Resource Adequacy Enhancements Stakeholder Work Group

April 8 & 9, 2019

Agenda – Day 1

Day 1 – April 8		
Time	**Topic**	**Presenter**
10:00 – 10:05AM	Welcome	Jody Cross
10:05 – 10:30AM	Introduction – Objectives and principles	Chris Devon
10:30AM – 12:00PM	RA framework – Capacity valuation: System, Local and Flexible RA	Chris Devon/ Karl Meeusen
12:00 – 1:00PM	Lunch	
1:00 – 3:00PM	RA framework – RA showings and assessments	Chris Devon
3:00 – 3:30PM	Planned outage substitution	Gabe Murtaugh
3:30 – 4:30PM	CPM and backstop authority	Gabe Murtaugh

Agenda – Day 2

Day 2 – April 9		
Time	**Topic**	**Presenter**
9:30 – 9:35AM	Welcome and introduction	Jody Cross
9:35 – 11:00AM	Rules for Import RA	Chris Devon
11:00AM – 12:00PM	Maximum Import Capability	Chris Devon
12:00 – 1:00PM	Lunch	
1:00 – 2:00PM	Must Offer Obligations review	Chris Devon
2:00 – 2:45PM	Local capacity assessments with availability-limited resources	Lauren Carr & Catalin Micsa
2:45 – 3:25PM	Slow demand response	Lauren Carr
3:25 – 3:30PM	Next steps and conclusion	Jody Cross

RA ENHANCEMENTS WORK GROUP – DAY 1

10:05 – 10:30AM

INTRODUCTION – OBJECTIVES AND PRINCIPLES

Revised initiative schedule

Date	Initiative Milestone
	Revised Straw Proposal
6/26/19	Publish Revised Straw Proposal
7/8/19 & 7/9/19	Stakeholder Meeting on Revised Straw Proposal
	Second Revised Straw Proposal
9/09/19	Publish Second Revised Straw Proposal
9/16/19 & 9/17/18	Stakeholder Meeting on Second Revised Straw Proposal
	Third Revised Straw Proposal
December, 2019	Publish Third Revised Straw Proposal
Early January, 2020	Stakeholder Meeting on Third Revised Straw Proposal
	Draft Final Proposal
Late February 2020	Publish Draft Final Proposal
March 2020	Stakeholder Meeting on Draft Final Proposal
	Board of Governors Meeting
Q2 2020	BOG Meeting

Initiative scope

Holistic RA review, includes following items in scope:

- RA Counting and Eligibility Rules
- System Flexible Capacity Assessments and Adequacy Tests
- Review of Must Offer Obligations and Outage and Substitution Rules
- Import RA Provisions
- Maximum Import Capability Provisions
- Local Capacity Assessments with Availability Limited Resources
- Meeting Local Capacity Needs with Slow Demand Response
- CPM/Backstop Enhancements

Resource Adequacy issues that present challenges and warrant review of current provisions

- Current RA counting rules do not adequately reflect resource availability and rely on complicated substitution and availability incentive mechanism rules
- Flexible capacity counting rules may not sufficiently align with operational needs
- Current system and flexible RA showings assessments do not consider the overall effectiveness of RA portfolio to meet CAISO operational needs

Resource Adequacy issues that present challenges and warrant review of current provisions (continued)

- Eligibility rules and must offer obligations for import resources may provide opportunities for economic withholding and/or non-delivery of intertie energy
- Current allocation of available import capability may result in inefficient outcomes and potential under-utilization of import capabilities
- Growing reliance on availability-limited resources where these resources may not have sufficient run hours or dispatches to maintain and serve the energy needs in local capacity areas and sub-areas

Principles for RA Enhancements initiative

- RA requirements and obligations should reflect CAISO's operational and reliability needs
- RA targets should remain clear, easily understood and based on stable criteria applied uniformly across all LSEs
- RA counting rules should incentivize upfront procurement of reliable resources rather than the cheapest RA capacity and ensure procurement of more dependable, reliable, and effective resources

Principles for RA Enhancements initiative (continued)

- Changes to RA provisions should be coordinated with LRA and CPUC RA program processes to the extent possible
- Encourage showing all RA capacity that is under a RA contract, and avoid disincentives to showing procured capacity
- Incentives for availability and proper maintenance should apply to both RA and non-RA resources

Objectives of RA Enhancements Work Group

- Provide additional explanation of CAISO proposals and initial concepts presented in Straw Proposal, Parts 1 & 2
- Clarify issues that are being considered and intent of options being explored
- Allow for open dialogue among stakeholders and CAISO on all scope topics
- Provide opportunity for additional feedback on policy topics and proposal aspects needing further development

10:30AM – 12:00PM

RA FRAMEWORK – CAPACITY VALUATION: SYSTEM, FLEX & LOCAL RA

Forced outage rate RA related terms and concepts

- **Installed Capacity (ICAP):** similar to CAISO's NQC, values based on summer net dependable rating of unit
- **Effective Forced Outage Rate of Demand (EFORd):** The probability a resource will be unavailable due to forced outages or forced derate when there is demand on the unit to operate

UCAP = ICAP x (1-EFORd)

- **Unforced Capacity (UCAP):** installed capacity that is not on average experiencing a forced outage or derate

CAISO has identified the following capacity valuation best practices

- Other ISO/RTOs assess availability of RA resources by considering historical forced outage rates
  - Using 3-5 years of historical data
  - Resources are required to provide NERC Generating Availability Data System (GADS) outage data
  - Class average data is used for new resources without sufficient historical forced outage data
- Forced outage rate metrics excludes planned outages
- ICAP planning reserve margins are set using system-wide average forced outage rates
- Must offer obligations are generally set at ICAP values

Incorporating forced outage rates in RA process upfront will encourage procurement of more effective and reliable resources

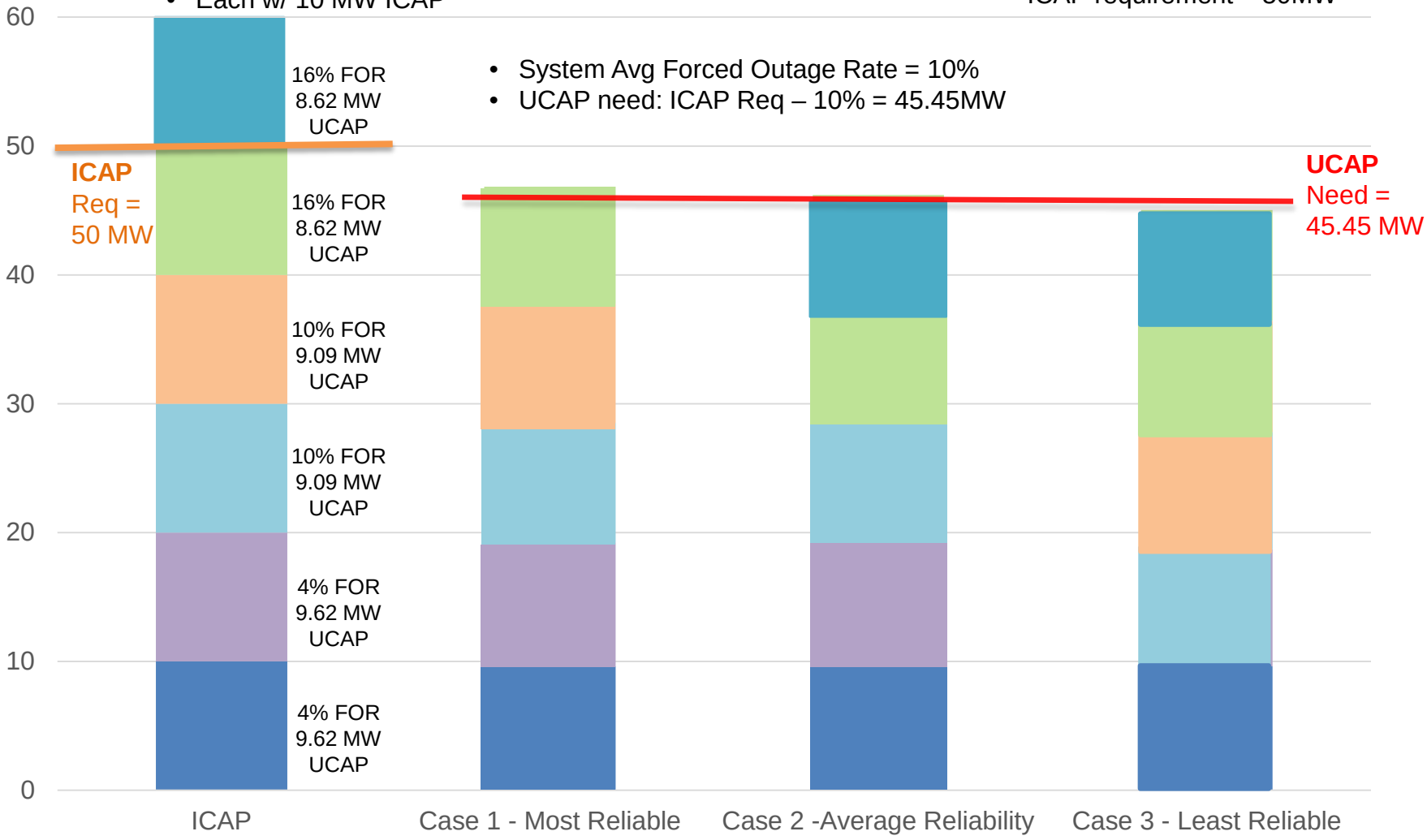
- Assess forced outage rates for resources and establish unforced capacity values for individual resources
- Intent is to coordinate and stay aligned with CPUC process
  - Review of established PRM may need to be considered
  - Solely relying on an installed capacity based PRM with RAAIM and substitution intra-month may result in future reliability concerns
- Transition to greater reliance on variable and energy limited resources necessitates revaluation of status quo
- **CAISO believes review of resources' forced outage rates and inclusion in RA valuation is warranted**

Example: UCAP concept visualized

- 6 Units
- Each w/ 10 MW ICAP

- Load = 43.47MW
- PRM = 15%
- ICAP requirement = 50MW

- System Avg Forced Outage Rate = 10%
- UCAP need: ICAP Req – 10% = 45.45MW



CAISO proposes to use a generally accepted method for calculating UCAP

- CAISO will calculate and publish UCAP values for all resources each year
- Should only consider forced outages
  - Details/definition for counting against forced outage rate is key
  - CAISO is exploring what outages and circumstances should apply in definition of “forced outage” for these purposes
- Hopeful to apply forced outage rates and establish UCAP based capacity values for as many resource types as possible to provide comparable treatment

Example: UCAP = (NQC) * (1 – forced outage rate)

Example NQC & UCAP list

Area	Non-Summer EFOR	Summer EFOR	Jan	Jan UCAP	Feb	Feb UCAP	Mar	Mar UCAP	Apr	Apr UCAP	May
LA Basin	99%	94%	174.56	172.41	174.56	172.41	174.56	172.41	174.56	172.41	174.56
LA Basin	80%	81%	175.00	139.41	175.00	139.41	175.00	139.41	175.00	139.41	175.00
LA Basin	97%	95%	332.18	322.61	332.18	322.61	332.18	322.61	332.18	322.61	332.18
LA Basin	83%	84%	335.67	277.76	335.67	277.76	335.67	277.76	335.67	277.76	335.67
LA Basin	97%	80%	497.97	481.56	497.97	481.56	497.97	481.56	497.97	481.56	497.97
LA Basin	93%	79%	495.00	462.37	495.00	462.37	495.00	462.37	495.00	462.37	495.00
Big Creek-Ventu	86%	83%	13.99	11.99	12.74	10.92	11.73	10.05	0.60	0.51	15.07
Sierra	78%	77%	0.36	0.28	0.48	0.37	0.46	0.36	0.35	0.27	0.30
Bay Area	88%	97%	23.40	20.48	23.40	20.48	23.40	20.48	23.40	20.48	23.40
Bay Area	84%	95%	23.50	19.79	23.50	19.79	23.50	19.79	23.50	19.79	23.50
CAISO System	96%	97%	18.98	18.25	29.06	27.95	30.74	29.57	52.75	50.73	51.41
CAISO System	94%	91%	14.92	13.98	22.84	21.40	24.16	22.64	41.45	38.84	40.39
CAISO System	94%	98%	11.53	10.83	17.65	16.59	18.67	17.54	32.03	30.10	31.21
CAISO System	94%	87%	18.98	17.75	29.06	27.17	30.74	28.74	52.75	49.32	51.41
CAISO System	98%	83%	16.95	16.68	25.95	25.54	27.45	27.01	47.10	46.35	45.90
CAISO System	77%	90%	16.95	13.13	25.95	20.10	27.45	21.26	47.10	36.49	45.90
CAISO System	83%	76%	16.95	13.99	25.95	21.42	27.45	22.66	47.10	38.88	45.90
CAISO System	81%	82%	16.95	13.79	25.95	21.10	27.45	22.32	47.10	38.31	45.90
CAISO System	96%	80%	16.95	16.33	25.95	25.00	27.45	26.44	47.10	45.37	45.90
CAISO System	84%	87%	10.17	8.58	15.57	13.14	16.47	13.90	28.26	23.85	27.54
CAISO System	99%	89%	15.59	15.51	23.87	23.75	25.25	25.12	43.33	43.11	42.23
LA Basin	88%	99%	3.26	2.86	4.99	4.38	5.28	4.64	9.06	7.96	8.83
LA Basin	97%	78%	49.40	47.93	49.40	47.93	49.40	47.93	49.40	47.93	49.40

