

ISSUE #3C: GENERATION INPUTS

Step 1: Introduction and Education

Step 2: Description of the Issue

Objective

To introduce and educate on the following topics:

- Generation Inputs Background
- Operating Reserves
- Balancing Reserves
- Scheduling Elections
- Intentional Deviation and Persistent Deviation Penalties
- Energy Imbalance and Generation Imbalance Service Rates

Generation Inputs

- Each Balancing Authority (BA) is responsible for ensuring that electrical generation equals electrical load in its Balancing Authority Area (BAA).
- BPA must maintain reliability within its BAA in accordance with applicable NERC reliability standards.
- BPA utilizes generation inputs to provide Ancillary and Control Area Services to maintain load-resource balance at all times and to respond to the many variables that affect transmission system reliability in its BAA.
- Generation inputs are the various uses of generation resources that are needed by BPA in order to provide Ancillary Services, Control Area Services, and other services that are necessary to support reliable operations of the transmission system.

Current Service Design

- BPA is required to offer to provide and the customers are required to acquire reserves-based Ancillary and Control Area Services from BPA or by self-supply to meet OATT requirements.
- Reserves-based Ancillary and Control Area Services include:
 - Services using Balancing Reserve (BR) Capacity and Energy
 - Schedule 3 – Regulation and Frequency Response Service
 - Schedule 4 – Energy Imbalance Service
 - Schedule 9 – Generator Imbalance Service
 - Schedule 10 – Capacity for Generator Balancing Services
 - Services using Operating Reserve (OR) Capacity and Energy
 - Schedule 5 – Operating Reserve – Spinning Reserve Service
 - Schedule 6 – Operating Reserve – Supplemental Reserve Service

Ancillary Services If BPA Joins EIM

- If BPA joins the EIM, the CAISO does not become the BA for BPA. BPA will continue to assume all of the responsibility for managing and operating its BAA.
 - EIM is an energy market, not a capacity market
- BPA will continue to be responsible to meet its BA and tariff obligations, including the performance standards in BAL-001 and BAL-002.
- BPA must continue to ensure that as a BA, it has sufficient capacity to supply Ancillary and Control Area Services to loads and generators located in its BAA.
- Real-time load and generation energy imbalances within the BPA BAA will be settled through the EIM.
- BPA will need to evaluate Ancillary and Control Area Services in both the tariff and rate schedules.

Potential Issues Raised by Joining EIM

Areas that BPA will have to consider:

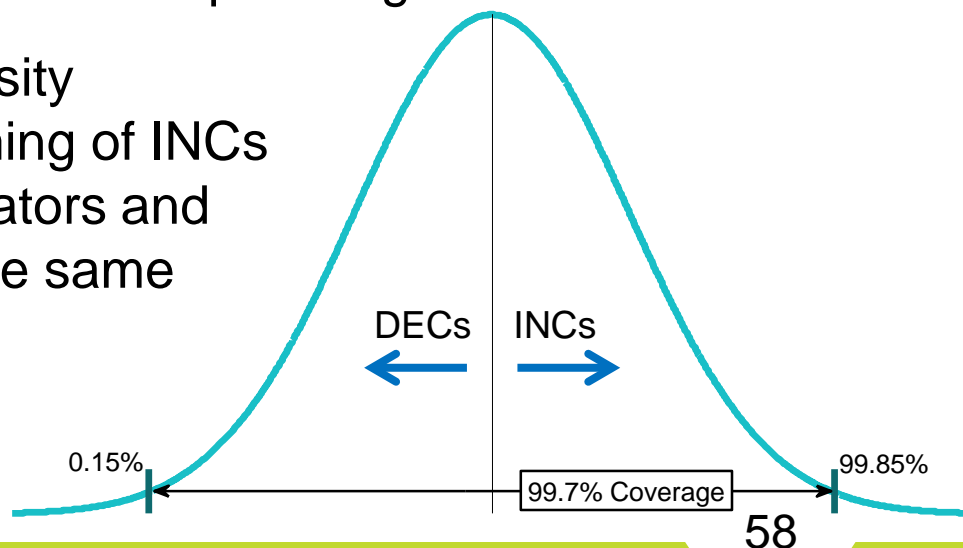
- Determination of the balancing reserve capacity and components
- Impacts of participating resources
- Scheduling election options
- Intentional Deviation and Persistent Deviation penalties
- Energy Imbalance and Generation Imbalance service rates

