Balancing Operating Reserve Credits – Updates for Early Eligibility and Flexible Resources

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Today's Presentation and Examples

Goals:

- Describe the following areas of the proposed Balancing Operating Reserve (BOR) credit calculation methodology as it relates to Flexible Resources*.
  - Balancing Operating Reserve Credit Eligibility
  - Self-Scheduled startup cost
  - Self-Scheduled periods of operation
- Describe updated proposal for eligibility prior to the time of commitment for resources without a soak period (flexible resources included).

**Flexible resources are those that have a startup plus notification time <= 2 hours and min run time <= 2 hours, and which are expected to wait to be committed by PJM in real-time before coming online, rather than automatically following their DA schedule.*

Balancing Operating Reserve Credit Eligibility Review

What does it mean for a resource to be “eligible for BOR credits”?

- It means the Balancing Operating Reserve credit calculations will be performed for eligible intervals
- It does NOT guarantee the resource will be made whole for every MW provided.
- The amount of make whole is determined by the outcome of the proposed BOR credit calculation methodology:
  - Step 1: Calculate make whole credit for the segment using ***Tracking Desired MW***.
  - Step 2: Calculate make whole credit for the segment using ***Actual RT MW.***
  - Step 3: Compare and set the resource’s credit equal to the ***lesser*** of the two values.

The effect is that resources are made whole to their costs, however the make whole is limited to the amount of uplift the resource *would have been entitled to* if the resource followed dispatch.

Which Resources are Eligible for BOR Credits?

Resources that are committed by PJM** are eligible for BOR credits

- The current tariff language uses the term “operating as requested by PJM” when referring to pool-scheduled resources eligible for uplift.
- **Status Quo:** This term has been historically interpreted as coming online and offline consistent with PJM’s request. Eligibility is based on the duration of the PJM commitment/min run periods and being online.
- **Proposal:** Eligibility is based on PJM commitments/min run periods and is not limited to a resource coming online/offline. This change in tandem with the proposed BOR credit methodology and the calculation of a Tracking Desired MW metric determines the uplift compensation for operating as requested by PJM.

** Committed by PJM means pool-scheduled by PJM in real-time for at least 1 interval of the DA commitment or min-run time

BOR Eligibility Prior to Start of Commitment: Resources without a Soak Process

PREVIOUSLY PRESENTED

Resources without a Soak Process have startup costs that include costs from PJM notification to first breaker close and from last breaker open to shutdown

- **Status Quo:** Eligible for ramping intervals prior to the start of the commitment, however ramping intervals are limited to 30 minutes.
- **Proposal:** Status Quo with additional clarifications on 30 minute ramping validations
  - Create an objective metric based on MWh output to determine if unit is ramping within the 30 min prior to the commitment start time and therefore eligible for the ramp up period.
  - Any flat profiled units according to M28 Section 1A, Revenue Data for Settlements, are excluded from the ramp up eligibility period due to the fact that PJM is unable to determine if the unit is in ramp up mode.
  - Resource is only eligible during the ramping intervals if the incremental energy offer price mw pairs remain less than or equal to that of the first hour of PJM commitment

BOR Eligibility Prior to Start of Commitment: Resources without a Soak Process

MODIFIED PROPOSAL

Resources without a Soak Process have startup costs that include costs from PJM notification to first breaker close and from last breaker open to shutdown

Proposal:

- Eligible for intervals prior to the start of the commitment, however intervals are limited to 20 minutes and MW are limited to Eco Min.
  - No restriction based on whether the unit is ramping in those 20 minutes or not. Intent is to cover the ramping MW up to Eco Min in preparation for following SCED dispatch at the beginning of the commitment, regardless of when they happened.
  - Analysis showed that 90% of the time these units are online and reach their economic minimum within 20 minutes of commitment.
- Resource is only eligible during the intervals, prior to commitment, if the incremental energy offer price mw pairs remain less than or equal to that of the first hour of PJM commitment

Flexible Resource Expectations

- Flexible Resources are not expected to automatically run in real-time for their entire DA schedule. Instead, they should wait to be committed by PJM or self-schedule in real-time.
  - If they are not committed by PJM to run in real-time, they are paid Lost Opportunity Cost Credits to cover losses in excess of DA revenues from DA buy back and/or forgone profits
- These resources are more likely to cycle on and off more than once in an operating day.