Note: All outage rates are illustrative only. They have not been calculated using an established formula

NQC will continue to be an important aspect of the RA program and will still be utilized

- For example NQC will still be used for:
  - Local RA assessments and studies
  - Establishing Must Offer Obligations
- CAISO is considering how to incorporate resource forced outage rates in RA assessments
- CAISO proposes to calculate and publish resource's Unforced capacity values (UCAP)
- Both NQC and UCAP values will necessarily be utilized in the CAISO's RA processes

Example: System RA Must Offer Obligations

- Assume 5 resources all sell RA capacity, 2 sell full UCAP amount, 3 sell partial RA value below full UCAP

Resource	NQC (MW)	Forced Outage Rate	Calculation (NQC * 1 – Forced Outage Rate)	UCAP (MW)	RA Showing (MW)	System RA MOO (MW)
1	100	5%	100 MW * (1 - 0.05)	95	100 ICAP (95 UCAP)	100
2	100	10%	100 MW * (1 - 0.1)	90	100 ICAP (90 UCAP)	100
3	100	15%	100 MW * (1 - 0.15)	85	50 ICAP (42.5 UCAP)	50
4	500	10%	500 MW * (1 - 0.1)	450	500 ICAP (450 UCAP)	500
5	600	20%	600 MW * (1 - 0.2)	480	300 ICAP (240 UCAP)	300
Total	1,400	-	-	1,200	1,050 MW ICAP Shown	1,050 MW MOO

CAISO plans to rely on CPUC ELCC methodology where applicable

- CAISO may be able to rely on ELCC for wind and solar UCAP values
- Existing CPUC ELCC methodology accounts for the probability of forced outages for wind and solar resources to an extent
- CPUC calculated QCs for wind and solar are derated for forced outage rates of resource class/technology type in ELCC analysis
- Need to further evaluate how applicable ELCC for wind and solar can be in regards to Flexible RA EFC

CAISO is exploring two potential data sources for calculating forced outage rates

- NERC Generation Availability Data System (GADS)
  - Generators would be required to submit GADS data to CAISO
  - Reporting requirement would need expanded
    - GADS only mandatory for resources 20 MW and above
      - Almost 4,500 MW less 20 MW on NQC list
- CAISO Outage Management System (OMS)
  - Numerous outage cards in OMS designed to describe the nature of work for outages
  - Current OMS outage cards and may not adequately cover the forced outages used in EFORd calculations
  - Planned vs Forced as described today must be reviewed

CAISO is assessing how to develop forced outage rates for resources

- CAISO is exploring calculating the forced outage rates seasonally or on an annual basis
- Seasonal calculations may add complexity, but may better reflect availability during seasons
- CAISO exploring using three to five years of historic data to determine these calculations similar to other region's approaches
- Current systems do not accurately track forced outage rate data in terms of this proposed change
  - Data acquisition and transition mechanisms will likely need to be developed

CAISO is also considering time periods of interest for forced outage rate assessments

- CAISO initially proposed a 16-hour assessment window from 5:00 AM to 9:00 PM for calculating forced outage rates
- CAISO also considering assessing all forced outages using 24-hour by 7 timeframe
- In response to stakeholder feedback to consider narrower windows, the CAISO is also considering a 5-hour window from 4:00 PM to 9:00 PM
- Pros and cons to broad vs narrow time periods.

Example: Resource on outage during peak (4pm-9pm)

- For example purposes assume a one month forced outage rate calculation period
- Example resource on forced outage for 15 days during a month (30 days) from 4pm to 9pm
- Forced outage rate calculation = (Hours on outage during assessment window) / (Total hours in assessment window)

Assessment window	Forced Outage Rate Calculation	Forced Outage Rate
5 hours (4pm-9pm)	(5 hours*15 days) / (5 hours*30 days)	50% (0.5)
16 hours (5am-9pm)	(5 hours*15 days) /(16 hours*30 days)	15.63% (0.15625)
24 hours	(5 hours*15 days) / (24 hours*30 days)	10.42% (0.10416)

Example: Resource on outage off-peak (12am-5am)

- For example purposes assume a one month forced outage rate calculation period
- Example resource on forced outage for 15 days during a month (30 days) from 12am to 5am
- Forced outage rate calculation = (Hours on outage during assessment window) / (Total hours in assessment window)

Assessment window	Forced Outage Rate Calculation	Forced Outage Rate
5 hours (4pm-9pm)	(0 hours*15 days) / (5 hours*30 days)	0% (0.0)
16 hours (5am-9pm)	(0 hours*15 days) / (16 hours*30 days)	0% (0.0)
24 hours	(5 hours*15 days) / (24 hours*30 days)	10.42% (0.10416)

Example: Resource on outage partially on-peak (2pm-7pm)

- For example purposes assume a one month forced outage rate calculation period
- Example resource on forced outage for 15 days during a month (30 days) from 2pm to 7pm
- Forced outage rate calculation = (Hours on outage during assessment window) / (Total hours in assessment window)

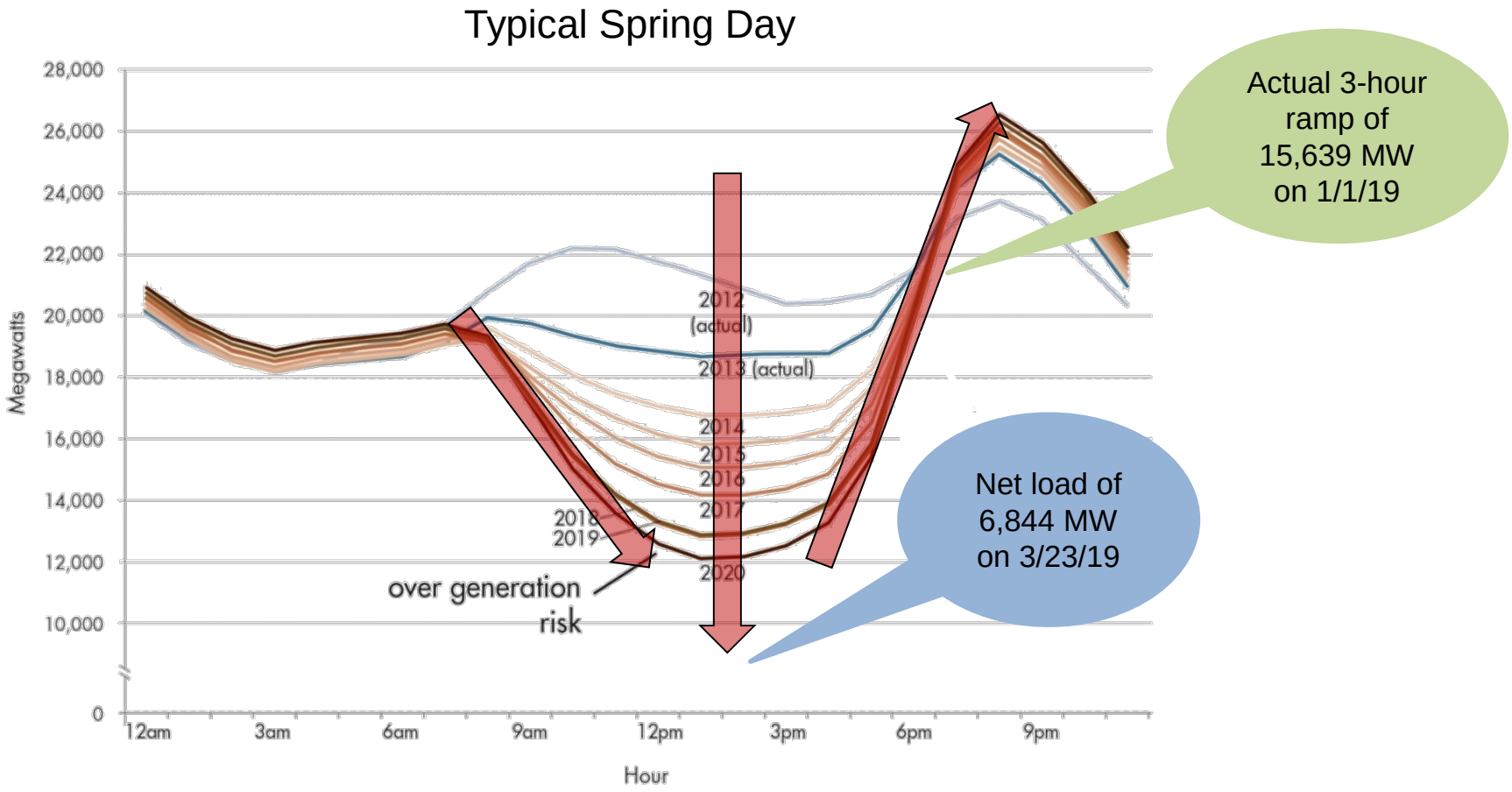
Assessment window	Forced outage rate calculation	Forced Outage Rate
5 hours (4pm-9pm)	(3 hours*15 days) / (5 hours*30 days)	30% (0.3)
16 hours (5am-9pm)	(5 hours*15 days) / (16 hours*30 days)	15.63% (0.15625)
24 hours	(5 hours*15 days) / (24 hours*30 days)	10.42% (0.10416)

CAISO exploring if UCAP concept should be applied to some resource types and what approaches may need to be applied to develop UCAP values

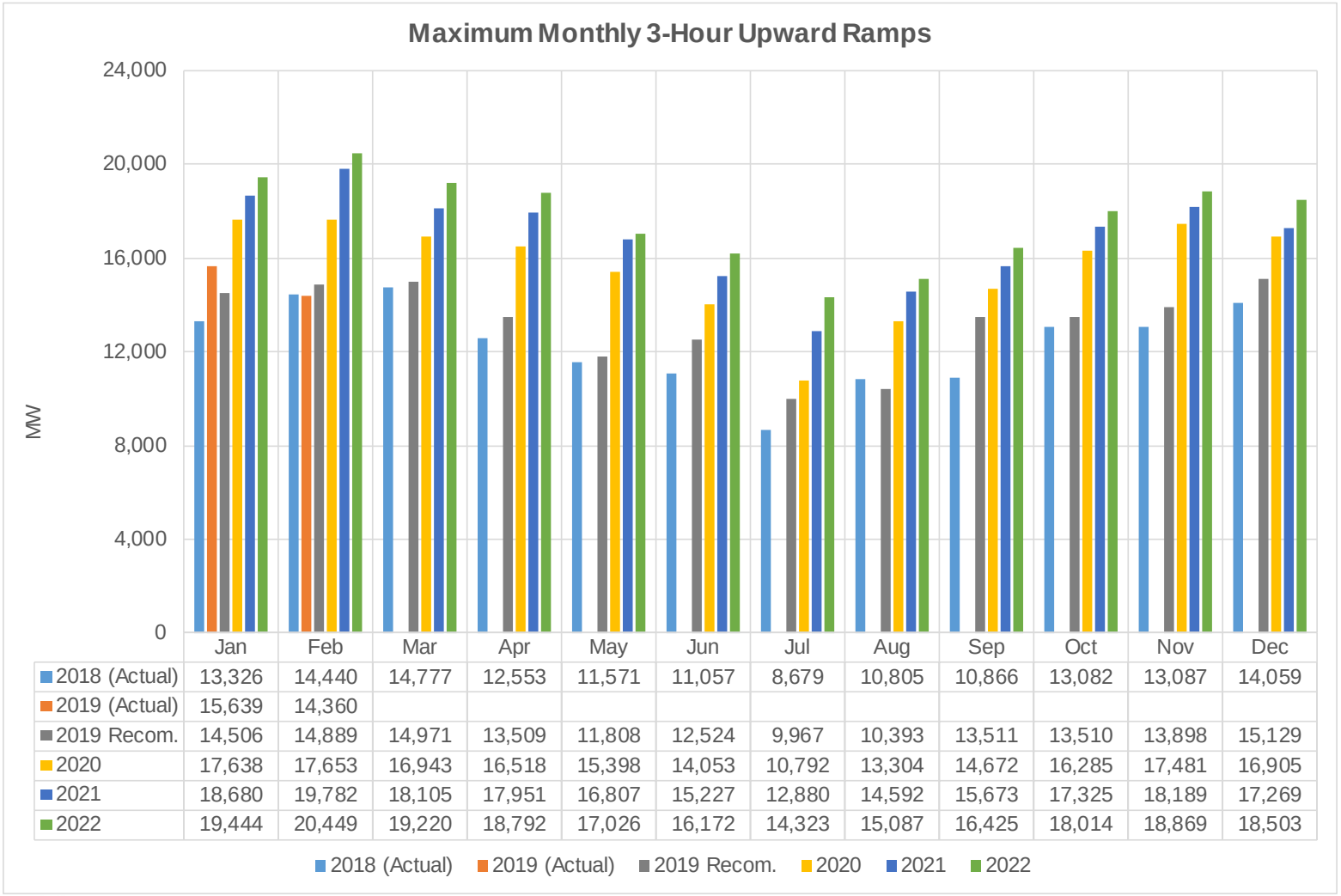
- Is it possible and appropriate to apply UCAP concept to the following resource types:
  - Hydro? DR? QFs? Imports? New resources? Others?
- What things should be considered for application of UCAP to other common resource types?
  - Many of these resource types do experience forced outages that should be accounted for if RAAIM is not applied in the future
- CAISO is seeking stakeholder feedback regarding applicability and potential methods for calculating UCAP values for these resource types

