Flexible Resource Adequacy Criteria and Must Offer Obligation – Phase 2

Working Group Meeting

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June 18, 2018

FRACMOO 2 Working Group Meeting Agenda – 6/18/2018

Time	Topic	Presenter
10:00 – 10:05	Introduction	Jody Cross
10:05 – 10:35	Day-Ahead Market Enhancements – Day-Ahead Flexible Ramping Product	Don Tretheway
10:35 – 11:10	Identifying ramping needs	Karl Meeusen
11:10 – 11:40	Must-Offer Obligations	Karl Meeusen
11:40 – 12:00	Flexible Capacity Deliverability Study	Songzhe Zhu
12:00 – 1:00	Lunch	
1:00 – 2:30	Panel 1: Flexible RA Eligibility and Counting Rules	Sandeep Arora, Mark Holman, Alan Wecker, Mark Smith
3:30 – 3:50	Panel 2: Allocating of flexible capacity requirements	Simone Brandt, Eric Little, Karl Meeusen
3:50 – 4:00	Next Steps	Jody Cross

Stakeholder Engagement Plan

Milestone	Date
Working Group Meeting	June 18, 2018
Draft Final Flexible Capacity Framework posted and submitted to the CPUC RA proceeding	July 10, 2018
Draft Final Flexible Capacity Framework stakeholder meeting	July 31, 2018
Stakeholder written comments due	August 8, 2018
Complete coordination with CPUC's RA proceeding prior to Board approval of final flexible RA Framework	Q4 2018

DAY-AHEAD MARKET ENHANCEMENTS OVERVIEW – DAY-AHEAD FLEXIBLE RAMPING PRODUCT

What is changing?

- Current DAM
  - MPM pass
  - IFM pass
  - RUC pass
  - D+2 run
  - D+3 run
- Hourly intervals
- RUC Capacity
  - Up

- New DAM
  - MPM pass
  - IFM/RUC pass
  - D+2 run
  - D+3 run
- 15min intervals
- DA FRP
  - Up/Down

Imbalance Reserves are now Day-Ahead Flexible Ramping Products (FRP)

- RT FRP currently settles Forecasted Movement and Uncertainty Awards

- To align with DA FRP, all resources will be settled for Scheduled Energy and Uncertainty Awards
  - Energy Schedule + Up Uncertainty Award = FRP Up
  - Energy Schedule – Down Uncertainty Award = FRP Down

ISO proposes to procure DA FRP using a demand curve

- Consistent with current RT FRP procurement
  - If expected avoidance of PBC > FRP cost then procure
- Modified proposal to require RA resources to still submit bids into real-time market even if no DA FRP award
- Non-RA resources that have a DA FRP award have a real-time must offer obligation
  - Generate bid similar to RUC awards today

RA Resource's DA FRP capacity bid is zero for interim period

- RA resources must bid $0.00 during transition period
  - Allows time for RA paradigm to recognize that marginal cost of real-time market availability will be compensated through day-ahead FRP
  - It is appropriate for the resource to be paid for any opportunity costs from not providing energy to meet DA FRP uncertainty requirement
  - Note: ISO will insert the market services cost as the bid cost
- Transition period is end of 2020 or EDAM implemented; whichever is sooner
  - EDAM will allow other BAAs to use ISO resources to meet DA FRP requirements. Marginal capacity costs should be recovered through market price.

FLEXIBLE RESOURCE ADEQUACY FRAMEWORK

Changes to flexible RA should closely align with ISO operational needs and align with ISO market runs

- The current flexible RA product results in fundamental gaps between the ISO's markets and operational needs:
  - Day-Ahead Market
  - Fifteen-Minute Market
  - Five-Minute Market
- Need to meet both:
  - Anticipated ramping needs and
  - Uncertainty within the time scales of the real-time market

The ISO seeks to close gap by developing a flexible RA framework that captures the ISO's operational needs and the (un)predictability of ramping needs

Basis of a new flexible RA framework in five steps

1) Identify the ramping needs that flexible RA should be procured to address
2) Define the product to be procured
3) Quantify the capacity needed to address all identified needs
4) Establish criteria regarding how resources qualify for meeting these needs
5) Allocate flexible capacity requirements based on sound causal principles

