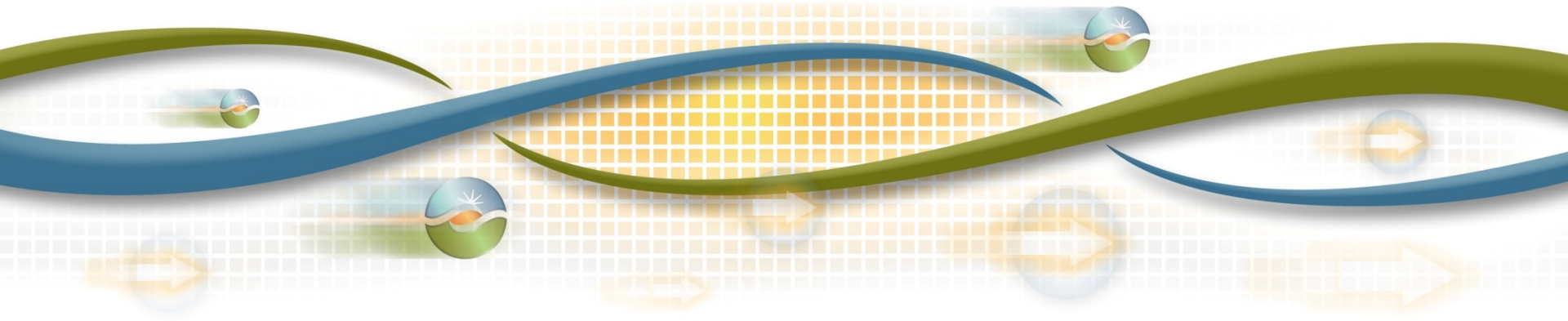




Flexible Resource Adequacy Criteria and Must Offer Obligation – Phase 2 (FRACMOO2)

Supplemental Issue Paper

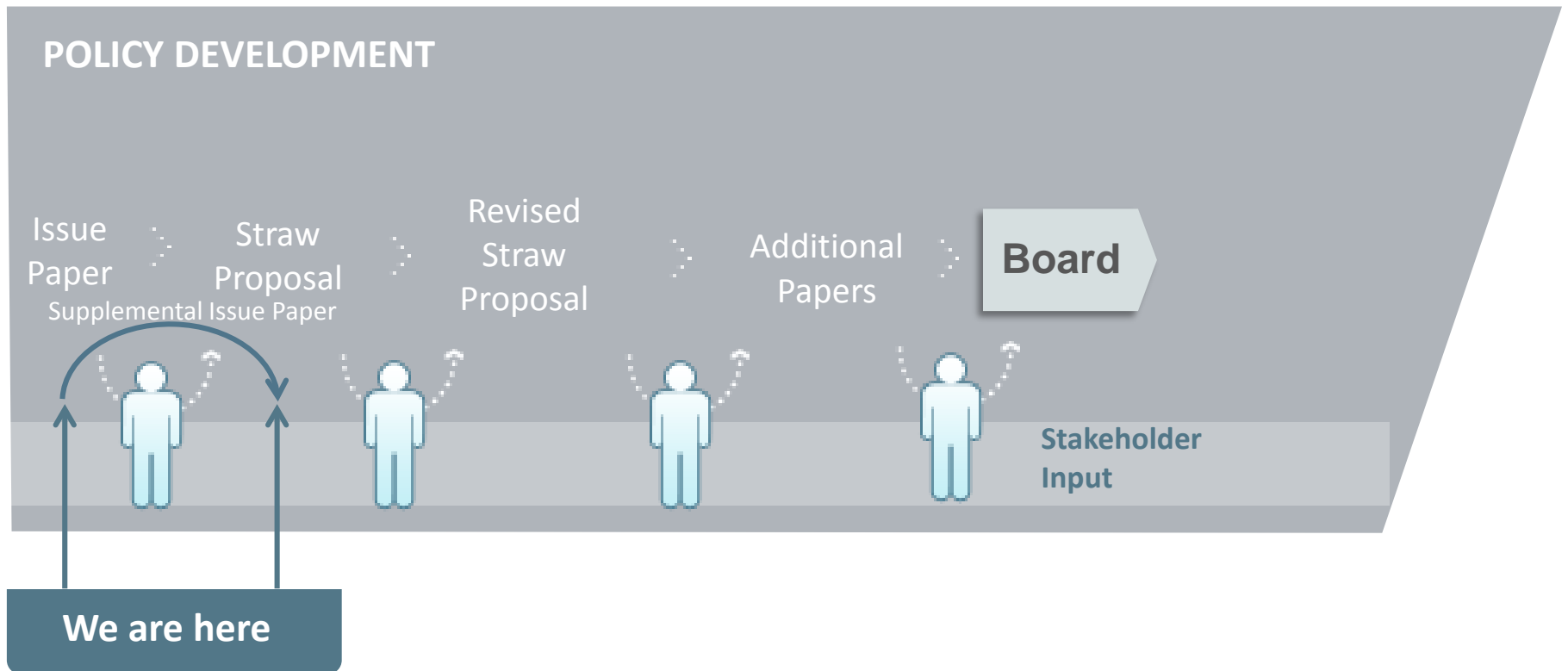
Stakeholder web conference
December 9, 2016
9:00 – 1:00 (Pacific Time)