FLEXIBLE CAPACITY

Actual net load and 3-hour ramps are about four years ahead of CAISO's original estimate primarily due to under forecasting rooftop solar PV installation



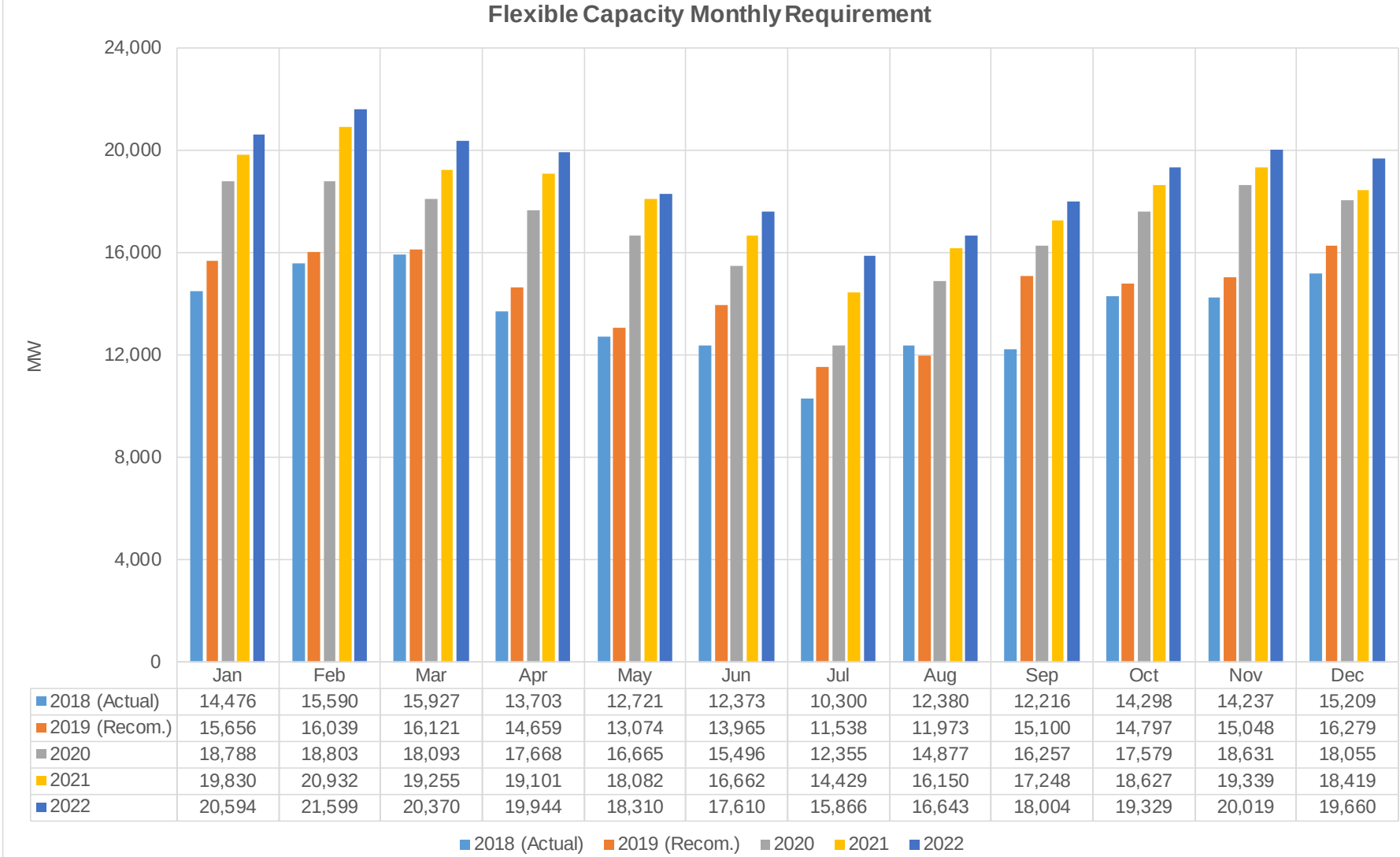
Maximum monthly 3-hour upward net load ramps for 2018 through 2022



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2018 (Actual)	13,326	14,440	14,777	12,553	11,571	11,057	8,679	10,805	10,866	13,082	13,087	14,059
2019 (Actual)	15,639	14,360										
2019 Recom.	14,506	14,889	14,971	13,509	11,808	12,524	9,967	10,393	13,511	13,510	13,898	15,129
2020	17,638	17,653	16,943	16,518	15,398	14,053	10,792	13,304	14,672	16,285	17,481	16,905
2021	18,680	19,782	18,105	17,951	16,807	15,227	12,880	14,592	15,673	17,325	18,189	17,269
2022	19,444	20,449	19,220	18,792	17,026	16,172	14,323	15,087	16,425	18,014	18,869	18,503

*Please note Actuals in this graph may have solar/wind curtailments present

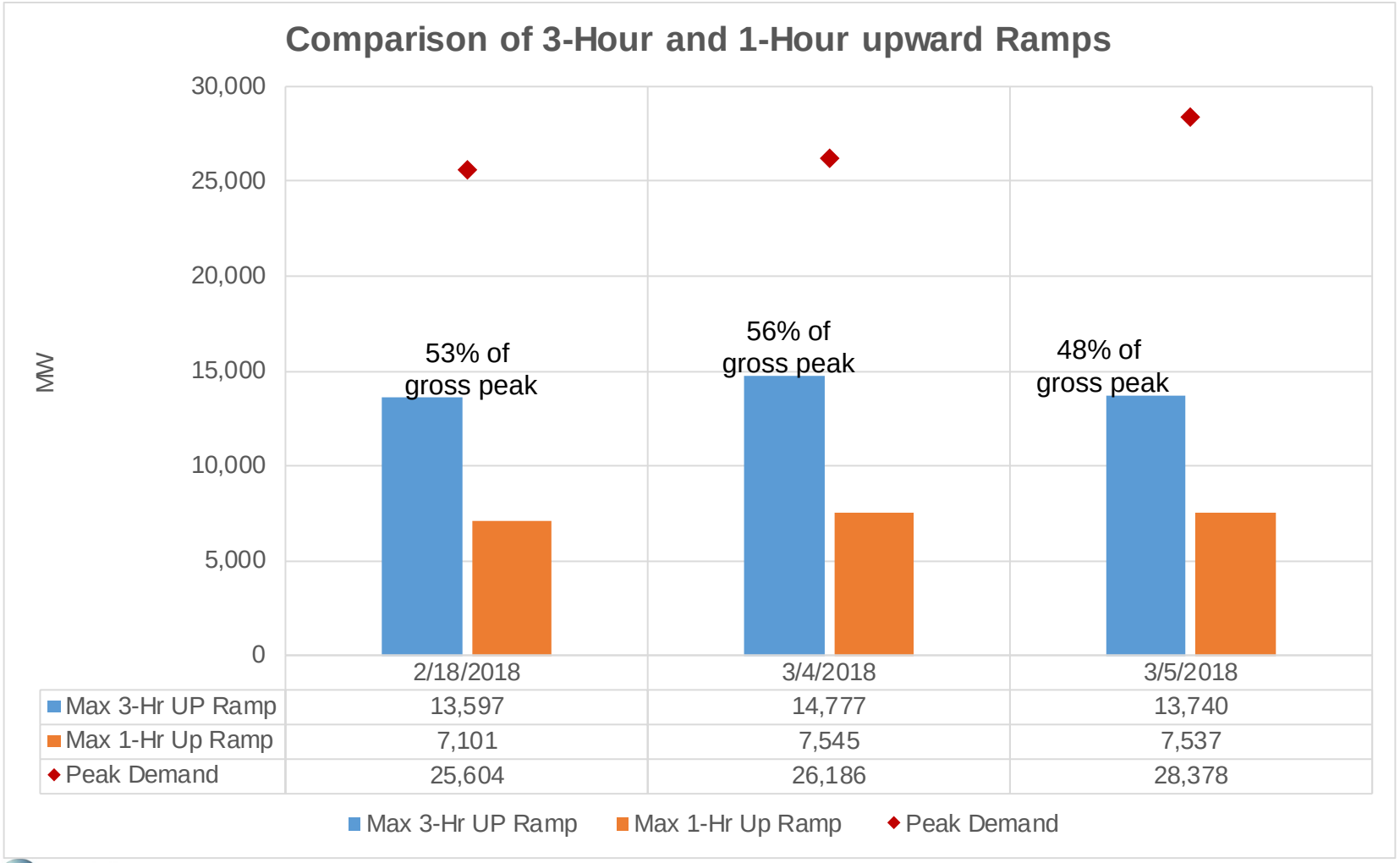
Current flexible capacity needs for 2018 – 2022



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2018 (Actual)	14,476	15,590	15,927	13,703	12,721	12,373	10,300	12,380	12,216	14,298	14,237	15,209
2019 (Recom.)	15,656	16,039	16,121	14,659	13,074	13,965	11,538	11,973	15,100	14,797	15,048	16,279
2020	18,788	18,803	18,093	17,668	16,665	15,496	12,355	14,877	16,257	17,579	18,631	18,055
2021	19,830	20,932	19,255	19,101	18,082	16,662	14,429	16,150	17,248	18,627	19,339	18,419
2022	20,594	21,599	20,370	19,944	18,310	17,610	15,866	16,643	18,004	19,329	20,019	19,660

*Please note Actuals in this graph may have solar/wind curtailments present

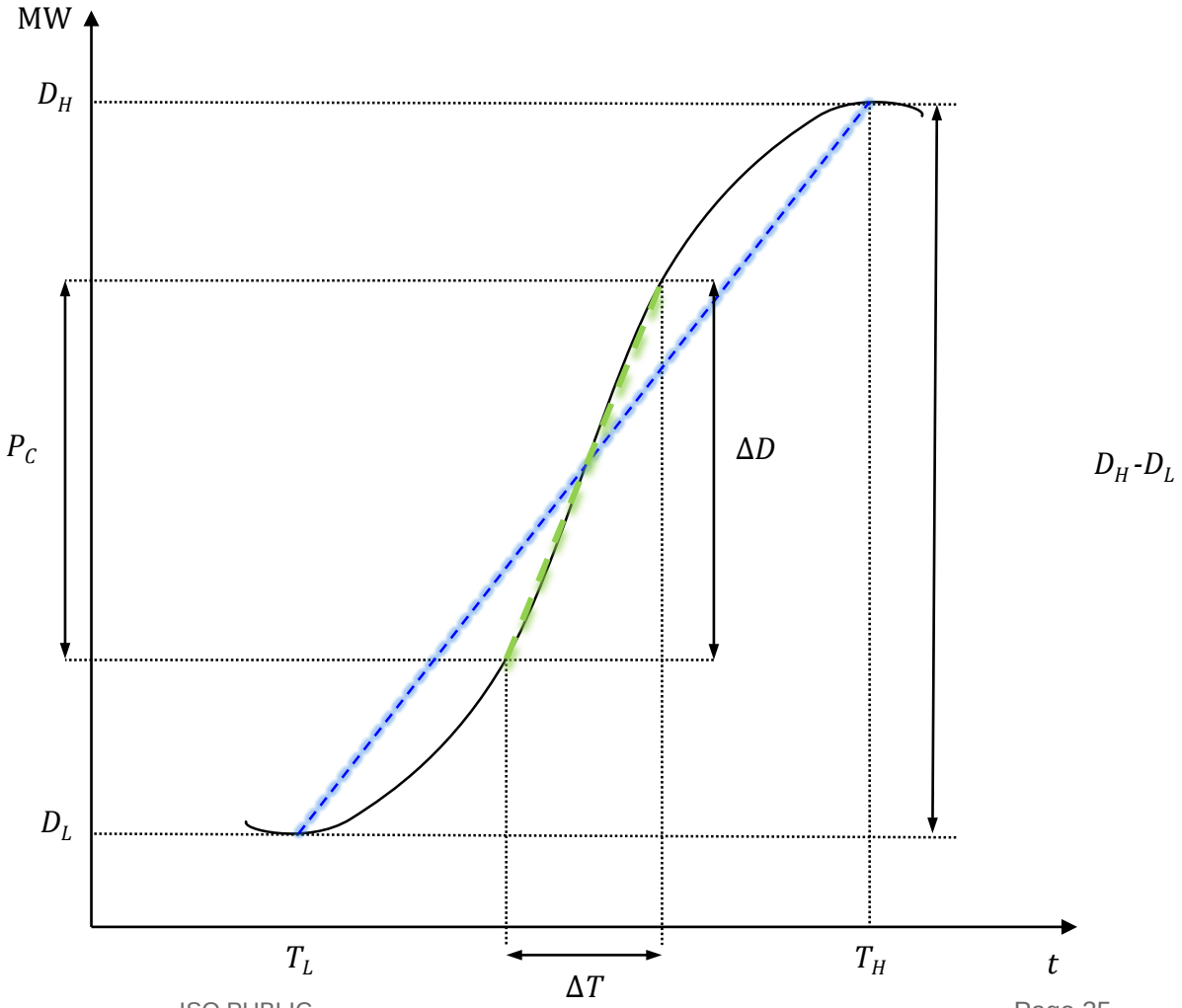
3-hour upward ramps are over 50% of daily peak demand, indicating need for faster ramping resources