Operating Reserves

- Operating Reserves capacity requirement and deployment are defined by the NERC standards and the NWPP rules
 - Capacity requirement: 3% of online generation plus 3% of load
 - Qualifying events: defined through NWPP rules
- In the EIM:
 - All currently applicable Operating Reserves standards and rules continue to apply
 - Operating Reserves are held separate from the market and are designated in the hourly EIM Entity Scheduling Coordinator resource plan
 - After experiencing a qualifying event, the BA must notify the market, and the market will freeze EIM Transfer System Resources in and out of the BAA
 - This allows the BA (and the NWPP) to solve the contingency event without the market attempting to solve it for them
- No anticipated changes to Operating Reserves products due to the EIM

Current Balancing Reserve Methodology

- BPA holds capacity for balancing reserves to meet the NERC standards and OATT requirements to maintain load-resource balance within its BAA.
- Balancing reserves needed for the BPA BAA is set in advance of the start of each two-year rate period.
- BPA performs statistical evaluations of combined load and generation fleet error to yield a final amount of balancing reserve capacity needed to meet BPA's 99.7% planning standard.
- This evaluation captures diversity benefits —the difference in timing of INCs and DEC's deployed for generators and load—they don't all move in the same direction at the same time.

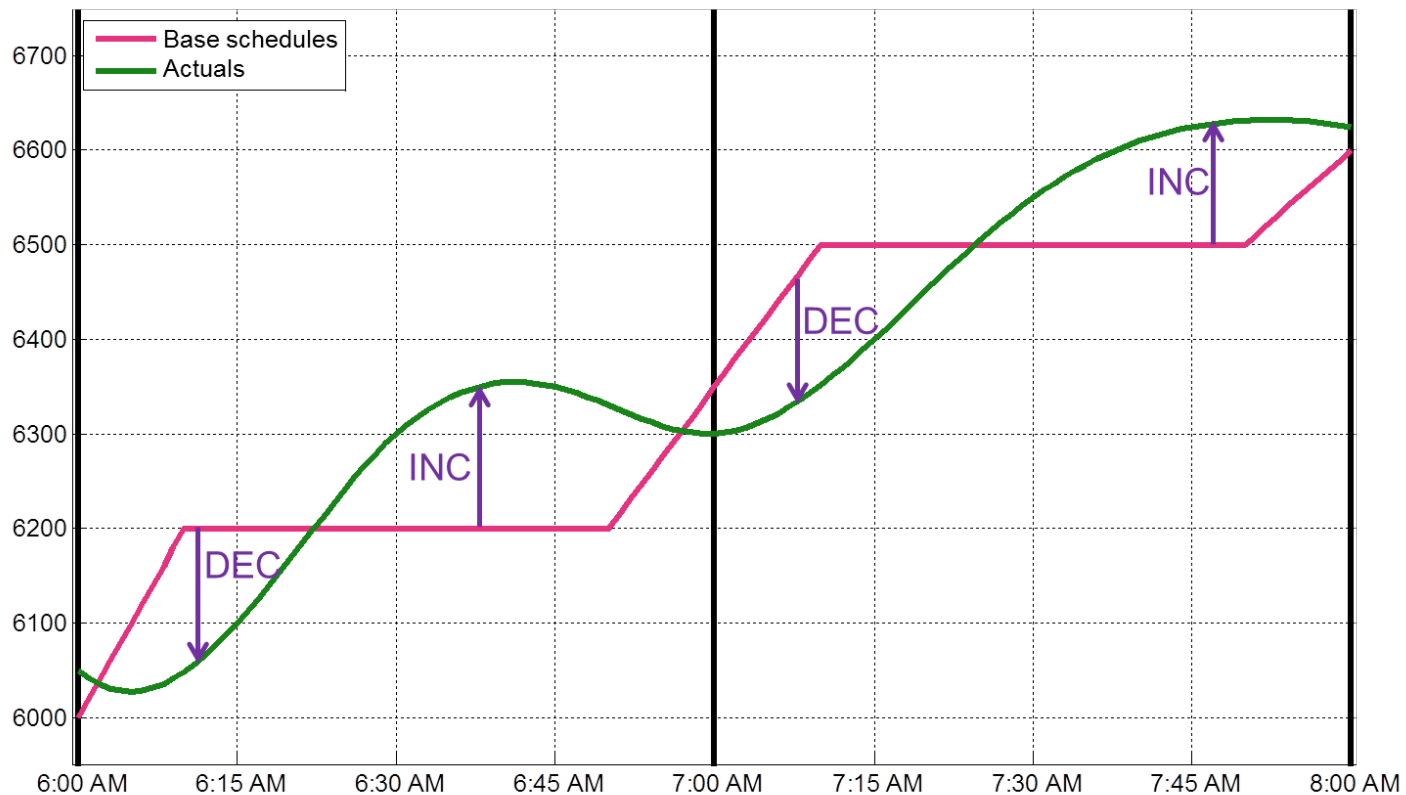


Balancing Reserve Capacity in EIM

- Today, BPA carries sufficient capacity to cover the error or uncertainty in its BAA.
 - BPA currently maintains a 99.7% planning standard for BAA balancing needs.
 - Error is the variability of load and generation vs. their schedule/forecast.
- In the EIM, the error or uncertainty (of loads and resources) in the BPA BAA is the same
- BPA is still responsible for carrying sufficient balancing reserve capacity to meet its BAA obligations, with or without participation in EIM.
 - BAA obligations are not the same as resource sufficiency requirements.
- The EIM will find the most economic deployment of energy from bid-in resources in the EIM footprint to meet the 5-minute dispatch.