Flexible capacity needs break down into two categories

1) Predictable: known and/or reasonably forecastable ramping needs, and

2) Unpredictable: ramping needs caused by load following and forecast error

These two types of flexible capacity needs drive different forms of flexible capacity procurement needs

QUANTIFYING CAPACITY REQUIREMENTS

Changes to flexible RA should closely align with ISO operational needs and align with ISO market runs

ISO will develop three flexible RA products:

- Day-ahead load shaping:
  - Ensure the ISO is able to meet its three-hour net load ramps
- Real-time products (five and fifteen minute flexible RA capacity):
  - Designed to address real-time imbalances that occur between day-ahead and real-time markets

ISO must be prepared to address the largest uncertainties that occur with the shortest notice

- Real-time flexible RA needs also include the need for incremental real-time flexible ramping product

- It is not necessary to establish flexible RA needs to cover both upward and downward uncertainty ranges
  - Need to ensure sufficient flexible capacity available to provide for the largest imbalances in a single direction

- Procurement of Day-Ahead Flexible Ramping product ensures the correct mix of upward and downward capability are available in real-time

The maximum forecasted three hour net load ramp plus contingency reserves should continue being the starting point for establishing flexible RA needs

- The interplay between contingency reserves and flexible capacity identified in FRACMOO process still exists
  - ISO will modify this to be consistent with modifications to WECC Standard BAL-002-WECC-2a

- The ISO will reconstruct overall available wind and solar output into formulation of the three hour net load ramp

- Overall requirement should also include the need to address overlap with Regulation and need for FMM FRP

The ISO will propose using the maximum identified needs for both predictable and unpredictable ramps

Overall flexible capacity need

Maximum forecasted three-hour net load ramp (including reconstituted renewable curtailments) + ½ Max(MSSC, 6% expected monthly peak load) + Regulation + FMM FRP + ε

Five-minute flexible RA product

Expected uncertainty between FMM and RTD

Fifteen-minute flexible RA Product (Five-Minute Product count towards requirement)

Expected uncertainty between IFM and FMM

Day-ahead load shaping (Five and Fifteen-Minute Products count towards requirement)

Overall flexible capacity need

Defining the quantity of real-time flexible capacity needed in each product should align with methodology used for Day-Ahead Flexible Ramping Product

- Day-Ahead Market Enhancements proposal suggests DA FRP as a function of load, wind, and solar
  - Also exploring ability to include forced outages

- To ensure alignment, ISO is exploring methodologies to determine real-time flexible RA need as a function of load, wind, and solar
  - Observed deviations plus growth factor
  - Regression

Modifications to must-obligations

All flexible RA resources must submit economic bids for the shown EFC value for all 24 hours in the day-ahead markets

- Must offer economic bids for all energy, ancillary services, and Day-Ahead Flexible Ramping Products
- VERs and some DR resources may not be capable of providing the full shown EFC value during all hours
  - Must offer the lower of the shown EFC value or the resource's forecasted output
- All external resources must economically bid into the day-ahead market, including a transmission profile that supports the resource's energy bid curve

Capacity providing real-time products must economically bid into real-time market

- All short start capacity must economically bid shown EFC capacity into the real-time market
- All long-start resources committed in day-ahead market must economically bid shown EFC into the real-time market
  - For all hours after the original day-ahead commitment until the resource is decommitted
- All external resources must economically bid shown EFC into the real-time market

Day-ahead load shaping capacity real-time MOO depends on day-ahead award

- Resources must make all capacity committed or awarded in the IFM available in the real-time market
  - Committed or awarded energy may be either economically bid or self-scheduled into real-time markets
  - Day-ahead flexible ramping products awards must be rebid economically into real-time
- Additional available capacity must be economically bid in to real-time market
  - Short-start
  - Capacity from committed long-start resources
    - For all hours after the original day-ahead commitment until the resource is decommitted

The ISO is exploring alternative availability incentive mechanisms

- RAAIM currently provides incentives for resources to bid into the ISO consistent with MOOs
- The ISO is still exploring whether the currently designed proposal can implemented and coordinated with existing RAAIM
- The ISO is exploring the viability of the following option:
  - RAAIM with tiered pricing
  - No RAAIM, but EFC derates for subsequent year