CAISO is exploring two potential flexible RA categories: Long Ramping and Fast Ramping

- **Long ramp:** From a low net demand (D_L) to a high net demand (D_H) over a time period ($T_H - T_L$), typically three hours

- **Fast Ramp:** Steepest section requiring highest ramp rate ($\Delta D/\Delta T$) over typically one hour



CAISO has identified numerous potential ways to improve existing flexible capacity product

- Need for greater differentiation based on ramping speed
- Opportunities to simplify products, including:
  - Reduce number of products
  - Streamline MOOs
  - More straightforward counting rules
  - Clarify resource eligibility and verification
- Greater alignment with operational needs and market products
  - Coordinate Flexible RA provisions with ongoing Day-Ahead Market Enhancements and Flexible Ramping Product enhancements

EFC will focus on operational attributes, CAISO no longer focused on applying historic bidding behavior

- Stakeholder feedback reflects general consensus that historic bidding behavior is not necessarily a good predictor of future capability – can change based on:
  - Contractual obligations or RA status, etc.
- For most resources, EFC may be limited by UCAP value
  - Exceptions include wind, solar, and storage
- ISO is seeking stakeholder input on:
  - How to apply EFC for wind and solar resources
  - Hoe to ensure compliance with flexible RA MOO
  - How best to manage Pmin burden issues

CAISO exploring continuing to set Flexible RA requirements using similar methodologies as currently applied today

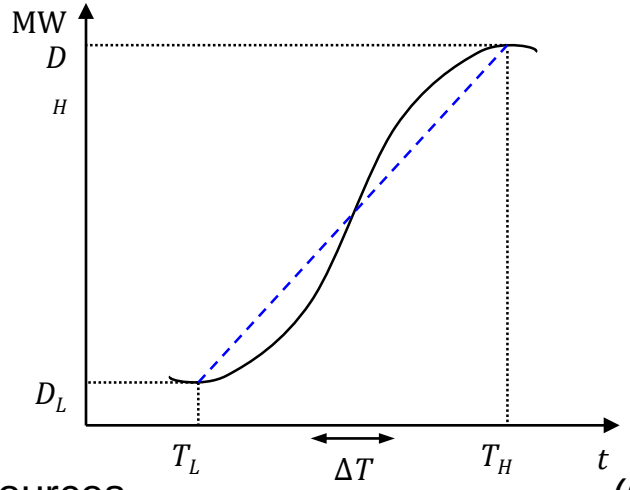
- Long ramping requirement may need to change slightly from current practices
  - Largest 3 hour net-load ramp +
  - Maximum (MSSC, 0.5*(3% load+3% generation))
- Fast ramping requirement could be set at the largest forecasted one hour net load ramping need
- Both products will be expected to address both net load ramping and uncertainty
- Modified categories would be subject to revised MOO

Two flexible capacity products can help CAISO address energy, ramping, and uncertainty needs

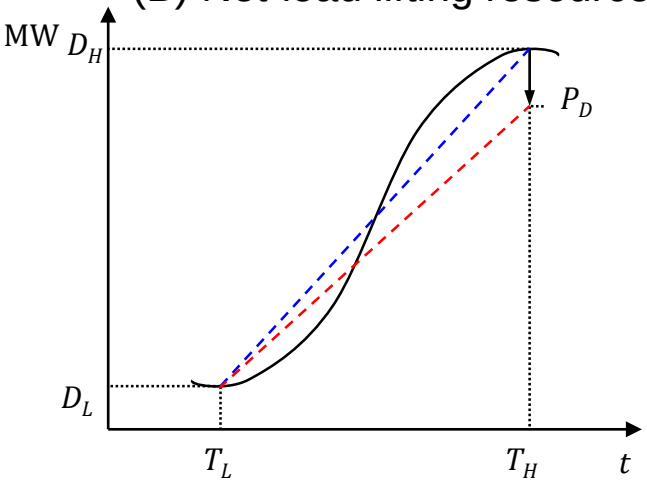
- Need to ensure adequate bid range so that CAISO will pass ramp sufficiency test for EIM
- Provide adequate ramping speed to address stressed ramping interval
- Procure resources with sufficient bids to clear both day-ahead and real-time flexible ramping product needs

Resources can provide Long Ramping flexible RA in several ways

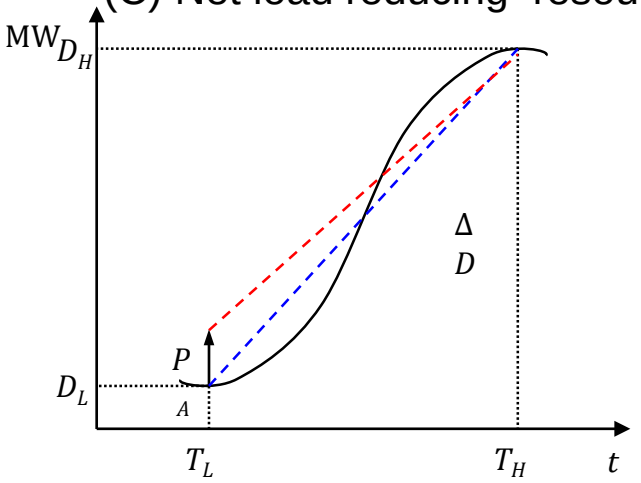
(A) Rampable resources



(B) Net-load lifting resources



(C) Net load reducing resources



Examples of each type of resource include:

- Ramping resources
  - Thermal
  - Hydro
- Net-load lifting
  - NGR charging
  - Load consumption resources
  - Curtailed Solar
- Net-load reducing
  - Demand response
  - NGR discharging

CAISO exploring how to simplify eligibility criteria for providing flexible capacity

- May be possible to eliminate most flexible RA capacity criteria
- Consider need to establish SIBR rules for flexible RA
  - Bids should contain sufficient bid range to support flexible RA showing
- Consider if NGR REM resources should no longer be eligible to provide Flexible RA
  - Not capable of providing energy needs

1:00 – 3:00PM

RA FRAMEWORK – RA SHOWINGS AND ASSESSMENTS

CAISO is not proposing major changes to current annual and monthly LSE RA showings and resource supply plans

- Annual demonstrations – October 31 of each year
- Monthly demonstrations – 45 days prior to the RA month
- CAISO will continue notifying both LSE SC and resource SC of any discrepancies between RA showings and supply plans

System and local capacity can be shown in terms of NQC for both RA showings and supply plans

- Single value designed to keep RA showings simple
- UCAP conversion for each resource would be published each year, allowing LSE to assess procurement levels
- CAISO could notify LSEs of NQC & UCAP deficiencies

	Non-Summer	Summer	Jan		Feb		Mar		Apr		May	
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LA Basin	97%	80%	497.97	481.56	497.97	481.56	497.97	481.56	497.97	481.56	497.97	481.56
LA Basin	93%	79%	495.00	462.37	495.00	462.37	495.00	462.37	495.00	462.37	495.00	462.37
Big Creek-Ventu	86%	83%	13.99	11.99	12.74	10.92	11.73	10.05	0.60	0.51	15.07	12.91
Sierra	78%	77%	0.36	0.28	0.48	0.37	0.46	0.36	0.35	0.27	0.30	0.23
Bay Area	88%	97%	23.40	20.48	23.40	20.48	23.40	20.48	23.40	20.48	23.40	20.48
Bay Area	84%	95%	23.50	19.79	23.50	19.79	23.50	19.79	23.50	19.79	23.50	19.79
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CAISO System	94%	91%	14.92	13.98	22.84	21.40	24.16	22.64	41.45	38.84	40.39	37.85
CAISO System	94%	98%	11.53	10.83	17.65	16.59	18.67	17.54	32.03	30.10	31.21	29.33

Note: All outage rates are illustrative only. They have not been calculated using an established formula

CAISO will assess only RA portfolio provided on showings to test adequacy under various load and net load conditions

- CAISO must assess how the shown RA fleet works collectively to meet system needs
  - Similar in concept to the collective deficiency test the CAISO conducts for local RA
  - Some resources may be more “effective” in ensuring reliable operations under different scenarios

CAISO can conduct an annual process to determine correct inputs to use in a portfolio assessment

- Portfolio assessment will require input assumptions including but not limited to:
  - Hourly load forecasts, wind and solar profiles, forecast hydro production, planned outages
- Exploring what additional inputs will be necessary
- CAISO will not include assumptions about non-RA resources or non-RA imports
  - These other non-RA resources represent energy substitutes in the day-ahead and real-time markets, but are not capacity resources in the RA space so CAISO believes they should not be included in a portfolio assessment

Portfolio assessment will provide greater certainty that a broad mix of resources can meet CAISO operational needs

- No additional action needed if portfolio is adequate
  - If not, then CAISO will notify market of deficiency and allow LSEs to provide additional capacity
  - If deficiency remains uncured, CAISO exploring additional authority for related backstop procurement
  - Costs should be allocated based on load ratio share to all LSEs
  - CAISO does not believe it would be feasible to determine that a specific LSE's RA portfolio contributed to the collective deficiency for purposes of cost allocation

CAISO is currently exploring three primary options to develop further for conducting RA portfolio analysis

- Market Optimization based model
- Integrated Optimal Outage Coordination tool
- Summer Assessment Plexos model
- Each option has pros and cons

Market optimization using RUC variant with data projected for days in a month with high flexibility needs

- All relevant market features and constraints are modeled
- An existing application requires only some changes and data setup leveraging existing D+2/D+3 reliability studies
- Customizable to address specific needs and requirements
- Integrated with the market systems allowing for save cases and auditing
- Can study multiple days, but not sequentially
- Limited stochastic capabilities without enhancements (i.e. requires input profiles and stochastic parameters)

Integrated Optimal Outage Coordination Model

- Functions similar to an extended DAM run for more deterministic approach
  - Assumptions made regarding input data for both energy bids and forecast for windows beyond DAM
- Evaluates generation and transmission outages for up to 21 days
- IOOC can run up to 7 days at a time in 1 hour
- Models all transmission constraints
- Not integrated with CIRA
- Assumes the generation bids based on the primary 7 day bid

CAISO Plexos model for seasonal assessments

- 35 WECC BAs and 91 Transmission path constraints
  - WECC wide, but not all constraints are included
- Capable of producing 2000 monthly scenarios in 40-60 hours using CA only profiles with 1995 to 2018 weather
- Commitment based model (DA unit commitment is done)
- Assesses System, Flexible, and AS capacity needs
- Can be modified to address ISO only RA fleet

3:00 – 3:30PM

PLANNED OUTAGE SUBSTITUTION

CAISO proposed two potential updates in Part I of the RA Enhancements straw proposal

- There was a significant amount of stakeholder feedback asking for changes to the current planned outage system
- Most stakeholders were interested in redesigning the current framework around the following principles:
  - Encourages resource owners to enter outages early
  - Will generally not have planned outages cancelled
  - Identifies specific replacement needs for a resource
  - Allows owners to self-select replacement capacity
  - Includes ISO system for procuring replacement capacity

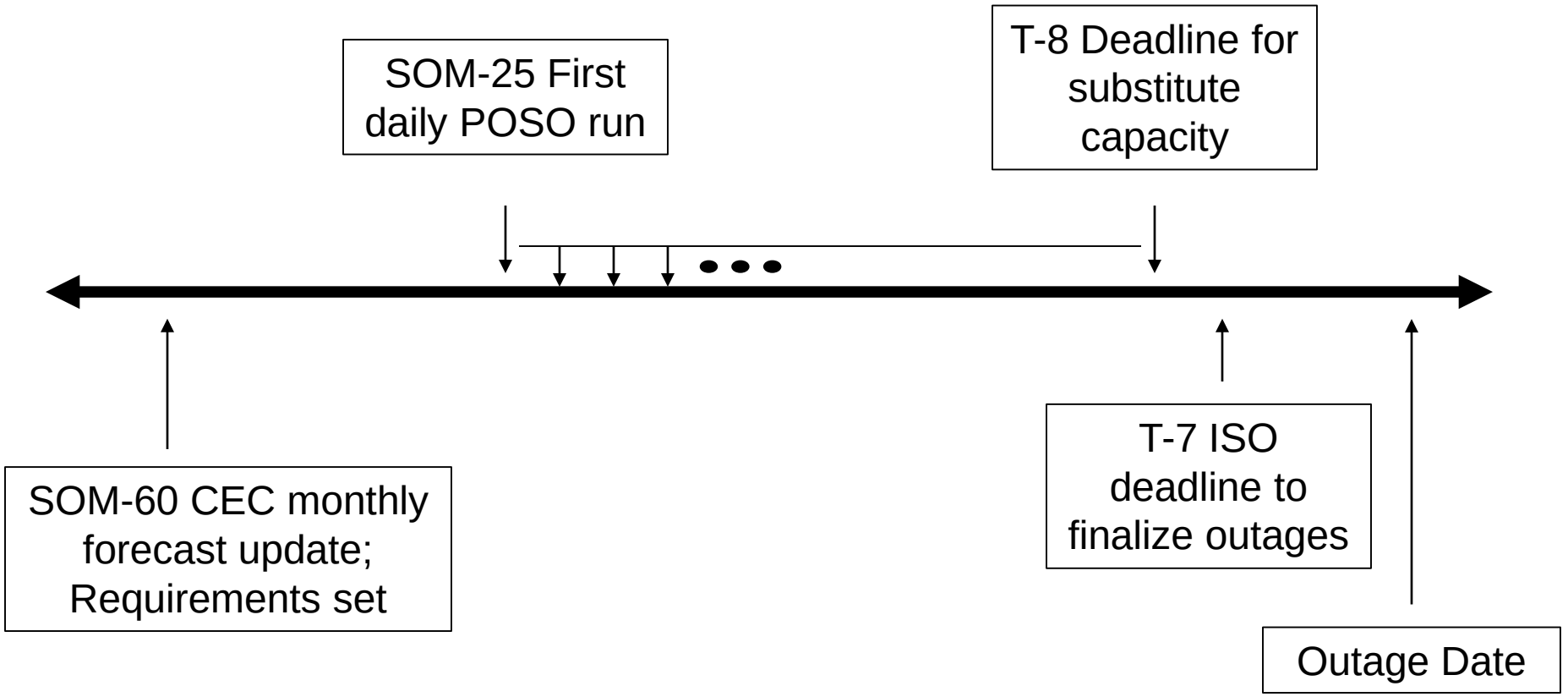
As the fleet becomes more diverse, CAISO will face challenges when resources want to take outages