Agenda

Time	Agenda Item	Speaker
9:00-9:10	Introduction, Stakeholder Process	Tom Cuccia
9:10-12:50	Discussion of Supplemental Issue Paper	Karl Meeusen
12:50-1:00	Next Steps	Tom Cuccia

ISO Stakeholder Initiative Process



Stakeholder process schedule

Step	Date	Event
Issue Paper	June 26, 2015	Issue Paper posted
	July 2, 2015	Stakeholder meeting
	July 10, 2015	Comments due
Straw Proposal*	December 11, 2015	Straw proposal posted
	December 21, 2015	Stakeholder meeting
	January 6, 2016	Comments due
Supplemental Issue Paper	November 9, 2016	Supplemental issue paper posted
	December 9, 2016	Stakeholder meeting
	December 19, 2016	Comments due
Revised Straw Proposal**	February 2017	Revised straw proposal posted
	Early March	Stakeholder meeting
	Late March	Comments due
Additional Papers As Needed	TBD	
	TBD	
	TBD	
Board Approval	2018	Board Approval

*The ISO also hosted two working group meetings (July 22, 2015 and August 18, 2015) prior to releasing the straw proposal.

** The ISO will work with LRAs to facilitate collaboration with their processes prior to issuing a complete schedule.

Background

- Straw proposal focused on outstanding issues remaining from the initial FRACMOO stakeholder process
 - 1) Allowing intertie resources to provide flexible capacity
 - 2) Assessing the flexible capacity capability of storage resources such as pumped-storage hydro resources that do not align with the ISO's NGR market design, and
 - 3) Allocation of negative flexible capacity contributions

Background (cont.)

- The ISO is expanding the original scope of this initiative to include potential enhancements to the current flexible capacity product based on
 - Stakeholder comments to the straw proposal
 - The availability of sufficient flexible RA showing data
 - The need to enhance the overall flexible capacity product
- Discussion and comments should focus on this element

Overview

- Process: Review Flexible RA Capacity Showings and forecasted flexible capacity needs
- General findings: The flexible capacity showings to date indicate that the flexible capacity product is not sending the correct signal to ensure flexible capacity will be maintained long-term

Overview

- Next steps of the process: Consider enhancements to the flexible capacity product that
 - Increase the overall availability and ramp rate of the flexible capacity fleet, while
 - reducing the minimum operating level of flexible capacity resources.

Overview

- Starting point: Review eligibility and criteria for providing flexible capacity (i.e. Ramp rate, start time, cycle time, daily starts)
 - Assumes product definition remains stable to mitigate regulatory risks
 - Several of the issues identified overlap
 - The solution for one issue may alleviate or even eliminate another
 - At this time the ISO is simply identifying the issues with the current flexible capacity product

The ISO has identified six issues as potential areas to enhance the current flexible RA product

1. Ramping speed
 - Large single hour net load ramps
 - The transition from low net loads to steep ramps
 - Intra-hour variability
2. Cycle time and flexible capacity qualifications
3. High minimum operating levels from both RA and flexible RA