Proposal for Flexible Resources

- Because the overall proposal will make resources eligible for BOR credits for the entire DA commitment anytime the unit runs for PJM for at least 1 interval in real-time, special consideration needs to be given to intervals where the unit cycled and also came online for company rather than PJM within that same DA commitment window.
- Losses incurred during periods where the resource was self-scheduled in RT before or after a RT PJM commitment period should not be made whole
  - This is achieved by flooring net revenues (costs minus revenues) at $0 in both the Step 1 and Step 2 calculations for these intervals
  - Revenues in excess of costs (including startup costs) will be recognized and available to offset losses in other intervals within the segment

Amortization of Startup Costs

- If a unit is self-committed in RT, the startup cost will be amortized across all contiguous intervals where the unit is self-committed
- WHEN
  - Unit has a pool-scheduled day-ahead commitment AND
  - Self-committed period over laps with or is within the day-ahead commitment AND
  - Unit is pool-scheduled in real-time within or overlapping another portion of the day-ahead commitment
- WHY
  - This is to ensure the balancing net revenue only includes profits in excess the energy offer, no load and the allocated start costs for the interval.
  - If startup costs are assigned to a single interval, as they are today, it may result in only the first interval having a loss and being floored to zero, while the remaining intervals may look profitable and have their revenue carried forward to offset losses in the PJM-committed intervals. This would be an inaccurate representation of the actual positive net revenues earned from self-committed run.

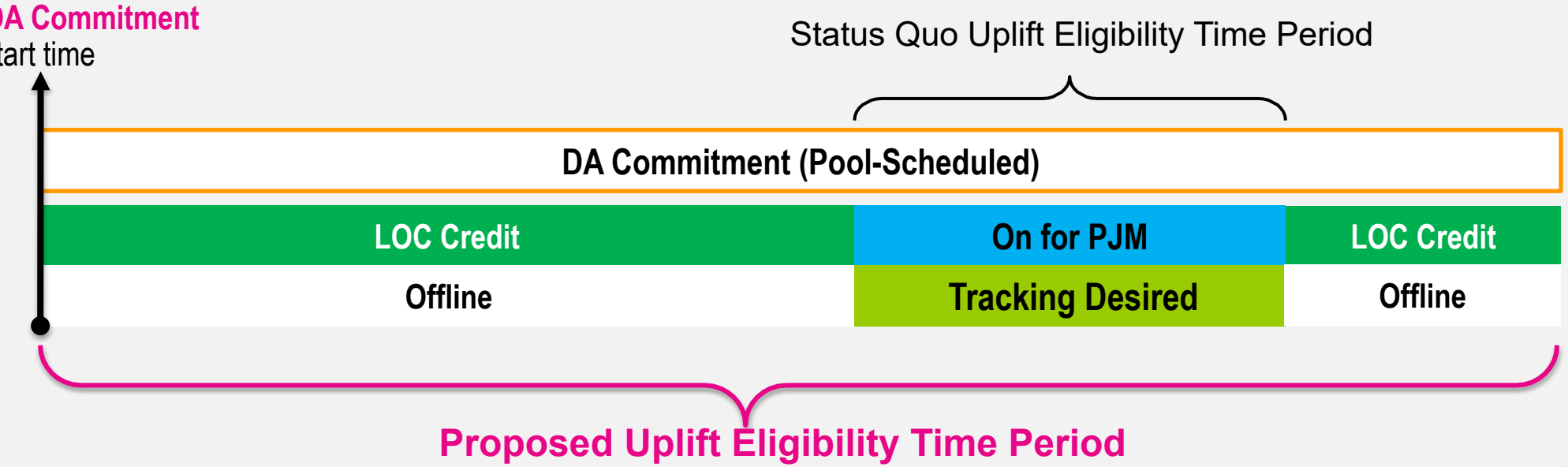
Examples

1. Committed by PJM in RT
2. Committed by both company and PJM in RT
3. Taken over for company in the middle of PJM RT commitment

