LSE SURVEY RESPONSES AND MODELING ASSUMPTIONS

21 LSEs responded to the survey (an estimated 70 percent of CAISO BAA load)

Year Ahead: Comparison of RA capacity from the survey to estimated obligation (not adjusted for credits)



"Other" category includes 2025 expected resources and any resources without a matching Resource ID in Master File

Year Ahead Modeling: Assumptions for developing resource portfolios for LSEs with no survey response

- Start with using the 2025 load forecast from CEC's 2023 IEPR
- Determine 2025 load forecast by LSE: Using 2024 LSE' load ratio share of monthly peak demand
- For each LSE, use 2024 PRM and Credits to calculate an estimated 2025 obligation
- Use 2024 shown RA resources (except OTC resources and known retirements) from LSE plans to meet this estimated obligation
- If necessary, assume capacity from 2025 expected resource additions

Preliminary year-ahead results along with draft Inputs & Assumptions document will be shared for SH feedback

- Preliminary monthly LOLE assessment of the **2025 RA portfolio** will be performed using Inputs & Assumptions used in CAISO's Summer Assessment model:
  - Update resource portfolio and import assumptions
  - Update base profiles to develop 500 stochastic profiles
    - 2025 hourly load profile sourced from 2023 IEPR
    - 2025 solar and wind base profiles sourced from CPUC
  - Assume average hydro conditions

- In addition to probabilistic year-ahead assessment, a deterministic stack model will also be shared

Summary of survey responses: Mid-term and Long-term resource additions and indicated retirements/contract expiration dates

- Mid-term additions and retirements (2026 – 2028)
  - 2,765 MW of Battery storage resources additions
  - 1,246 MW of Solar, 470 MW of Wind, and 320 MW Geothermal additions
  - 1,419 MW of Natural Gas capacity and 550 MW of CHP shown as retired/contract end

- Long-term additions and retirements (2029 – 2034)
  - 430 MW of Battery storage resources additions
  - 425 MW of Solar and 40 MW of Wind additions
  - 2,300 MW of Nuclear and 1,423 MW of Natural gas shown as retired/contract end
  - Significant amounts of Solar/Wind/Battery capacity is shown as retired/contract end

BREAK

TRACK 2 - OUTAGE AND SUBSTITUTION & AVAILABILITY AND INCENTIVE MECHANISMS

Track 2 Problem Statement for Policy Development

Outage and Substitution:

The ISO's existing outage substitution mechanisms should be reassessed. Both initial analysis and working group feedback indicate that the current processes and procedures likely result in:

- Inefficiencies as multiple SCs hold back RA capacity for outage substitution for a partial-month outage.
- Artificial tightness in the RA bilateral market due to holding back capacity.
- Potential maintenance delays if substitute capacity is not available.
- Higher forced outage rates because planned outages cannot be scheduled and the resource ultimately experiences a forced outage.

Availability and Performance Incentives and Penalties:

- In light of a tight RA market, high RA prices, and market incentives, the current CAISO mechanism for incentivizing capacity to be available, RAAIM, may be insufficient. For example, RAAIM is applied only to a fraction of the RA fleet, the current deadband provides insufficient incentives to be available, and the monthly netting process and carry-forward provisions both mute incentives. In some cases this can result in incentivizing less reliable generation to be contracted, discouraging showing of all RA resources to the ISO, and disincentivizing actions to increase availability particularly during critical periods. Additionally, it creates operational backstop challenges for the ISO resulting in potential reliability risks.
- 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.

Track 2: Outage and Substitution & Availability and Incentive Mechanisms: Objectives

- Outage and Substitution
  - Reduce inefficiencies associated with held back capacity
  - Increase incentives to show all contracted capacity for operational visibility
  - Reduce maintenance delays if substitute capacity is not available
- Strengthen Availability and Performance Incentives

CPUC 2022 RA Report

Table 6. RA System Capacity Prices in 2022-2024

	2022 Capacity	2023 Capacity	2024 Capacity
Contracted Capacity (MW)	99,685	182,449	198,293
Weighted Average Price ($/kW-month)	$7.67	$10.06	$9.04
Average Price ($/kW-month)	$8.31	$11.03	$9.73
85% of MW at or below ($/kW-month)	$10.75	$16.67	$13.00

Source: 2022-2024 price data submitted by LSEs.