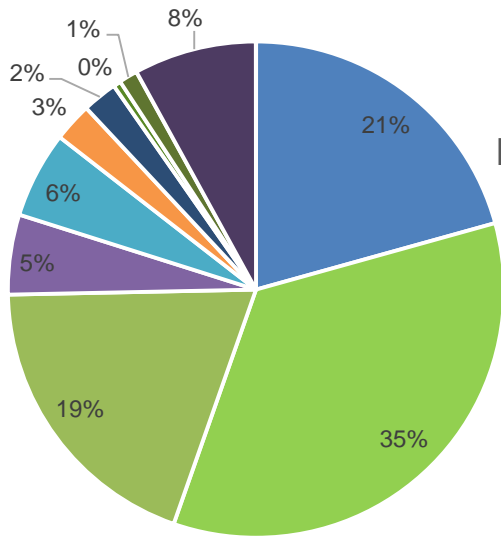
The ISO has identified six issues potential areas to enhance the current flexible RA product

4. Most significant net load ramps occur on weekends or holiday weekdays
5. Significant quantities of long start resources may limit the ISO's ability to address real-time flexibility needs
6. There is currently no means in place for the ISO to assess the likelihood that the flexible RA showings will adequately meet all ramping needs

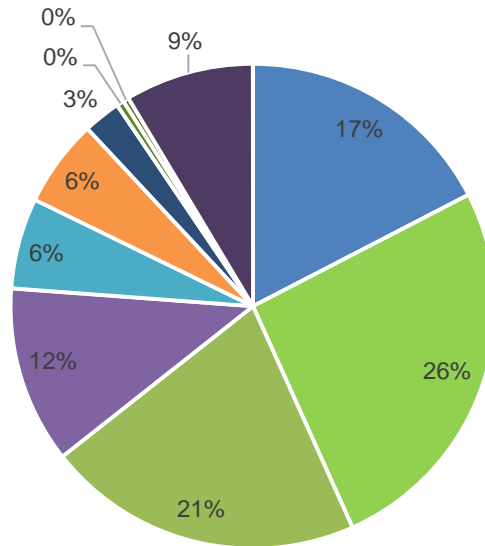
1. RAMPING SPEED

Ramp Rates of Capacity Fleets