Example 1:
Flexible CT Committed by PJM in RT

SCENARIO:

- PJM schedules the unit in DA
- **Brought on by PJM in RT**



TAKEAWAYS

Status Quo

- Unit is only eligible for BOR when running for PJM in RT
- All of the DA revenue is used in the "Dispatchable" (blue boxes) and none of the balancing revenue is used in the "Offline" period (white box)
- **This causes an overstatement of revenue in the BOR credit calculation during the period the unit is running for PJM.**

Proposal

- Unit is now eligible for BOR for the entire DA Commitment period
- For the offline periods, the balancing revenue for buying out of the DA commitment and the any LOC credit that is provided will be included in the BOR credit calculation.
- **Step 1 and 2** will produce the same result for the offline periods.

Example 1

Why include Balancing revenue and LOC credits when the resource is offline?

- Currently, when a unit is committed in DA but does not run in RT, the full DA revenue from the intervals where the unit wasn't running is included in the BOR calculation for the subset of intervals where the unit was running. However, the balancing revenue (or the DA buy back) from the intervals where the unit didn't run is excluded. It also does not include any LOC payments. This can lead to an overstatement of the revenues available to offset costs in other intervals. **This currently reduces the opportunity for the unit to receive BOR Credits.**

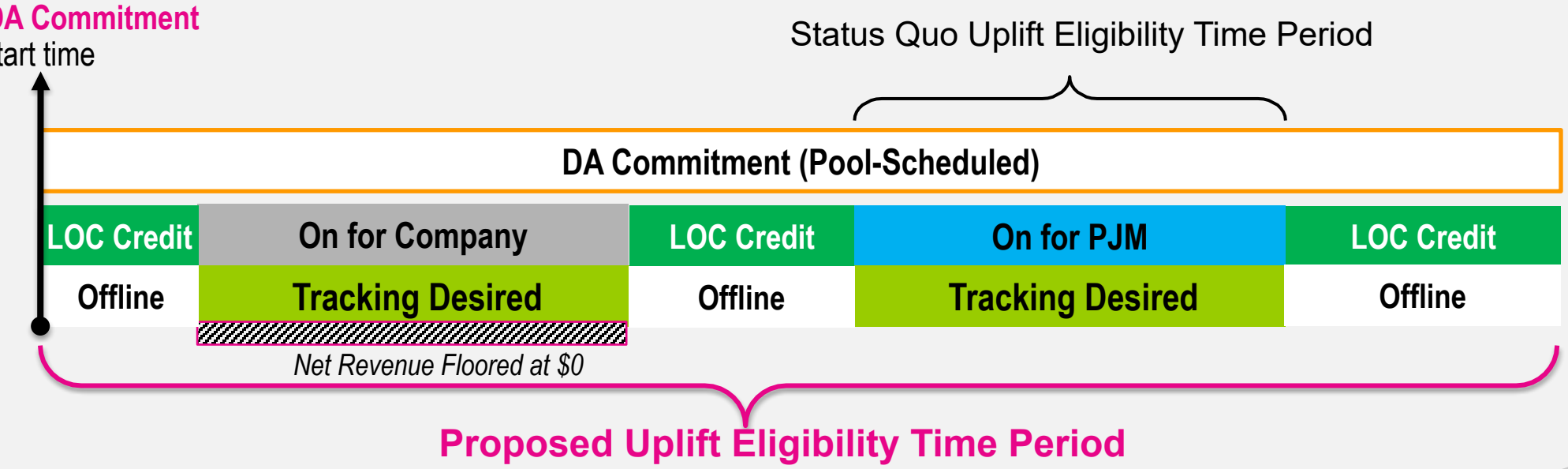
- Keeping the unit eligible for BOR for the entire DA commitment under the proposal will take into account the DA buy back the unit was subject to while offline. This more accurately captures the unit's revenues.