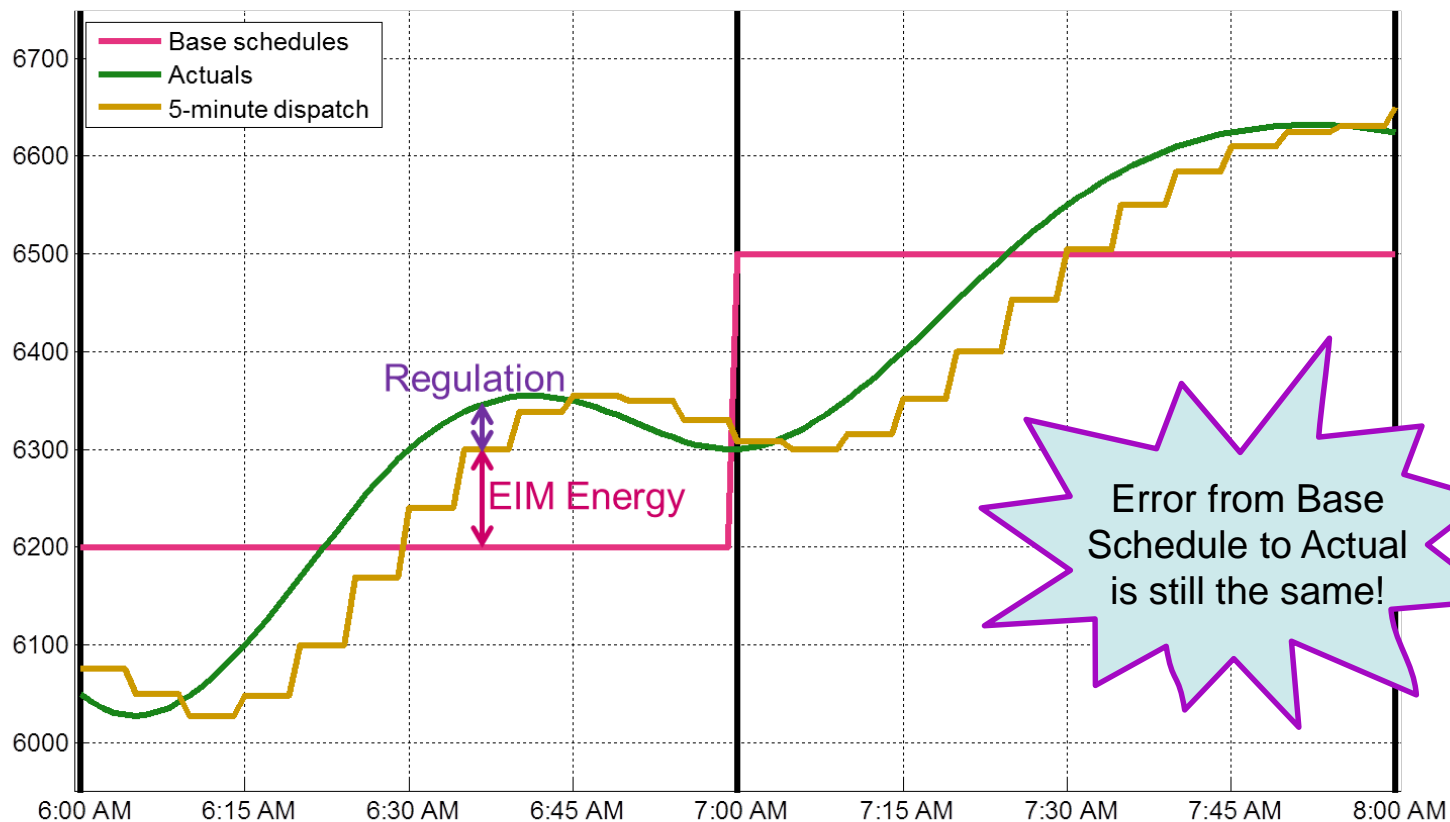
Balancing Reserves Today

- BPA currently holds balancing reserves in order to balance within-hour variability