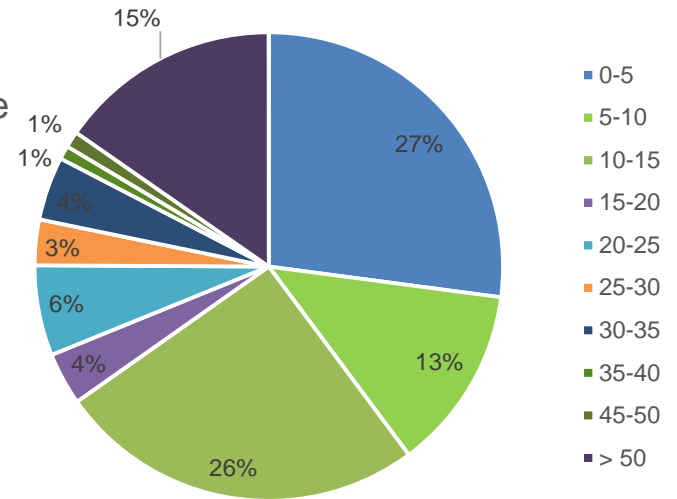
Percent of Total RA fleet by Ramp Rate



Percent of Total EFC by Ramp Rate



Percentage of Shown EFC by Ramp Rate



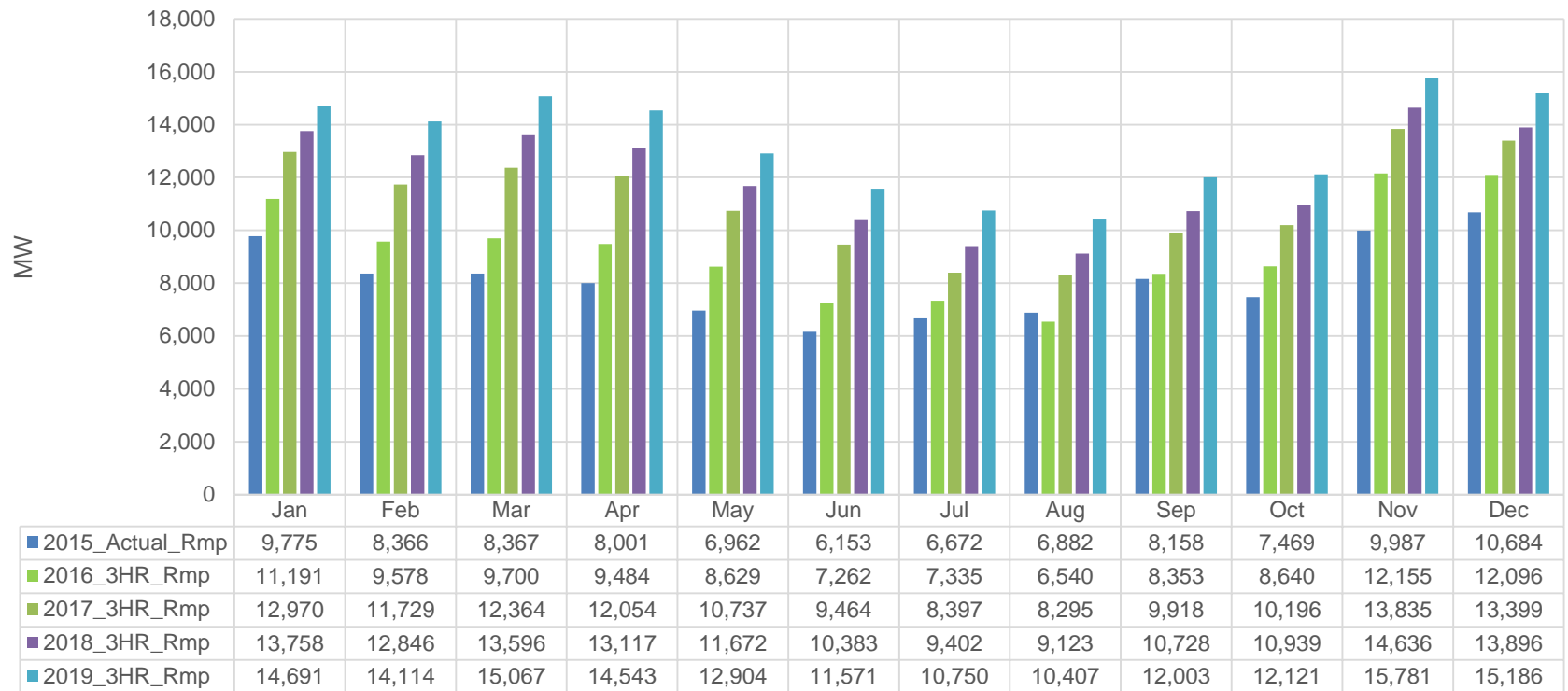
- 0-5
- 5-10
- 10-15
- 15-20
- 20-25
- 25-30
- 30-35
- 35-40
- 45-50
- > 50

Additional limitations on weighted average ramp rate may be needed for EFC eligibility

- The ISO believes it is necessary to consider minimum ramp rate limitations to address:
 - Large single hour net load ramps
 - The transition from low net loads to steep ramps
 - Intra-hour variability