- The calculation for the Net Balancing Revenue in STEP 1 and 2 for the offline period will be the DA Revenue + Balancing Revenue (or DA Buy Back) + LOC Credit. The end result is that net revenues will equal either zero or the profit the unit made by not running in RT due to PJM instructions for the offline periods.

Example 2:
Flexible CT Committed by Company and PJM in RT

SCENARIO:

- PJM schedules the unit in DA
- **Brought on by Company and later by PJM in RT**



TAKEAWAYS

Status Quo

- If a resource is on for company, the resource is responsible for any losses while running for company. Any profits earned do not offset other costs during the PJM commitment period.
- All of the DA revenue for the entire DA commitment period is used in the "On for PJM" intervals (blue box) and none of the balancing revenue is used in the "On for Company" period (gray box) or Offline periods (white boxes)
- **This overstates the total revenue of the unit by including all of the DA revenue, for the on for Company period and offline periods, without any of the associated costs**

Proposal

- Unit is now eligible for BOR for the entire DA Commitment period
- For flexible resources, any self-scheduled log during the DA commitment period, where the interval does not overlap with the min run time of the RT PJM-commitment for the unit has balancing net revenues floored at $0. Start cost gets amortized across all contiguous intervals where unit is self-scheduled.
- **Step 1 and 2** losses for the On for Company period are not made whole. Step 1 will use tracking desired for the On for company and On for PJM period. Step 2 will use RT MW for both periods.

Example 2

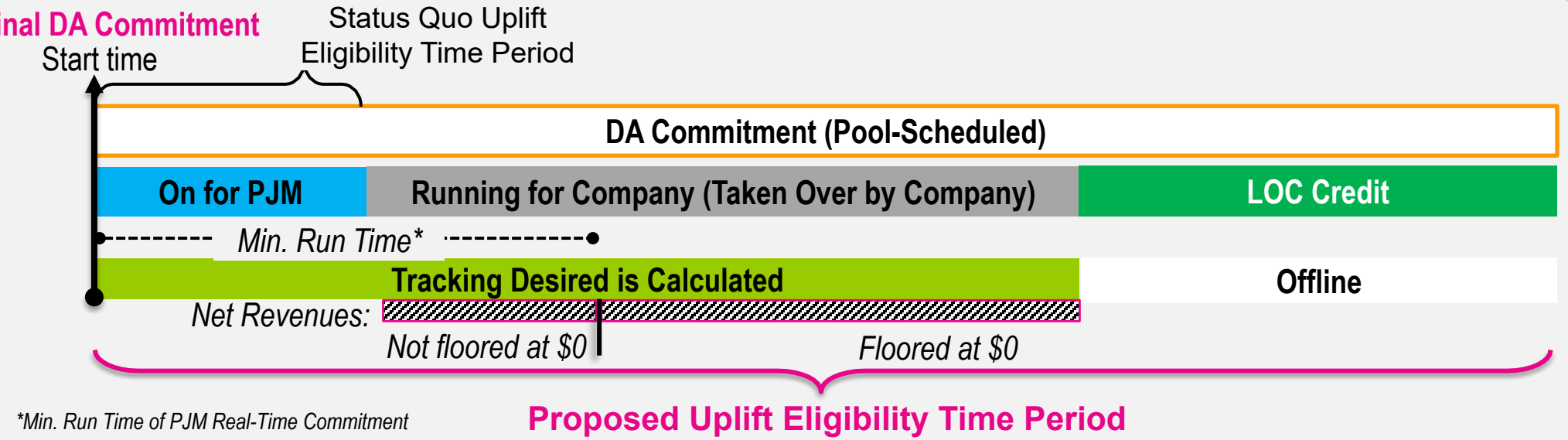
Why is the unit now eligible for BOR credits during self-committed periods?