Balancing Reserves in the EIM

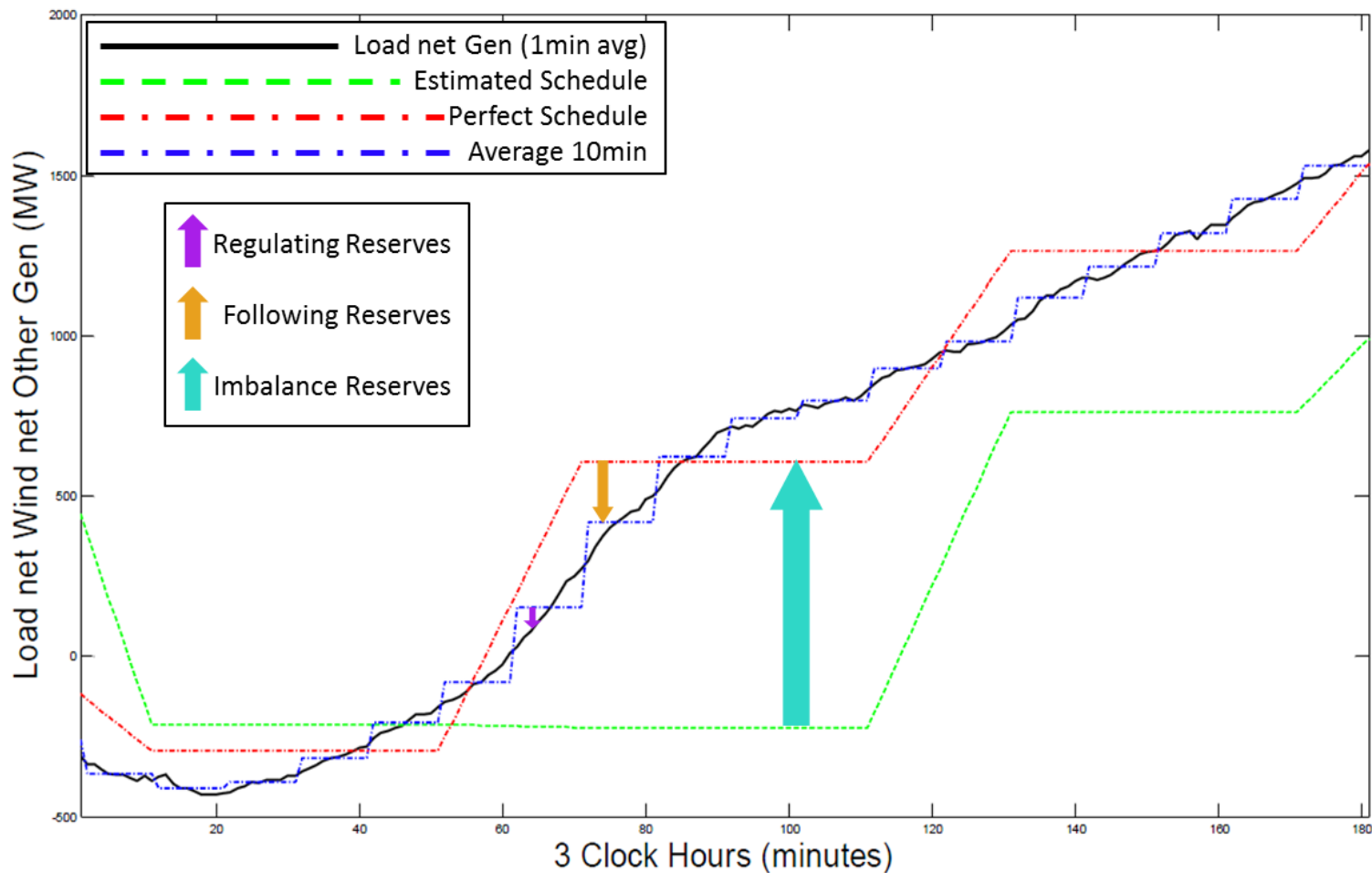
- Once in the EIM:
 - The BA dispatches regulation reserves (within-5 minute imbalance)
 - The EIM dispatches bid-in resources to meet imbalance