Forecasted three hour net load ramps are forecasted to continue growing

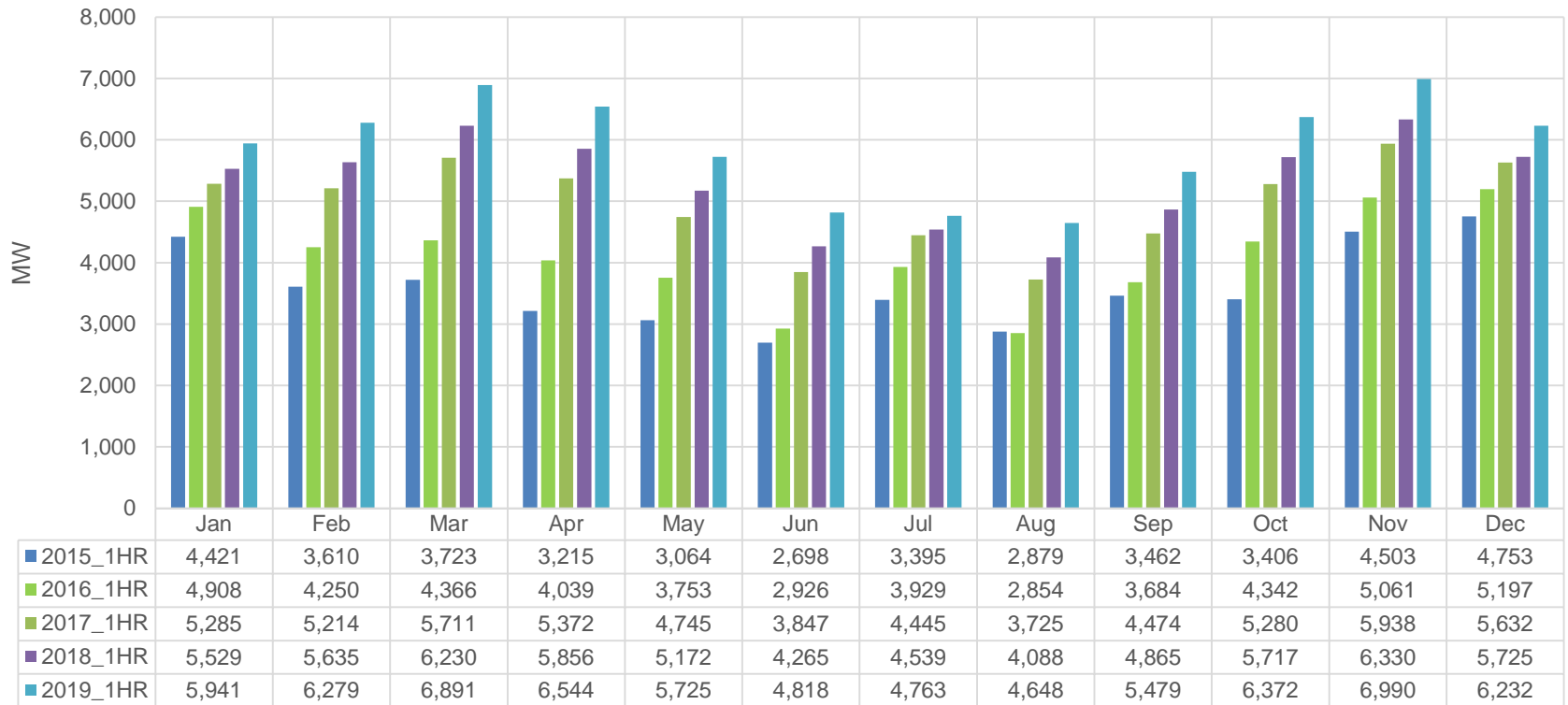
Monthly 3-Hour Upward Ramps



While these ramps will continue to grow, the current flexible capacity product has been designed to explicitly meet these ramps (up to about 90 MW/minute)