- Fuel types are important to consider when contemplating substitute capacity for planned outages
  - i.e. if a nuclear resource is on outage for refueling, replacement capacity from wind resources may not be appropriate
- UCAP is an important consideration for substitute capacity

CAISO currently uses POSO for planned outages

- RA resources currently enter planned outages from the system into the CIRA POSO system
- Resources may submit outages between 25 and 8 days prior to the substitution obligation day
- POSO compares the total amount of operational RA Capacity to the total system requirement
  - Requirements are established by CEC forecasts and are updated 60 days prior to the start of the month
  - Considering outages, if less capacity is available than requirements, CAISO assigns substitution obligations

Current planned outage timeline



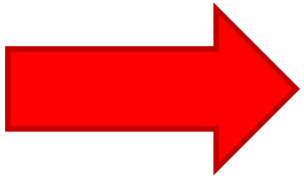
Updates to the planned outage process would follow the principles identified earlier

- Outages would be approved based on available UCAP and aggregate UCAP requirements
- Outages are approved in the order they are received
  - If operational RA capacity (includes outages and derates) exceeds requirements planned outages will be approved
- Local needs will continue to be observed
- CAISO will continue to retain the authority to review and potentially cancel planned outages for reliability needs

Add example for a substitute bulletin board product

Res	Type	MW	Offer
A	Gas	50	$6
B	Gas	50	$5
C	Wind	10	$2.5
D	Wind	10	$2.5
E	Wind	10	$2
F	Wind	10	$2
G	Gas	30	$2

Query:
Prices < $5



Query:
Prices < $5
Type = ‘Gas’

Feedback on the planned outage process can help shape the final product

- CAISO is considering a metrics with allowable tech type substitutions
  - i.e. considering if renewable resources should qualify as substitute capacity for gas fired generation
- CAISO may consider other models aside from the UCAP accounting methodology to determine acceptable substitution
- Should CAISO automatically match outage capacity with offered substitute capacity?
- Does this methodology ensure the correct incentives for a the planned outage process?

3:30 – 4:30PM

CPM AND BACKSTOP AUTHORITY

CAISO currently has authority to backstop for CPM for a number of scenarios

Existing CAISO CPM authority

1. System annual/monthly deficiency
2. Local annual/monthly deficiency
3. Local collective deficiency
4. Cumulative flexible annual/monthly deficiency
5. Significant event
6. Exceptional dispatch
7. Risk of retirement*

* Authority moving to RMR in the RMR-CPM enhancements initiative

CAISO would like to discuss two potential paths for new CPM authority for individual deficiencies

1. System UCAP test
   - System deficiencies would trigger CPM procurement and costs would be allocated to deficient LSEs
   - Should test include annual and monthly timeframes?
2. Capacity incentive mechanism (deficiency penalty)
   - LSEs that show below requirements would be charged a penalty price
   - Penalties distributed to LSEs that show above requirements
   - The capacity incentive mechanism would work in tandem with the system UCAP test

There could be benefits from implementing a capacity incentive mechanism (deficiency penalty)

- Mechanism aligns with RA Enhancement design principle to ***incentivize showings*** for as much capacity as possible
- ***Will avoid "over-procurement"*** of resources through a backstop procurement process
- A system UCAP and capacity incentive mechanism ***prevents leaning*** between LSEs
- Mechanism would be ***self funded*** and settled in the month-ahead and year-ahead time frame

Examples of capacity incentive mechanism concept

LSE	Req.	Shown	Penalty ($1/MW)
1	100 MW	110 MW	$3
2	100 MW	110 MW	$3
3	100 MW	94 MW	-$6

- Example 1: shows no system deficiency, but 6 MW of leaning from LSE 3

LSE	Req.	Shown	Penalty ($1/MW)
1	100 MW	90 MW	-$2
2	100 MW	85 MW	-$3
3	100 MW	105 MW	$5

- Example 2: shows a system deficiency of 20 MW, which is cured through CPM, and an additional deficiency of 5 MW of leaning from LSE 1 and 2

Expand CPM authority to procure for deficiencies identified in the system portfolio assessment

- It is essential that CAISO has resources available to reliably operate the grid
  - May not align with UCAP analysis
- CAISO may make backstop designations to ensure that we can meet aggregate energy needs for the system
  - This analysis will not focus only on peak needs
- Details of portfolio analysis proposal continue to be discussed
- CAISO will continue to publish study information behind CPM designations made as a result of this authority

4:30PM

END DAY 1

RA ENHANCEMENTS WORK GROUP - DAY 2

Agenda – Day 2

Day 2 – April 9		
Time	**Topic**	**Presenter**
9:30 – 9:35AM	Welcome and introduction	Jody Cross
9:35 – 11:00AM	Rules for Import RA	Chris Devon
11:00AM – 12:00PM	Maximum Import Capability	Chris Devon
12:00 – 1:00PM	Lunch	
1:00 – 2:00PM	Must Offer Obligations review	Chris Devon
2:00 – 2:45PM	Local capacity assessments with availability-limited resources	Lauren Carr & Catalin Micsa
2:45 – 3:25PM	Slow demand response	Lauren Carr
3:25 – 3:30PM	Next steps and conclusion	Jody Cross

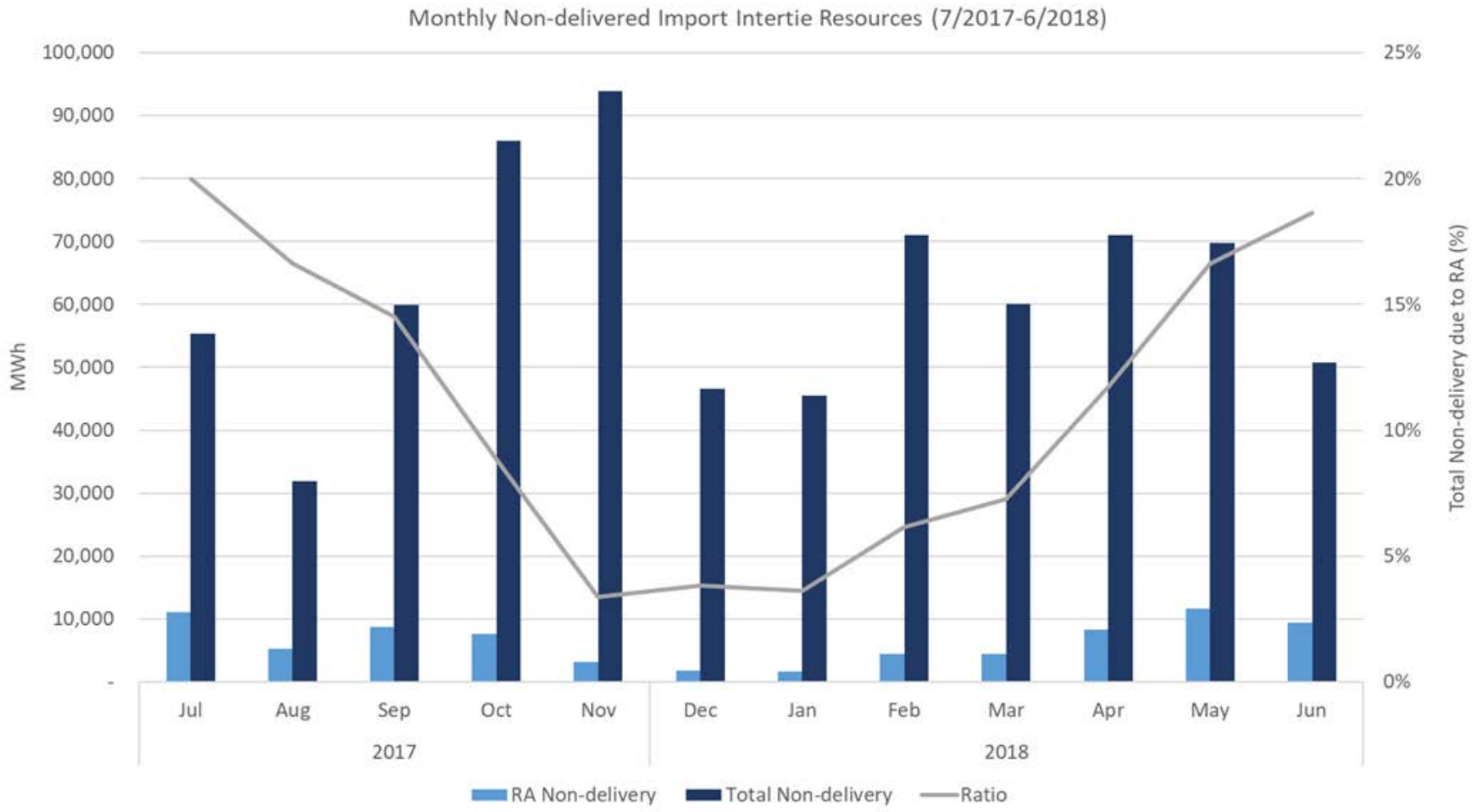
9:35 – 11:00AM

RULES FOR IMPORT RA

Potential concerns related to current provisions

- CAISO must ensure import RA resources are available to provide required services for reliability
- If import RA is potentially double counted or speculative supply it represents a reliability concern –
  1. Import RA provisions should ensure that all import resources have the physical capacity to be able to deliver when called upon
  2. No certainty these resources can be recalled during emergencies or system-wide shortages when critically needed
- Initial analysis suggests that non-delivery of import RA may be a valid concern even during non-emergency/shortage timeframes

Data shows undelivered import RA accounts for up to 20% of undelivered intertie resources (HASP)



Current provisions may allow for speculative supply to meet RA requirements or imports to be double counted

- What is “speculative supply” in the context of import RA?
  - Non-Resource Specific RA import resource providing energy bids that are not supported by physical supply and/or a firm transmission reservation
  - May result in the failure to deliver awarded energy if the scheduling coordinator is unable to locate supply in real-time
- Speculative supply and double counting of import RA resources also raises a concern of displacement of internal RA resources that would otherwise be procured

CAISO relies on RA Must Offer Obligations to ensure adequate bids in CAISO's energy markets

- When any RA resources, including imports, are awarded CAISO is relying on delivery of that energy
  - CAISO depends on intertie supply just as much as internal generation if intertie schedules clear the market
- Once intertie schedules clear HASP, the transmission is reserved for that schedule and cannot be used by another intertie resource

Current provisions do not allow CAISO visibility into type of bilateral agreement supporting an RA import