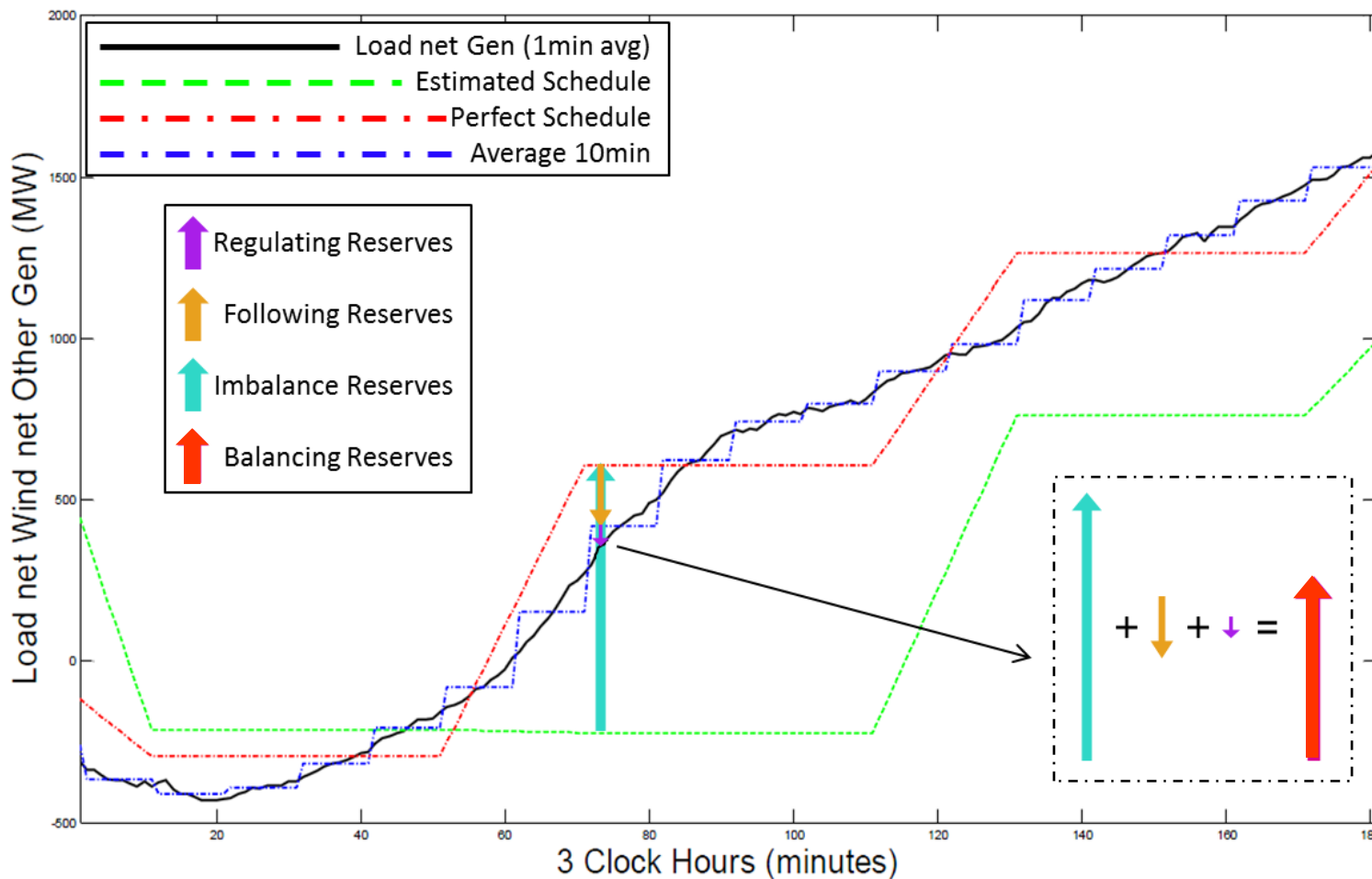
Current Methodology – 3 Components

- BPA’s balancing reserves consist of 3 components - Regulation (100% spin), Following (50% spin), and Imbalance (100% non-spin).
 - Regulation: The difference between actual Load net Generation and the 10-minute average of Load net Generation
 - Following: The difference between the 10-minute average of Load net Generation and the “perfect schedule” of Load net Generation
 - Perfect schedule: hourly average, ramped from xx:50 to xy:10
 - Imbalance: The difference between the “perfect schedule” of Load net Generation and the entered schedules/forecasts of Load net Generation
- History on 3 components
 - To date, no industry standard for regulation or balancing capacity requirements exist, while NERC standards focus solely on performance outcomes.