Flexible RA resources that reach use-limitations will be required to provide replacement capacity

- Flexible RA capacity is designed to ensure the ISO can efficiently shape day-ahead market awards and address uncertainty at any time

- ISO is considering this requirement only for real-time flexible capacity products
  - Due to the particularly uncertain nature of real-time flexible capacity needs

- Commitment Cost Enhancements Phase 3 provisions mitigate the risk that use-limitations are reached

FLEXIBLE CAPACITY DELIVERABILITY STUDY

Definition of Flexible Capacity Deliverability

- Deliverability of the flexible capacity shall mean that the output of a flexible resource could be ramped to EFC simultaneously with other flexible resources in the same generator pocket to match the net load ramping without being constrained by the transmission capability.

Exporting Limit from a Gen-Pocket

- Net Export from a Gen-Pocket =
  - Flexible resources output +
  - Other resources output –
  - Load inside the pocket

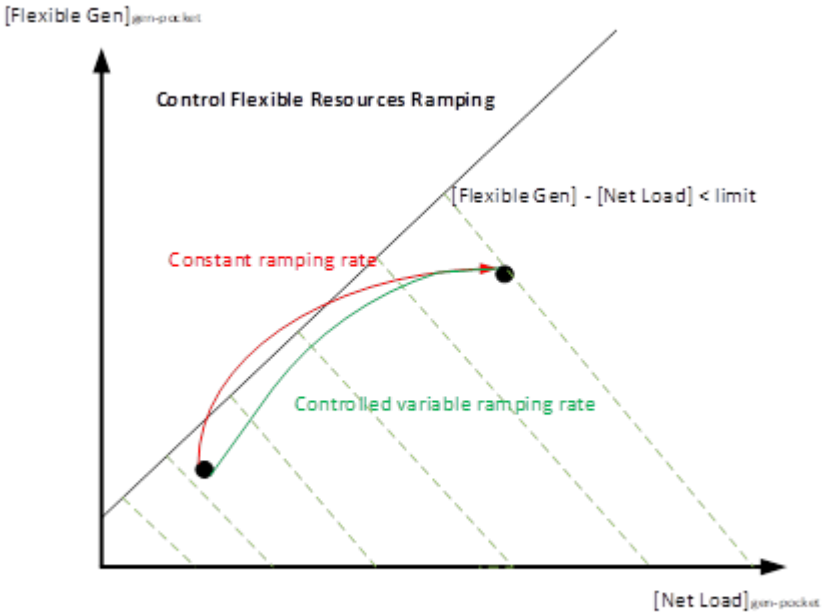
- For discussion purpose,
  - Flexible resources are those on the posted EFC list
  - Other resources include wind, solar, QF and other non-dispatchable generators.
  - Does not incorporate any proposed changes in FRACMOO2

Potential Deliverability Concerns

- Is it proper to rely on the RA deliverability test performed under summer peak load conditions for flexible capacity counting?
  - Deliverability along the ramping curve
  - Deliverability need in different seasons

Deliverability along the Ramping Curve

- In theory, the net export could be higher at the start of the ramp.
  - Deliverable at the ending point does not mean deliverable along the ramping path.
  - Ramping may need to be controlled to stay inside the limit, i.e. non-simultaneous ramping