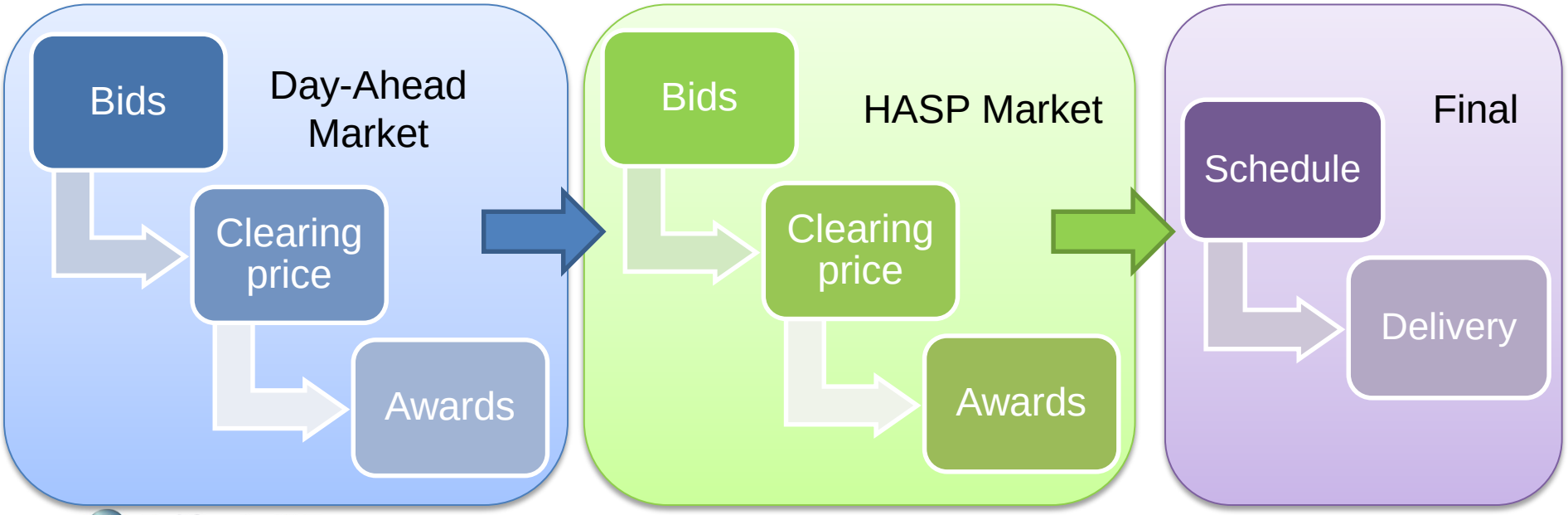
- NRS-RA import resource category does not require sellers to indicate what type of contractual obligation supports their showing/transaction
- WSPP Agreement – Three basic products are set forth in WSPP Service Schedules, Firm, Non-Firm, Energy Only:
  - WSPP Schedule C (“Firm Capacity/Energy Sale or Exchange Service”)
  - WSPP Schedule B (“Unit Commitment Service”)
  - WSPP Schedule A (“Economy Energy Service”)
- No CAISO requirements to specify, just assumed firm – concerned that may not always be the case

Questions about reliability of non-specific external resources versus resource specific import RA resources

- Some stakeholders have stated they believe that import RA sourced from a Non-Resource Specific RA resource is actually more reliable than a resource specific import
  - Statement based on assumption that there is an ability to rely on a pool of resources rather than one that may go on outage
- CAISO is concerned with this concept because these NRS-RA imports may not be backed by firm obligations and physical resources/reserves
  - No certainty these resources can be relied on when critically needed

Exploring additional data analysis to inform potential modifications

- Existing analysis suggests there is a problem of RA resources not delivering awarded energy on the interties
- Considering objectives of additional analysis on DA and RT bids, awards, and delivery behavior



Potential changes

- Does specification of import RA resource sources help address firmness and double counting concerns?
  - Would it also be necessary to require an attestation that the import RA capacity is not and will not be sold to a third party?
- Would it help to add a requirement to specify the firmness of agreement backing transaction to qualify as import RA?

Potential changes (continued)

- Would real-time bidding requirement for all MWs of import RA shown (not just MWs awarded in IFM) address speculative supply concerns and improve intertie non-delivery from RA resources?
- Is expansion of import RA MOO to 24x7 to provide comparability with internal RA useful to address issues?
- Should CAISO consider requiring monthly firm transmission reservation to qualify for import RA?

Potential modifications need to consider interaction with EIM sufficiency tests and E-Tag related issues

- Timing of the EIM Resource Sufficiency Evaluation and E-Tagging requirements
  - Resource sufficiency evaluation occurs at T-75, T-55, and T-40
  - E-Tags are currently required by T-20 – With IDS proposal (Fall 2020 implementation), timeline will move to T-40
  - There is no intertie bidding in EIM

11:00AM – 12:00PM

MAXIMUM IMPORT CAPABILITY

Import Capability background

- Each year, CAISO establishes maximum import capability (MIC) values for import paths
- Once MIC values are calculated the capacity is allocated to CAISO LSEs for RA purposes through 13 step process
- MIC values for each intertie are calculated annually for a one-year term and a 13-step process is used to allocate MIC to LSEs
  - MIC allocations are not assigned directly to external resources
  - LSEs choose the portfolio of imported resources they wish to elect for utilization of their MIC allocations

Import Capability background (continued)

- MIC calculation determines the maximum size/magnitude of simultaneous import capability
- Does not guarantee that all MIC will be used for RA import purposes in all months
- RA showings designating import MWs to meet RA obligations across interties are:
  - Required to be used in conjunction with a MIC allocation
  - **Considered a firm monthly commitment to offer those MWs in CAISO markets at the specified interconnection point**

MIC calculation background

- CAISO calculates MIC MW values based on a historic methodology
  - Utilizes actual schedules into CAISO's BAA for highest imports obtained simultaneously during peak system load hours over last two years
- Sample hours are selected by choosing two hours in each year:
  - On different days within the same year, with highest total import level when peak load was at least 90% of annual system peak load
- CAISO believes current calculation method is appropriate

Forward looking MIC studied and planned for state and federal policy goals

- CAISO also performs a power flow study in the CAISO's TPP to test MIC values to ensure each intertie's MIC can accommodate all state and federal policy goals
- If any intertie is found deficient, the CAISO establishes a forward looking MIC for that intertie
  - CAISO plans the system to accommodate this level of MIC in the TPP and RA

Historic MIC data

MIC / RA Year	2014	2015	2016	2017	2018	2019
Maximum Import Capability	17,486	16,228	15,755	15,221	14,852	15,208
ETC and TOR held by non-CAISO LSEs	4,090	4,090	4,090	4,211	4,511	5,015
Available Import Capability for CAISO Resource Adequacy purposes	13,396	12,138	11,665	11,310	10,341	10,193
Total Pre-RA Import Commitments & ETC	6,047	5,426	5,256	4,736	4,628	4,306
Remaining Import Capability - less all ETC and TOR	**7,348**	**6,712**	**6,409**	**6,574**	**5,713**	**5,888**

All values in MWs

Import Capability allocation process review

- After calculating total MIC, Existing Transmission Contracts (ETC) and Transmission Ownership Rights (TOR) amounts held by LSEs are protected for and removed from MIC figure
  - Determines remaining MIC available for allocation to LSEs
  - Remaining MIC referred to as Available Import Capability
- Process for allocating this MIC to LSEs is referred to as the Available Import Capability Assignment process
  - 13 step allocation process detailed in the CAISO tariff, Section 40.4.6.2.1
  - Process and schedule further detail provided in straw proposal part 2 appendix: section 8.4 and section 8.5

Available Import Capability Assignment process steps

	Process description
Step 1	Determine Maximum Import Capability (MIC)
	- Total ETC
	- Total ETC for non-ISO BAA Loads
Step 2	Available Import Capability
	- Total Import Capability to be shared
Step 3	Existing Contract Import Capability (ETC inside loads)
Step 4	Total Pre-RA Import Commitments & ETC
	- Remaining Import Capability after Step 4
Step 5	Allocate Remaining Import Capability by Load Share Ratio
Step 6	CAISO posts Assigned and Unassigned Capability per Steps 1-5
Step 7	CAISO notifies SCs of LSE Assignments
Step 8	Transfer [Trading] of Import Capability among LSEs or Market Participants
Step 9	Initial SC requests to ISO to Assign Remaining Import Capability by Intertie
Step 10	CAISO notifies SCs of LSE Assignments & posts unassigned Available Import Capability
Step 11	Secondary SC Request to ISO to Assign Remaining Import Capability by Intertie
Step 12	CAISO Notifies SCs of LSE Assignments & posts unassigned Available Import Capability
Step 13	SCs may submit requests for Balance of Year Unassigned Available Import Capability

CAISO received stakeholder feedback on challenges presented by Import Capability Assignment process

- CAISO is open to reviewing current approach to determine if any enhancements could improve use and efficiency of Available Import Capability allocated to LSEs
  - Exploring how to modify process to improve fairness, efficiency, and ease of understanding and implementation
- Concerns about possibility some LSEs may not fully utilize allocated MIC on each intertie during all RA months
  - Some LSEs may not make unused MIC available for others to buy or trade – is this acceptable?
- Other areas for improvement?

CAISO is considering potential enhancements to import capability allocation process

- Considering need for modifications to allow release and reallocation, or transfer of unused import capability after initial monthly RA showings
- Incorporate an auction or other market based mechanism
- Enhance the provisions for reassignment, trading, or other forms of sales of import capability among LSEs

Consider modifications for release and reallocation of unused import capability after initial monthly RA showings

- Some stakeholders have suggested intertie capacity not used to support an RA contract within a respective RA procurement timeframe should be released and made available to support other import RA contracts
  - Could possibly address hoarding concerns
  - Timing issues to consider with showings and assessments
- CAISO hopes to maintain fundamental principle:
  - Entities funding embedded costs of CAISO interties should be given first opportunity to use that intertie capacity to support an RA contract in each RA procurement timeframe

Incorporate an auction or other market based mechanism into the Available Import Capability Assignment process

- Provide alternative or additional opportunities for procurement of import capability by LSEs
  - Some LSEs may need to secure more than their pro rata load ratio share of MIC on any given branch group/intertie to support a particular RA contract
- Alternative mechanism could allow for more efficient procurement of import capability by those LSEs that place a greater value on Import Capability for various reasons

Incorporate an auction or other market based mechanism (continued)

- Allocate only a portion of remaining Available Import Capability through a mechanism, similar to current process
- Retain a portion of the remaining Available Import Capability to be auctioned or otherwise procured by LSEs
  - Additional auction revenues could potentially be used to reduce the TAC Transmission Revenue Requirement
- Market based clearing mechanism for trading of import capability could address concerns regarding fairness

Enhance provisions for reassignment, trading, or sales of Import Capability among LSEs

- May need to provide alternative to current bilateral transfer process to better facilitate transfer of import capability among LSEs and improve efficient utilization of import capability
- Market based trading or other form of market platform for MIC transfers may provide greater efficiency and transparency
- CAISO seeks feedback on potential options for improvements to import capability allocation process

1:00– 2:00PM

MUST OFFER OBLIGATIONS REVIEW

CAISO received stakeholder feedback on must offer obligations and bid insertion rules

- CAISO proposes MOO be aligned with NQC
  - Stakeholders provided mixed feedback on the MOO proposal
  - Several stakeholders expressed concern over setting the MOO at the NQC and the RA value at the UCAP
- CAISO provided two options on bid insertion rules for stakeholder consideration
  - One party preferred option one, one party preferred status quo until DAME products are developed
  - Stakeholders generally supportive of reducing reliance on RAAIM
  - Some stakeholders prefer CAISO maintain bid insertion exception for certain technology types (e.g., hydro, PDR)

Resources shown for RA capacity will continue to have a must offer obligation

- A resource's must offer obligations must be consistent with its NQC value
  - For example: A resource shown for 100 MW of NQC with a 20% forced outage rate providing 80 MW of UCAP, would have a MOO to bid 100 MW of capacity into the CAISO markets
  - Bidding rule required to ensure the underlying UCAP availability is met
- Allows CAISO to simplify forced outage substitution
  - The RA fleet effectively provides its substitute capacity upfront
  - CAISO is exploring eliminating the existing RA forced outage substitution rules and reducing or eliminating RAAIM

Example: System RA Must Offer Obligations

- Assume 4 resources all sell RA capacity, 2 sell full UCAP amount, 2 sell partial RA value below full UCAP

Resource	NQC (MW)	Forced Outage Rate	Calculation (NQC * 1 – Forced Outage Rate)	UCAP (MW)	RA Showing (MW)	System RA MOO (MW)
1	100	5%	100 MW * (1 - 0.05)	95	100 ICAP (95 UCAP)	100
2	100	10%	100 MW * (1 - 0.1)	90	100 ICAP (90 UCAP)	100
3	100	15%	100 MW * (1 - 0.15)	85	50 ICAP (42.5 UCAP)	50
4	100	10%	100 MW * (1 - 0.1)	90	75 ICAP (67.5 UCAP)	75
Total	400	-	-	3600	325 MW ICAP Shown	325 MW MOO

CAISO will perform a comprehensive review of must offer obligations for all capacity resource types

- Current must offer obligations based on technology type
- CAISO is considering basing must offer obligations on operational characteristics rather than tech types
  - Potential operational characteristics include:
    - Start-up time
    - Cycle time (start-up time plus minimum run time)
    - Minimum down time
    - Use-limited status
  - Would require validation of unit capabilities to ensure resource receives appropriate MOO

CAISO seeks stakeholder feedback on changing the basis MOO rules from tech type to operational characteristics

- What operational characteristics should be considered to base must offer obligations?
- What are some potential challenges with transitioning must offer obligations from tech type to operational characteristics?
  - For example, are there specific tech types that would not align with MOOs based on operational characteristics?