- Example 1 illustrated why the unit should remain eligible for the entire DA commitment period, rather than just the intervals where the unit is running for PJM. This helps avoid overstating revenues (and potentially lowering make whole) by using all of the DA revenues and none of the associated balancing revenues.
- This is true for self-scheduled periods as well. Because the DA revenue from these periods is already being accounted for in the calculation, the unit should remain eligible for the BOR credit calculation so that the full costs can be accounted for.
- However, because the unit was self-committed and running for company, rather than PJM, the unit is not entitled to be made whole for losses during these intervals. Any losses are the responsibility of the unit owner. This is the reason the net revenues are floored at zero.
- Any positive net revenues earned during self-scheduled periods within the DA commitment will now be used to offset losses in other intervals within the segment.

Example 3:
Flexible Resource Taken over for company in the middle of PJM RT commitment

SCENARIO:

- PJM schedules the unit in DA
- **Taken over by company before end of min run time**



*Min. Run Time of PJM Real-Time Commitment

TAKEAWAYS

Status Quo

- If a resource is taken over by company, the resource is responsible any losses while running for company. Any profits earned do not offset other costs during the PJM commitment period.
- All of the DA revenue is used in the "Dispatchable" (blue boxes) and none of the balancing revenue is used in the "Running for company" period (gray box)

Proposal

- Unit is now eligible for BOR for the entire DA Commitment period
- Treatment of self-scheduled flexible resources:
  - During periods where a flexible unit is self-scheduled in RT, floor net revenues at $0 in both Step 1 and Step 2 so that it is not made whole for any losses while not running for PJM (PJM is not responsible for those losses). However, any positive net revenues will be used to offset the BOR calculation during the DA commitment / min run time.
  - To the extent that the unit is taken over as self-scheduled during the min run time of a PJM RT commitment, net revenues will not be floored at $0 and Step 1 and Step 2 will calculate as normal until the end of the min run time. This is because while still in the min run time, the commitment decision was PJM's and the unit is therefore eligible to recover losses in that period. This only applies if the PJM commitment comes first and the unit is taken over for self-scheduling while still in the min run time of the PJM RT commitment. Net revenues will be floored at zero after the min run time elapses.

Example 3

- Why is the resource eligible to recover losses for self-scheduled intervals within the min run time of the PJM commitment?
  - Example 2 delineated the reasoning for keeping the unit eligible during periods that the unit was self-committed. Since the DA revenue from these periods is already being accounted for in the calculation, the unit should remain eligible for the BOR credit calculation so that the full costs of the self-committed period can be accounted for as well. Any losses are the responsibility of the unit owner. This is the reason the net revenues are floored at zero.
  - Unlike non-flexible units, flexible units are not called on to meet their DA commitment. In this example, after the min run time, with the unit taken over by company, PJM has lost the ability to economically de-commit the unit. There isn't an expectation that the unit would remain online for PJM for their DA commitment, as with non-flexible units. This is the reason the unit is not eligible to be made whole for losses beyond the min run time of the PJM commitment when it is self-scheduled.
  - To the extent that the unit is self-scheduled during the min run time of a PJM RT commitment, net revenues will not be floored at $0 and Step 1 and Step 2 will calculate as normal. This is because while still in the min run time, the commitment decision was PJM's and the unit is therefore eligible to recover losses in that period. This only applies if the PJM commitment comes first and the unit is taken over for self-scheduling while still in the min run time of the PJM RT commitment.

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Operating Reserve Clarifications

Potential Solution Options - Balancing Operating Reserve Credit Matrix Updates

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