*RAAIM before and after June 1, 2024 **($3.79 and $4.40**, respectively) is much lower than the system capacity prices (above) and the anecdotal reports from CCAs for summer 2023 of RA transactions over $60/kW-mo and as high as $82.94/kW-mo.*

Track 2: Outage and Substitution: Stakeholder Feedback

Feedback Theme	Details
Analysis	Analyze outage rates, drivers of forced outages, reliability implications of forced outages
Outage Definitions	Reassess if the current outage types are sufficient
Design Changes	1. Planned Outage Buffer: Include estimated planned outages into RA requirements and allow the ISO to approve/deny outages based on the buffer 2. Showing Granularity: Show annually with monthly true up between suppliers and ISO 3. Outage Pool: Daily voluntary pool; capacity made available from SCs; same administratively set price to buy/sell; first right of refusal from SC who makes the capacity available 4. Roll back POSO: Undo 2021 reforms
Transparency	- Transparency to the ISO by increasing shown RA - Transparency to stakeholders into available capacity for substitution
Process	Allow for a different timelines for denying outages

Track 2: Availability and Incentive Mechanisms: Stakeholder Feedback

Feedback Theme	Details
Analysis	Assess effectiveness of the various attributes of the current design
Objectives	Assess if RAAIM is meeting its goals and if those goals need revisiting
Showings	Update monthly showings to have daily values
RAAIM design	Move to a daily RAAIM; remove RAAIM (due to UCAP)
MOO and Bid Insertion	Revisit, and coordinate with UCAP design
Scarcity pricing	Rather than RAAIM reform, focus on scarcity pricing

Track 2: Outage and Substitution & Availability and Incentive Mechanisms: Policy Process

Analysis and concepts to explore in the forthcoming Issue Paper

Outage and Substitution

- Analysis
- Outage Definitions
- Explore Design Improvements
  - Pool
  - Buffer
  - Showing Granularity
  - Timeline

RAAIM

- Analysis
- Re-assess Goals
- Allow for daily variability in monthly showings
- Revisit MOO and Bid Insertion rules
- Explore Design Changes
  - Daily RAAIM
  - Remove RAAIM, or just the incentive
  - Explore stronger performance incentives and coordinate with Price Formation Scarcity Pricing work

TRACK 3 – BACKSTOP REFORM AND EDAM RSE SOLUTIONS

Track 3 Problem Statement for Policy Development

1) The ISO lacks visibility into the contract and availability status of resources not shown as RA, preventing the ISO from efficiently and reliably running its current CPM processes
2) Some stakeholders note they lack sufficient visibility into the ISO's CPM decision making processes.
3) In the current tight RA market the ISO's CPM may not be producing all of its intended results, particularly given the frequent lack of bids into its Competitive Solicitation Processes.
4) As grid reliability needs evolve (e.g. to address changing needs for battery storage) the ISO's CPM process may need to evolve to obtain specific attributes necessary for reliability.
5) While CAISO proposes to utilize its existing exceptional dispatch authority to resolve reliability concerns highlighted by potential capacity shortages identified by the RSE, stakeholders have expressed concern that:
    a. The option to exceptionally dispatch resources might not be available during critical periods.
    b. The cost allocation should be reexamined to align better with cost causation, if feasible.