CAISO is considering two potential options for revising bid insertion rules

1. Apply bid insertion to all non-use-limited resources and use-limited resources with an opportunity cost per CCE3 policy
2. No bid insertion for any resource, but will need to either;
   a) Apply RAAIM to RA resources
   b) Treat all intervals without bids as a forced outage for purposes of UCAP calculation

- CAISO prefers option 1 because it reduces complexity and does not create a disincentive to show RA capacity

2:00– 2:45PM

LOCAL CAPACITY ASSESSMENTS WITH AVAILABILITY-LIMITED RESOURCES

CAISO believes it is important to consider availability-limitations in local capacity areas

- Currently, availability-limited resources must have a minimum of four-hour duration to qualify as RA
- Moorpark study showed the minimum duration requirement may lead to procurement that is sufficient in meeting peak capacity RA requirements but insufficient in meeting energy needs in all hours of the day
- As a first step CAISO will publish hourly load shapes and available resource data to inform procurement aligned with energy needs in each local capacity area and sub-area

The CAISO received stakeholder comments on local assessments with availability limited resources

- Most stakeholders support CAISO the addition of hourly load and resource data into the local capacity study
- Some stakeholders support assessment but oppose disqualification, blunt cap, or backstopping
- Some stakeholders asked CAISO to provide a list of availability limited resources and their energy capabilities
  - CAISO does not plan to provide this information to stakeholders but is willing to explore more targeted procurement guidelines up front
- Several stakeholders asked CAISO to explain how backstop and cost allocation of backstop procurement will change
  - CAISO proposes to expand its backstop authority for energy needs in local areas and will provide more detail in subsequent iterations of the proposal

Local Capacity Requirement (LCR) Area Types and Profiles

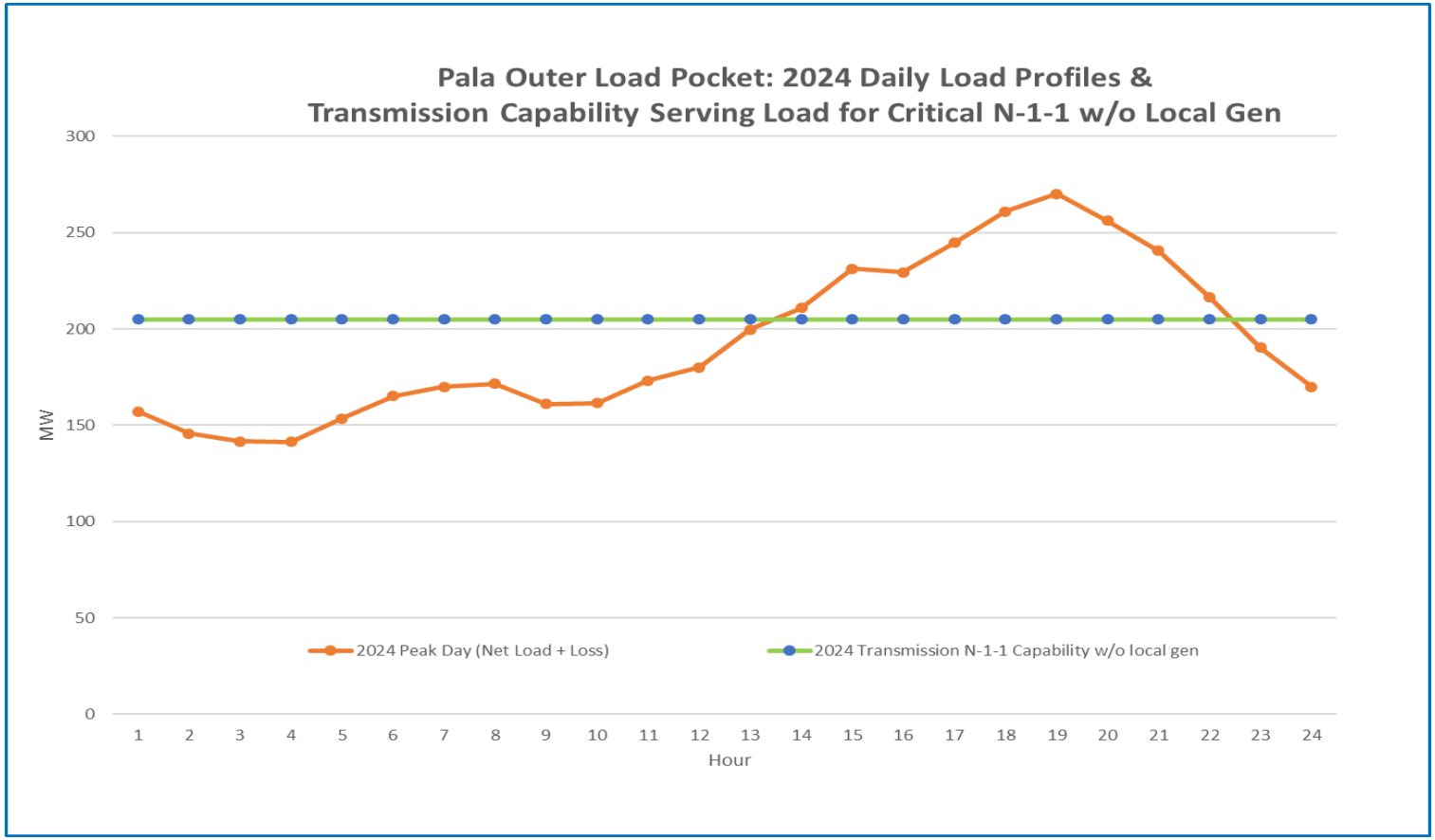
Catalin Micsa

Senior Advisor Regional Transmission Engineer

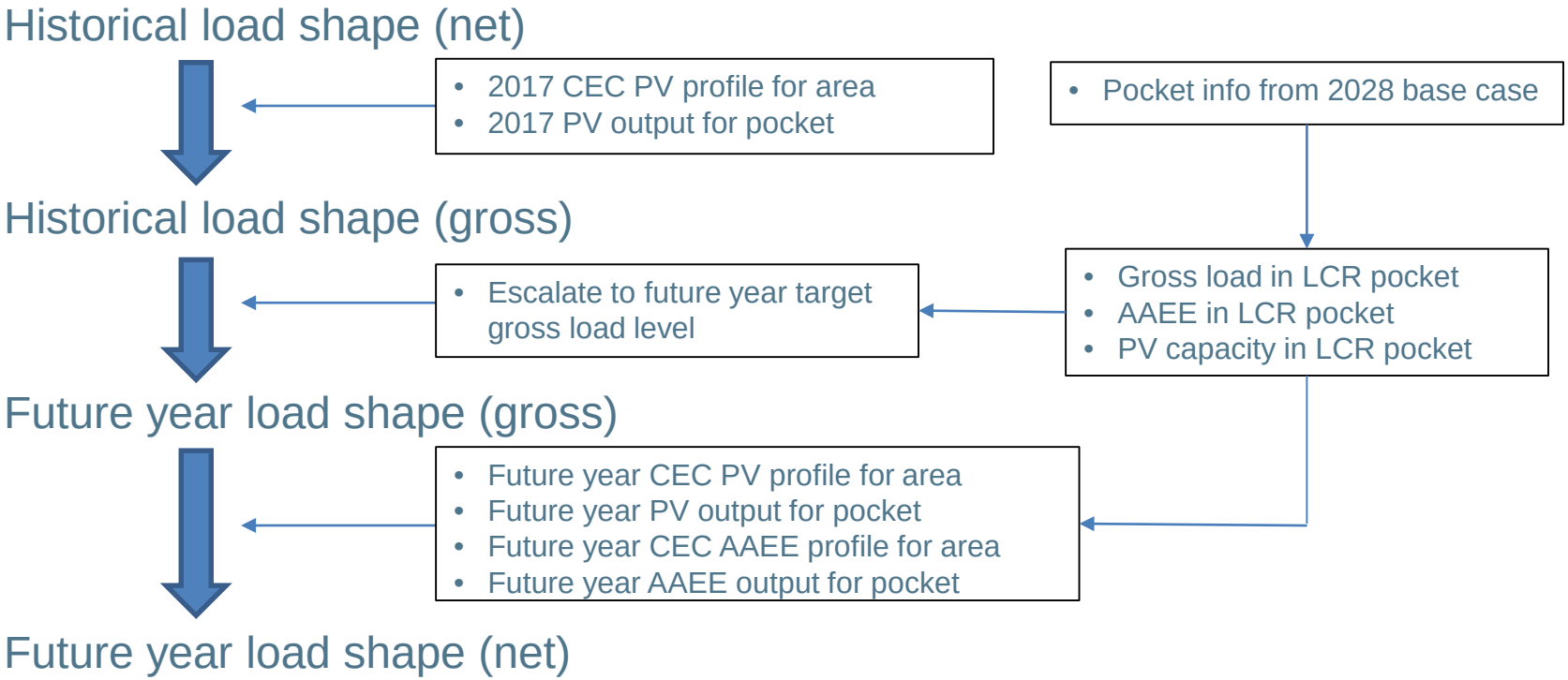
Purpose of providing area profiles

- Profiles are provided to:
  - Guide procurement of energy limited resources including preferred resources
  - Provide awareness of energy needs during the peak day as well as year long availability of resources required to meet local reliability
- In the TPP process the ISO has and will explore and assess alternatives – conventional transmission and preferred resources – to reduce requirements of the existing local capacity areas and subareas by looking at both capacity and energy reductions

Sample Radial or Multi-Source Area Load Profile

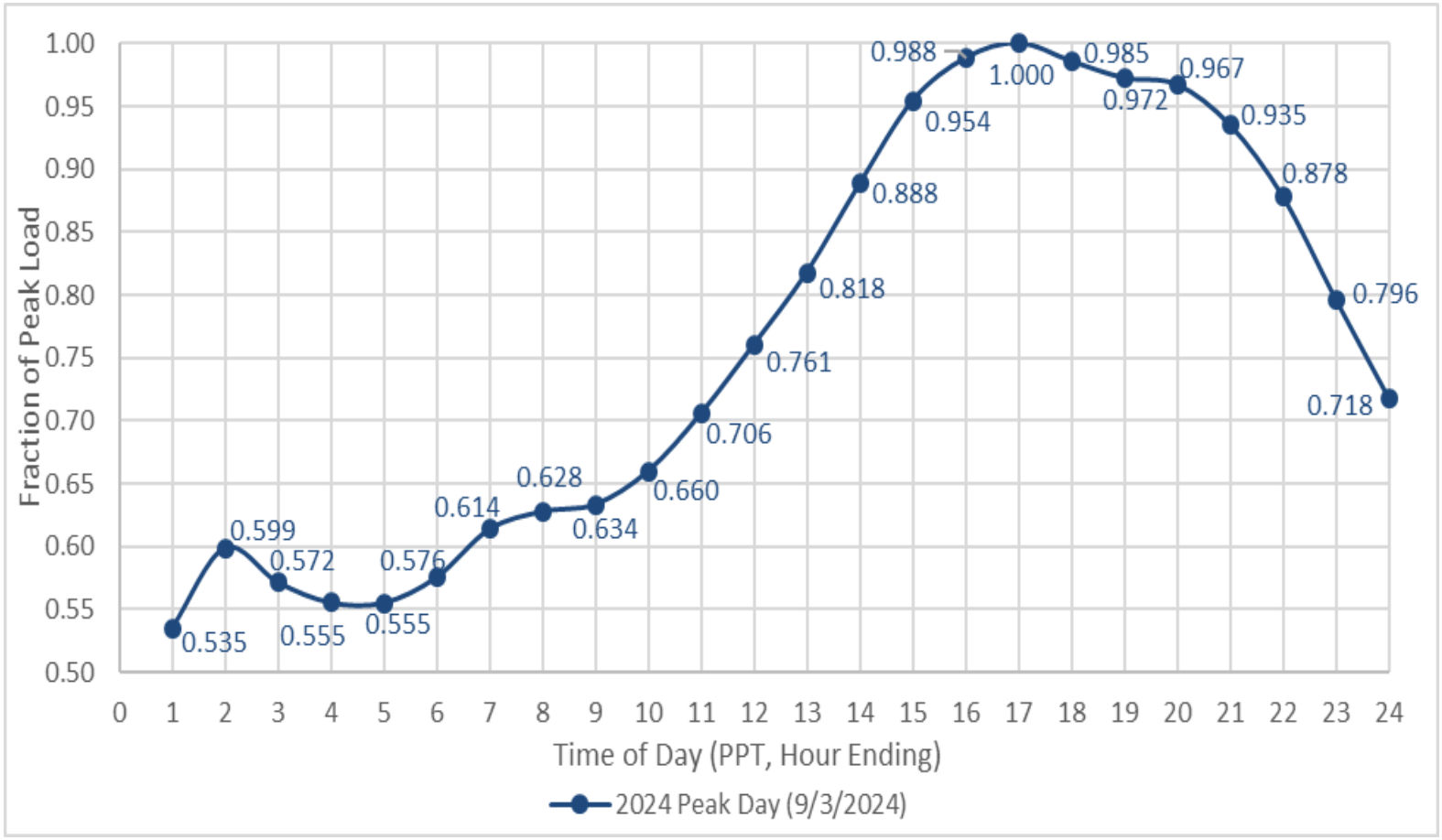


Load Profile and Escalation Process for Defined LCR Areas and Sub-areas)



Exception: Certain local areas have the future year load shape (net) derived directly from the CEC forecast. (Example: San Diego, LA Basin)