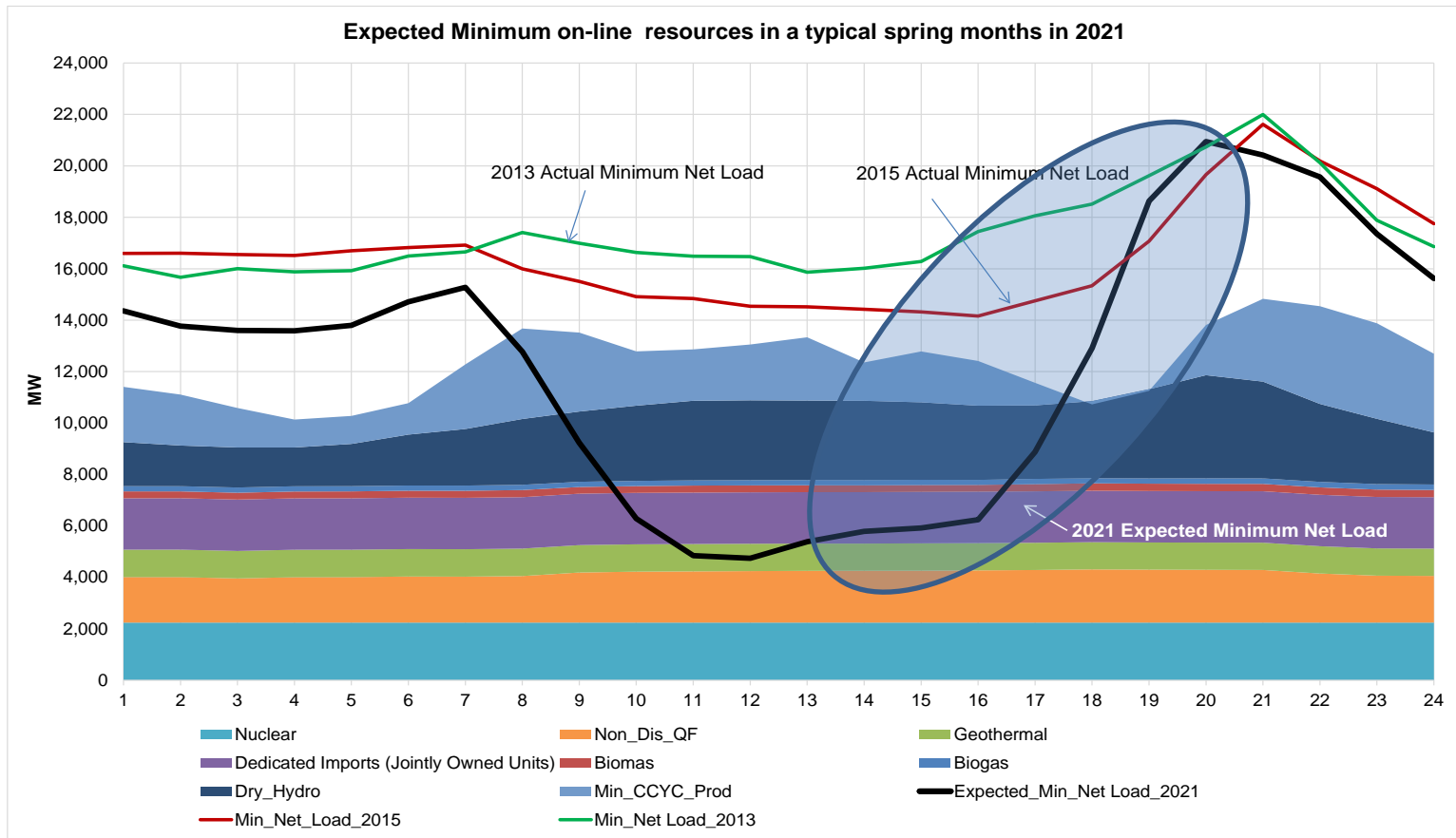
Forecasted single hour net load ramps could exceed 115 MW/minute

Monthly 1-Hour Upward Ramp



The current flexible capacity product has not been designed to explicitly meet these ramps

Transitioning into net load ramps



The current flexible capacity product has not been designed to explicitly meet these flexibility needs.

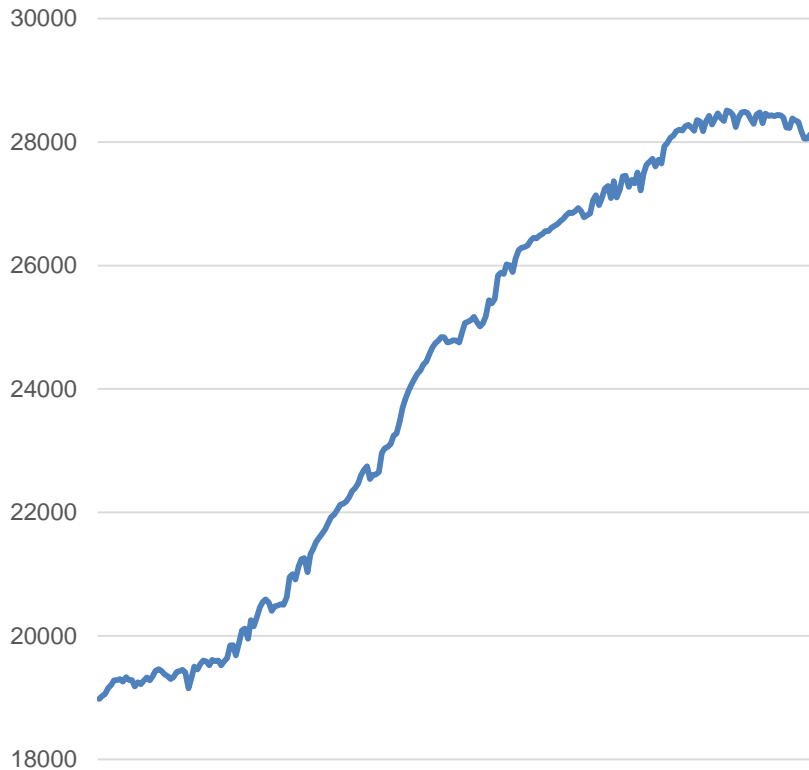
Transitioning into net load ramps (cont.)