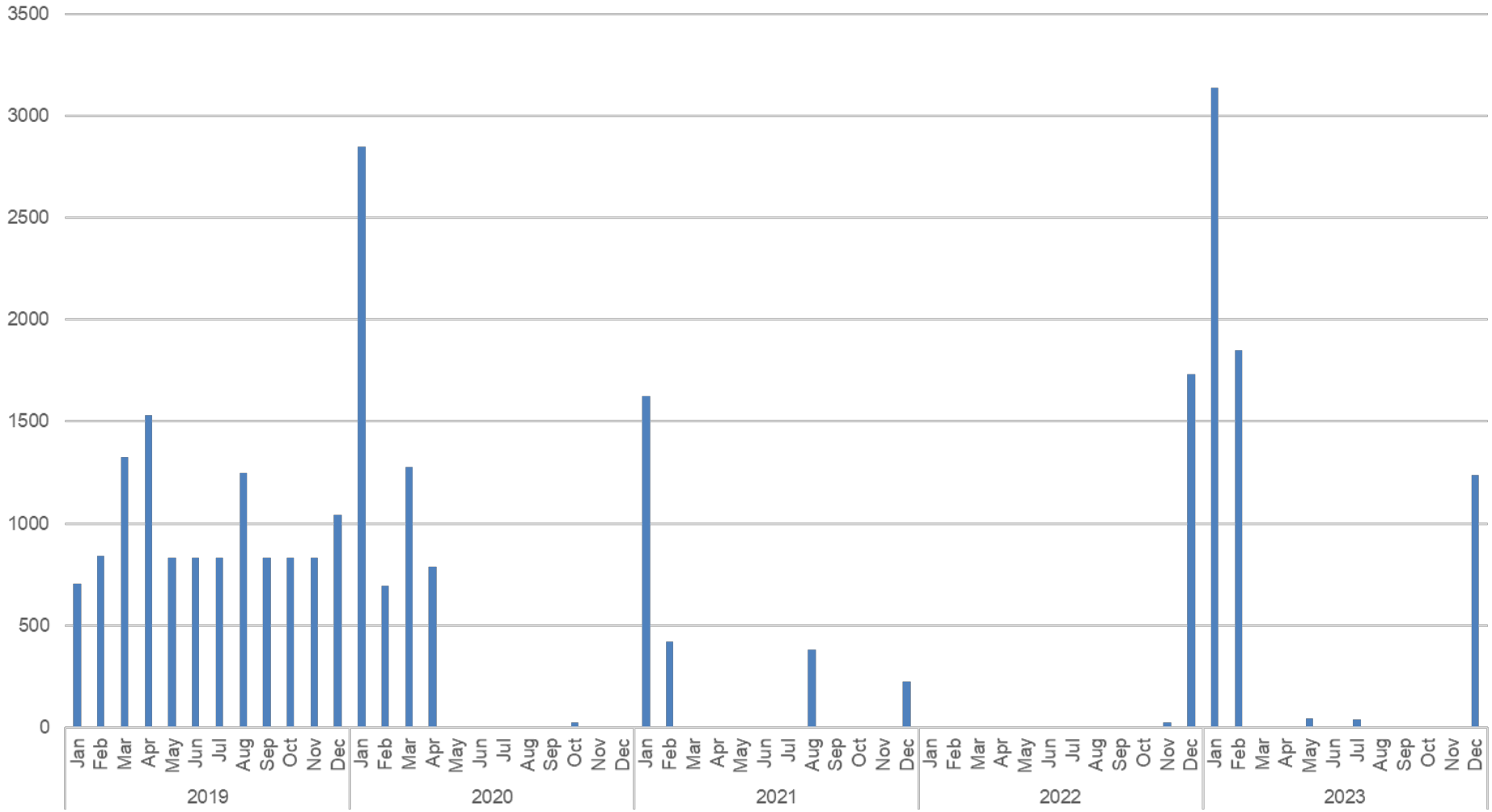
Track 3 Objectives

- Obtain visibility into the contract and availability status of resources to efficiently and reliably run our current CPM processes

- Evaluate alternative designs to more efficiently and reliably obtain backstop capacity
  - Address frequent lack of bids into its Competitive Solicitation Processes
  - Redefine needed attributes for reliability (i.e. Energy and Capacity)

- Develop solutions beyond exceptional dispatch to more efficiently/reliably cure EDAM RSE failures in the CAISO BA

CSP Offers by MW (Past Five Years)



Track 3 Stakeholder Feedback - Visibility

- CAISO needs more visibility into where resources are being contracted that could otherwise be bidding into the CSP
  - Resources contracted for RA and reliability services outside the CAISO BAA
  - RA-eligible resources held back for substitution
  - RA resources on outage for all or part of the month

- Some Stakeholders have requested additional discussion into CAISO's analysis and decision-making around CPM procurement

Track 3 Stakeholder Feedback – Soft Offer Cap (SOC)

No change to soft offer cap (SOC)	SOC tied to a different resource	More granular SOC that varies with solicitation window/season	SOC linked to opportunity cost in bilateral market

Status quo → Increasing change from current SOC methodology → **Fundamental change in role of SOC**

Increasing SOC could further tighten RA market; current SOC price reflects the role the SOC was designed to play while RA prices are based on scarcity	Could update the SOC to more accurately reflect the changing resource fleet; some stakeholders offered thoughts and were open but none directly proposed this	Monthly and intra-monthly CSP solicitations might attract more bids by setting SOC to cover the annual going-forward cost over the duration of the contract and/or reflecting seasonal cost variation	Necessary to procure sufficient CPM capacity in a constrained market and help prevent eligible capacity from contracting outside the CAISO BAA