Sample CEC forecast Area Load Profile



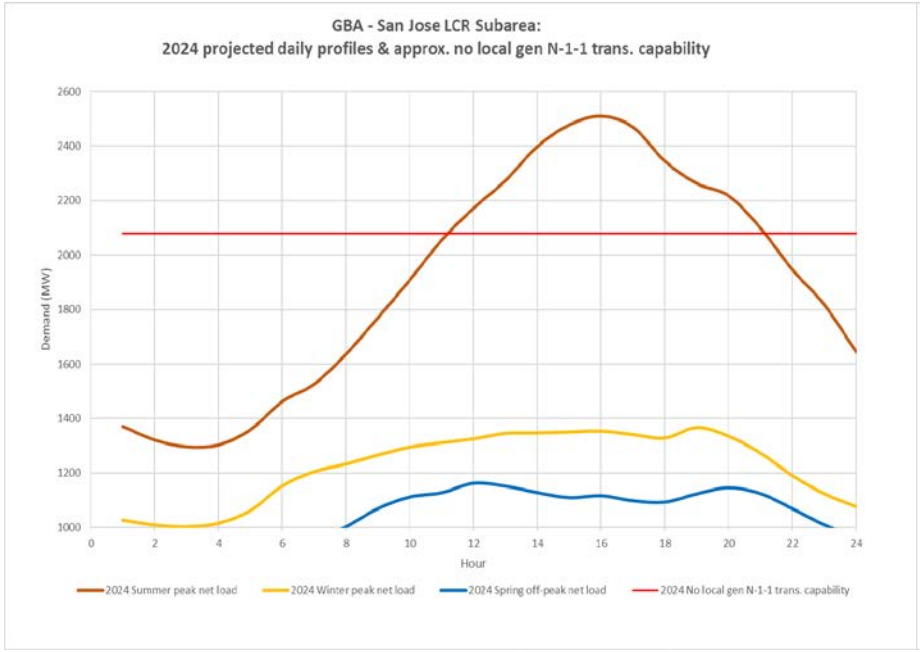
N-1-1 No Generation Transmission Capability Approximation*

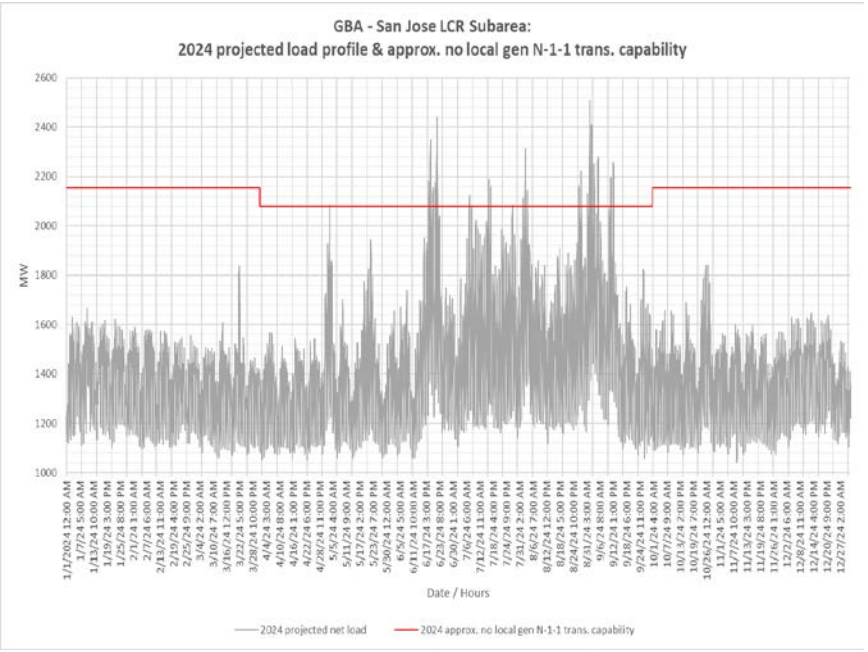
- Option 1:
  - Get distribution factor for worst constraint (DC approximation)
  - Turn off all resources
  - Reduce the most effective load(s) until loading gets back to 100%
  - Subtract load dropped from total load in the area or sub-area
- Option 2:
  - Run a study with all resources off-line (all contingencies)
  - Gradually reduce the load (overall) or most effective until no problems are found
- Option 3:
  - Subtract the LCR need from the total load in the area or sub-area
- Option 4:
  - Other

Types of LCR areas/sub-areas and profiles

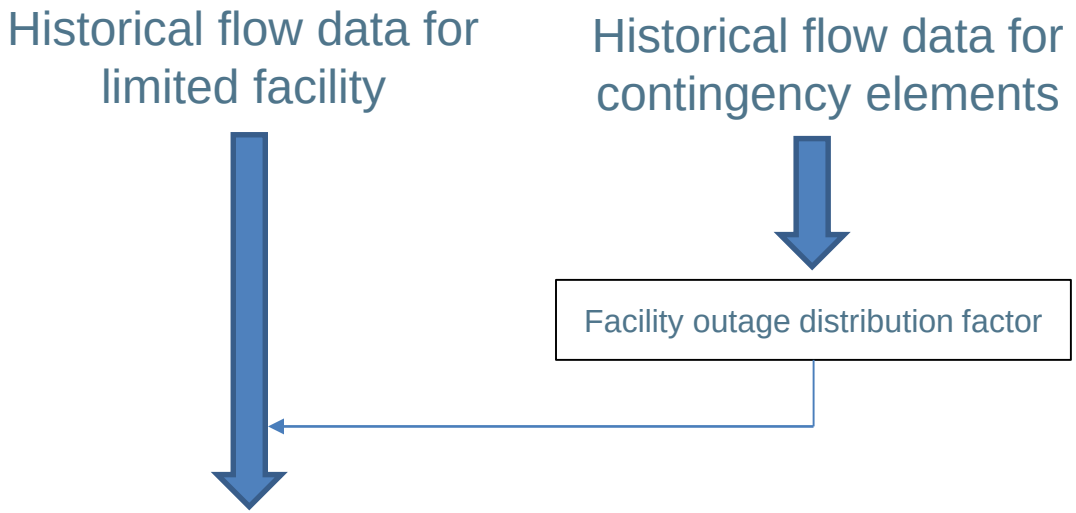
Area Type	Profiles
Single source pocket (radial)	• 2028 hourly (8760) area load profile • Seasonal daily load profile
Multi source pocket	
Flow-through	• Historical hourly (8760) flow profile • Historical seasonal daily flow profile • 2028 seasonal daily load profile for the most effective load pocket

Sample Radial or Multi-Source Area Load Profiles



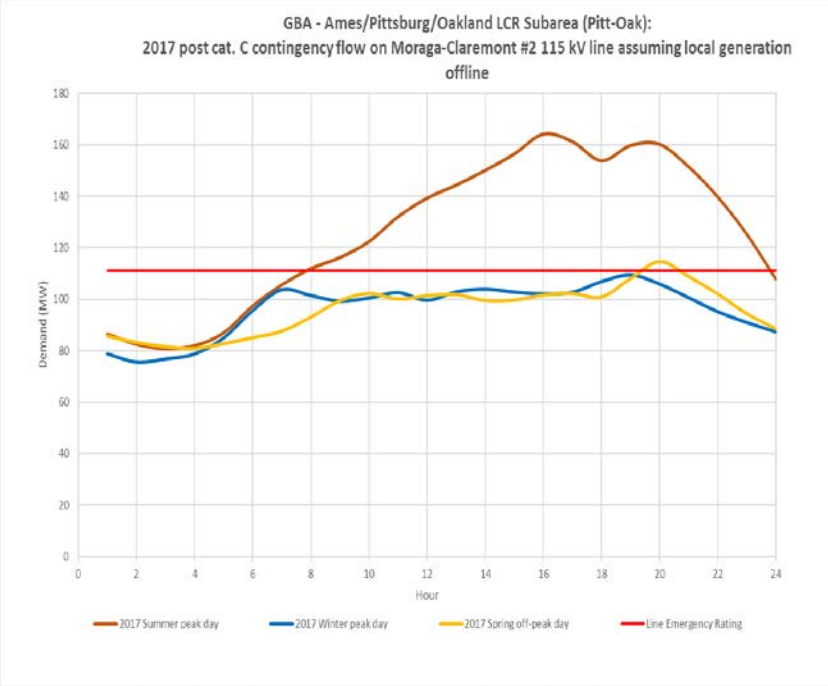


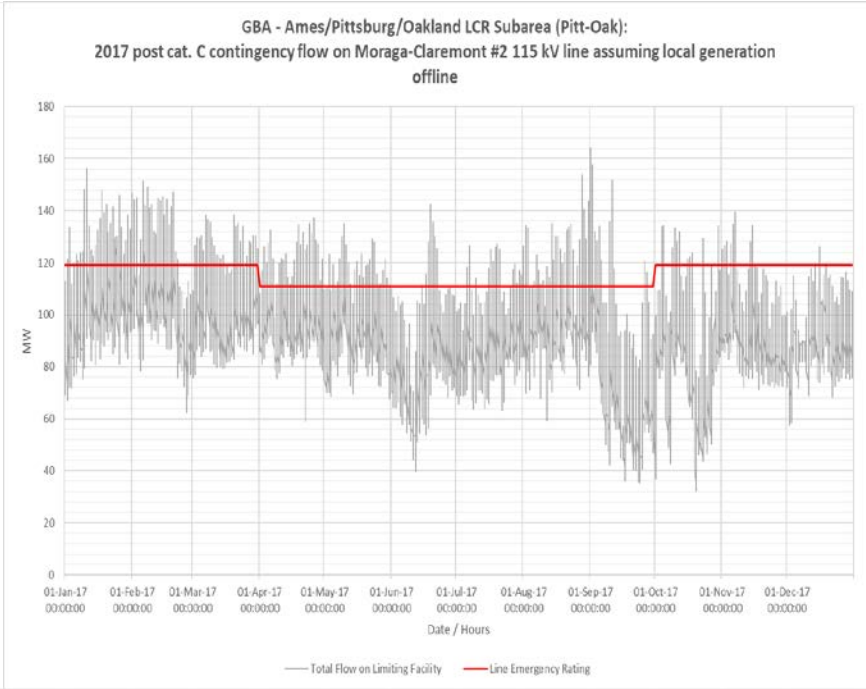
Flow Profile for Flow-Through Type LCR Area



- Post N-1-1 contingency flow shape for limited facility
- Rating of limited facility is also provided to compare line capacity against post contingency flow

Sample Flow-through Profiles





CAISO will model load and resource dispatch for each hour in the power flow model to confirm dispatch meets local capacity needs

- CAISO may make additional CPM procurement if power flow shows deficiency in meeting energy needs in a local area
- To minimize backstop procurement, what requirements should be considered to ensure LSEs have diverse portfolios and don't over rely on availability-limited resources? Potential options include:
  - Setting a maximum amount of four-hour resources in each local area
  - Maximum cumulative capacity (MCC) style "buckets" for resources with different durations

2:45– 3:25PM

SLOW DEMAND RESPONSE

Slow DR is an availability-limited resource not capable of responding to CAISO dispatches within 20 minutes

- Per NERC standards and ISO tariff section 40.3.1.1(1), the CAISO must secure the system within 30 minutes of a contingency
- This allows roughly 10 minutes for CAISO operators to assess system conditions and 20 minutes for resource dispatch and response
- This required response time impacts “slow” DR resources because they cannot respond with 20 minute notification and have availability limitations that prevent frequent dispatch

To meet local RA needs, resources must either…

1. Be capable of responding quickly enough such that the CAISO can rebalance the system within 30 minutes of a contingency event, or;
2. Have sufficient availability such that the resource can be dispatched frequently on a pre-contingency basis (before a potential contingency event occurs)
   - CAISO planning studies indicate current levels of slow DR generally have sufficient availability to count for local RA
     - Excludes limited run-time duration

CAISO will develop tools to dispatch slow DR on a pre-contingency basis so it can help meet local area reliability needs

- Slow DR resources would be dispatched before a potential contingency occurs as a preventive measure
- Pre-contingency dispatch would not be cancelled if a contingency does not occur
- Pre-contingency dispatch will result in more frequent dispatch of slow DR
  - CAISO cannot provide estimates on how often slow DR would be dispatched at this time
  - Future dispatch depends on many factors that are difficult to determine including; resources available in local area at a given time, individual local area load profiles, actual contingency events, etc.

Interim approach

- **DAM:** Existing process, no change
  - CAISO will continue to run MOC
  - MOC eligible resources = Long start resources
  - MOC requirement = load – import capability – short start capacity
- **Post-DAM:** if MOC is not sufficient to commit enough resources to meet local need, ED slow DR
  - Create day-ahead dispatch for DR (RT does not undo/modify)
  - Post-DA ED eligible resources = Slow DR
  - Post-DA ED requirement = MOC insufficiency
- Slow DR response time must align with the day-ahead market timing (roughly 18 hours notice)

Long term approach

- ESDER 3 bidding options provide lead time slow DR requires in the real-time:
  - Hourly block: 52.5 minute notification time
  - 15-minute block: 22.5 minute notification time
  - Transition post-DA ED to real-time market time horizon
- When CME constraints are enforced, the market will dispatch slow DR for energy when economic over reserving corrective capacity on another resource

Local RA eligibility

- Slow PDR must be dispatchable in real-time market time horizons once ESDER bidding options are implemented
- Slow RDRR will not count for local RA
  - This is because it cannot be dispatched prior to the ISO declaring a warning or emergency
  - If a portion of an RDRR resource is fast responding and wants to count for local RA, the portion of the resource that is fast should be under its own resource ID

3:30PM

NEXT STEPS