Deliverability Need in Different Seasons

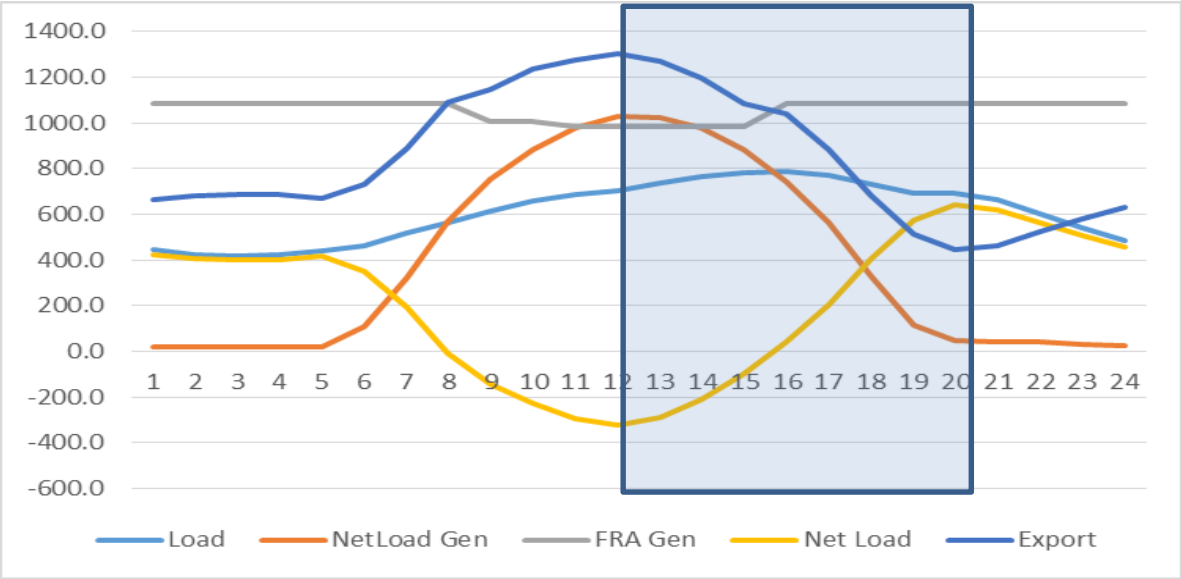
- The seasonal difference between winter and summer could drive quite different gen-pockets from the transmission capacity perspective.
- For the same gen-pockets, the transmission could be stressed more in the winter and spring seasons than in the summer season.

Explore Validity of the Concerns

- Identify gen-pockets for constrained ramping
  - Examine gen-pockets that are more stressed under off-peak conditions than peak conditions in planning studies
  - Use economic planning study data
  - Use real-time operation data

Explore Validity of the Concerns – an Example

- North of Lugo gen-pocket



Future Steps

- Identify and analyze gen-pockets
- Coordinate with the deliverability methodology review that is triggered by ELCC counting of wind and solar qualifying capacity
- Determine if flexible deliverability study is needed
- If needed, propose a methodology
- Methodology development will be done through the TPP stakeholder process

Panel 1: Eligibility and Counting Rules

Sandeep Arora – LS Power

Mark Holman – Powerex

Alan Wecker – PG&E

Mark Smith – Calpine

Panel 2: Allocating Flexible RA Requirement

Simone Brandt – CPUC
Eric Little – SCE
Karl Meeusen – CAISO

ALLOCATING FLEXIBLE CAPACITY REQUIREMENTS

Proper allocation of flexible capacity requirements must be based on reasonable causation principles

- Requirements will be allocated based on an LRA's jurisdictional LSEs' contribution
  - The primary driver operational needs identified here continue to be driven by LSE procurement to meet state policy objectives

- Existing allocation methodology
  - May be a reasonable reflection of the need for three-hour net load ramps
  - May not reflect the drivers of uncertainty

Flexible capacity requirements allocated based on the primary contributing factors to each product

- For unpredictable ramping (i.e. real-time flexible RA)
  - All imbalances attributable LRAs' jurisdiction LSEs' load, wind, and solar will be allocated directly to LRA
  - All other factors contributing to the need for real-time flexible RA capacity will be allocated to LRA based on load-ratio share
- For allocating day-ahead load shaping requirements
  - Rely on current practices of allocating based on each LRA's contribution to the three hour net-load ramp

The ISO is currently considering two primary allocation options for real-time products

- Contribution to largest observed uncertainty events
  - Pro: Reflects largest levels of uncertainty
  - Con: Does not reflect

- Regression
  - Pro: Captures the statistical relationship across all intervals
  - Con: May not reflect allocation based on the days/intevals greatest need

Next steps

- Draft Final Flexible Capacity Framework
  - Posted July 10, 2018
  - Simultaneously submitted into CPUC RA proceeding
  - Stakeholder meeting July 31, 2018