- The challenge of meeting this ramp is complicated by two factors:
 - The need to commit resources
 - Forecast error
- At low net loads, there may be limited amounts of dispatchable capacity available and online
 - Online may not be fast ramping resources
- ISO may have to ramp more quickly if forecast is off
 - When the ramp starts
 - Rate of ramp

Transitioning into net load ramps (cont.)

- As ISO “chases load” up the neck of the duck
 - Regulation depleted
 - Drops below acceptable CPS1 levels (*i.e.* lean on other BAAs for help maintaining system frequency).
 - Violations may result
- ISO seeks to ensure a portfolio of resources is available to mitigate the frequency and magnitude of instances of such violations

Intra-hour variability



The current flexible capacity product has not been designed to explicitly meet these flexibility needs

- Maximum total variability exceeded 12,000 MW in each month
 - The largest total variability exceeded 17,500 MW on March afternoon (three hour ramp was 8,660 MW)
 - Three hour net load ramp of greater than 12,300 MW
- Largest total variability did not correspond to the same days and hours as the single largest three hour net load ramp

2. CYCLE TIME AND FLEXIBLE CAPACITY QUALIFICATIONS

Clarity, precision, and revisions are needed for flexible capacity category eligibility

- ISO currently requires resources with a minimum downtime of greater than 12 hours to have one start per day to provide base flexible capacity
 - Translates into requiring 30 starts per month to provide base flexible capacity
- ISO continues to receive questions about what this means and how the ISO makes this determination
- ISO Board approved Commitment Cost Enhancements – Phase 3 proposal
 - Improved data on monthly starts, run-hours, energy, or other limitations

3. HIGH MINIMUM OPERATING LEVELS FROM BOTH RA AND FLEXIBLE RA

Range between Pmin and Pmax should also be considered when selecting flexible capacity resources

- High PMin to PMax ratio may not be problematic if resource can start and stop frequently and ramp quickly.
 - PMin to PMax ratio would also have to include considerations for daily starts and minimum run times
- High minimum operating levels can result in
 - Commitment of large quantities of inflexible capacity to meet upcoming ramping needs
 - Over-supply and significant quantities decremental dispatches to wind or solar resources
- Minimum operating level, March of 2016 RA showings:
 - Flexible RA: over 3,200 MW
 - could have been as low as 1,325 MW
 - System RA: 9,600 MW