Track 3 Stakeholder Feedback – Other Issues

- Considerations around specific resource types
  - Storage
  - Energy-only resources
- Backstopping to an LOLE standard
- Curing RSE Shortfalls
  - Develop cost-effective alternative products
  - Cost allocation of RSE failure surcharges

Track 3 Policy Process and Benefits

	Visibility and Analysis	Capacity Procurement Mechanism Policy Review and Reform	EDAM RSE Long-Term Solutions
Scope	Analysis of potential resource pool for CSP; addressing stakeholder backstop process questions	Policy design review and potential reform of backstop mechanisms, including soft offer cap methodology and resource-specific rules	Long-term alternatives for curing RSE shortfalls; revisiting the RSE failure surcharge cost allocation
Process	See forthcoming Issue Paper		
Benefits	Will improve understanding of resource status and availability Data-gathering and analysis may inform determination of need for design changes	Will allow for consideration of the full range of stakeholder assessments of need and proposals for CPM reform Will support reliability by producing a backstop program better able to secure needed capacity	Will allow consideration of alternatives to be informed by any changes made to CPM product Will support reliability by facilitating more efficient curing of RSE shortfalls

REMAINING WORKING GROUP ITEMS

Path Forward: Remaining RA Topics for Future Working Group

- RA product definitions (e.g., Flex RA, capacity and energy sufficiency, etc.)
- Deliverability
- Interoperability with existing and emerging RA programs

Pathway Forward: Discussion: Stakeholder Suggestions

Theme	Stakeholder Suggestion	Track
Showings	Six Cities suggested changing the monthly RA showing process to allow different RA values for internal RA resources for different days of the month, while still being subject to the sum of the monthly requirement.	Track 2
Showings	MRP suggested the ISO move to 100% annual showings. This was opposed by Six Cities, and Cal Advocates.	Track 2
Requirements/ Showings	Six Cities suggested recognizing load reducing capacity for in-front-of-the-meter battery resources in an LSE's forecasted monthly peak load. This would be based on the 4-hour continuous energy output of the battery.	Future WG
Requirements/ Showings	Six Cities suggested allowing locally developed projects to meet some percent of RA needs without deliverability. These projects would still need to meet MOO and telemetry requirements and could be capped (e.g., 15-20% of RA need, not to exceed load in a given area).	Future WG
Modeling	CEBA and MRP suggested conducting backcast analysis to see if the ISO has met a 0.1 LOLE	Track 1
RA Requirements-UCAP	MRP suggested Including estimated planned outages into RA requirements and allow CAISO to approve/deny outages based on planned outage buffer.	Track 2
Resource Accreditation	MRP suggested the ISO should consider unit testing to set QC values	Track 1

Pathway Forward: Discussion: Stakeholder Suggestions

Theme	Stakeholder Suggestion	Track
Outage and Availability	BAMx suggested two paths forward for batteries: - If technology is not a challenge, either 1.) Develop a RTM 5 min interval look-ahead window beyond the current 65 min or 2.) Run an hourly market multiple times within the delivery day, instead of running a single DAM. - If technology is a challenge, revisit MOO for Flex RA BESS to allow them to economically bid or self schedule consistent with their DAM awards, subject to availability of co-located gen.	Future storage initiative Track 2 for MOO
Outage and Substitution	MRP suggested that SCs be able to submit outages and substitutions well in advance and allow for up until T-8 to deny outage if not enough substitution is provided.	Track 2
Outage and Substitution	Both MRP and the City of Anaheim suggested pools for substitute capacity. The City of Anaheim suggested a voluntary pool of "conditional RA" availability. MRP suggested building a centralized market just for substitution capacity on a daily basis.	Track 2
Backstop	MRP and Terra Gen suggested the ISO backstop if the ISO has not met a 0.1 LOLE.	Track 1
Planning	WAPA suggested the ISO explore a capacity market.	Out of scope
Hybrid resources	Terra-Gen suggests the ISO address hybrid resource interaction with the RA MOO, AS, Flex RA, RAAIM, and the use of outage cards and dynamic limits for signaling unavailability to the ISO and operators	MOO, RAAIM, and outage issues in Track 2

NEXT STEPS

Next steps

- Please submit written comments on the June 18th working group meeting along with your feedback on the RA Working Group Revised Discussion and Draft Recommendations paper by Tuesday July 2, 2024, through the ISO's commenting tool using the link on the working group webpage: https//stakeholdercenter.caiso.com/Comments/MyOrgComments