4. NET LOAD RAMPS ON WEEKENDS OR HOLIDAY WEEKDAYS

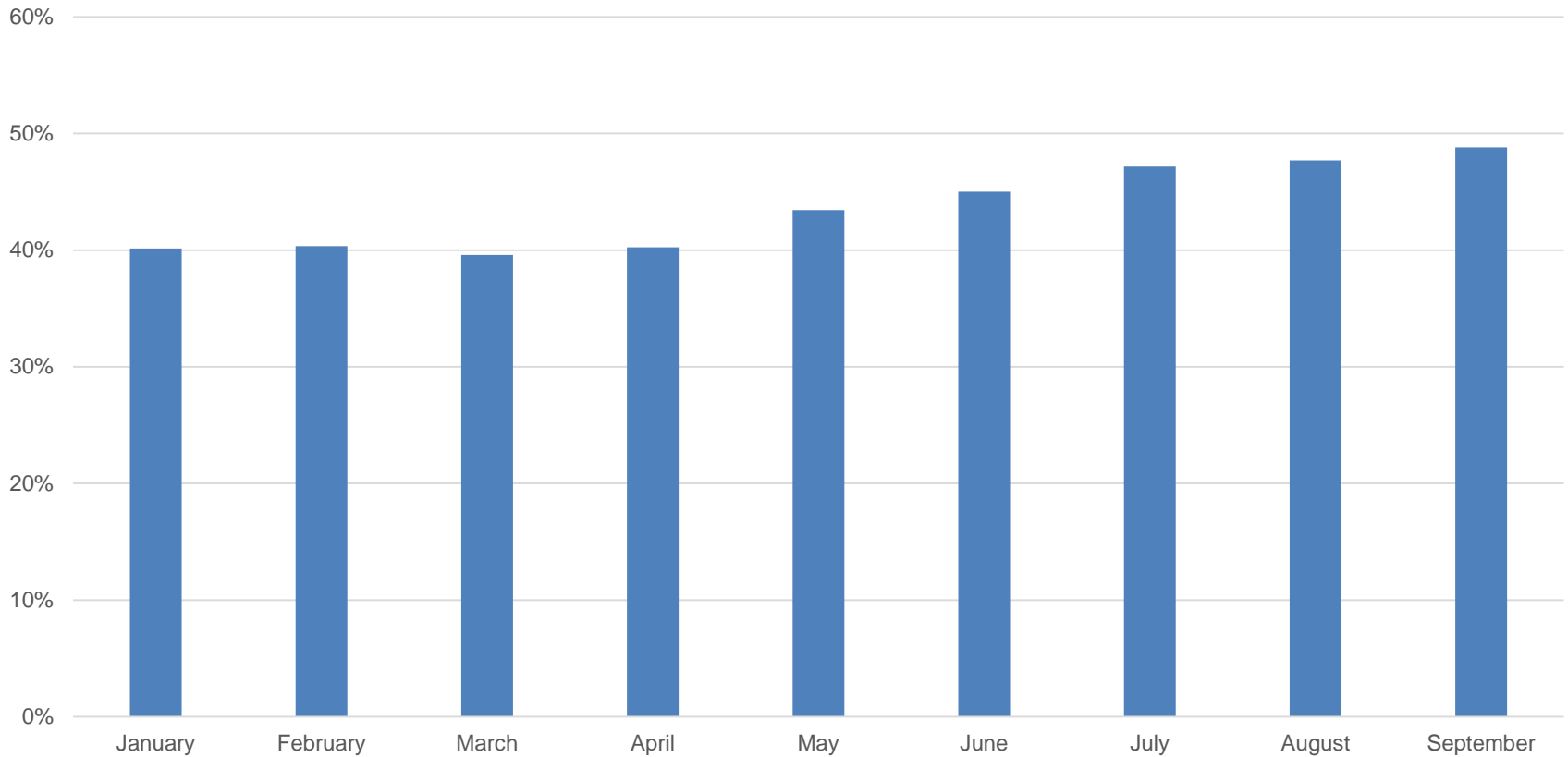
The ISO will consider changing Category Three Flexible Capacity to seven days a week

- Net load ramps are greatest on weekends because evening peaks during non-summer months
 - Mid-day loads are typically higher during the week
- Several of the ISO's largest net load ramps occurred on either holidays or weekends
 - 2015 Largest ramp (10,675 MW) occurred on Saturday December 26
 - Maximum net load ramp occurred on a holiday or weekend in eight months during 2015
- While Category Three MOO may be modified, five starts per month appears to be adequate

5. LONG START RESOURCES AND REAL-TIME FLEXIBILITY NEEDS

Over 40 percent of the flexible capacity fleet comes from long start resources each month

Percent Long Start



May need to limit the quantity of long-start resources in flexible RA showings

- Long start resources are only available to meet real-time flexible capacity needs if they receive day-ahead commitments
- Roughly 40 percent of the flexible capacity resources are unlikely to be available to address real-time flexibility needs
 - 31 resources totaling 5,100 MW of flexible capacity
 - Commitment rate of 25 percent (244 day-ahead commitments out of a possible 961 opportunities)
 - 17 resources totaling 3,444 MW of flexible capacity
 - Commitment rate of 5.5 percent (only 29 combined day-ahead commitments out of a possible 527 opportunities)

6. FLEXIBLE RA SHOWINGS ASSESSMENT AND RAMPING NEEDS

ISO is exploring tools that it can use to assess the effectiveness of the flexible capacity showings

- Currently, there is no means for the ISO to assess the effectiveness of the shown flexible RA fleet at meeting the identified flexible capacity needs
 - The current practice of comparing EFC MWs shown the Flexible RA Requirement may be sufficient
- The ISO has similar authority to test the effectiveness of local RA showings
 - Grants the ISO broad authority and discretion to conduct a variety tests
- ISO will explore costs and benefits of a variety of means to assess the adequacy of flexible capacity showings

Next Steps

Request stakeholder comments by COB December 19

Be sure to use comments template provided

Submit to comments mailbox:
initiativecomments@caiso.com

Step	Date	Event
Supplemental Issue Paper	November 9	Post second revised straw proposal
	December 9	Stakeholder web conference
	December 19	Stakeholder comments due

Thank you!