 - As part of the original Wind Initiative Team efforts, BPA collaborated with Pacific Northwest National Lab, producing a study on balancing wind variability in a BAA. Out of that study, definitions for regulation and following reserves were created. BPA further split following into 2 components, as listed above, to separately capture the capacity associated with forecast/scheduling error.
 - https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-17558.pdf

Current Methodology – 3 Components

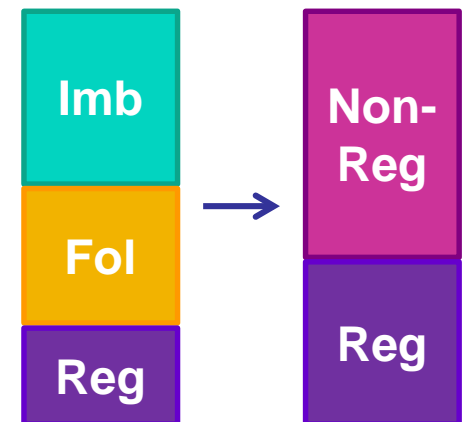


Current Methodology – 3 Components



Balancing Reserve Components in EIM

- BPA’s balancing reserves currently consist of 3 components - Regulation (100% spin), Following (50% spin), and Imbalance (100% non-spin).
 - These components were developed for the purpose of pricing, rate design, and determining the minimum amount of spinning reserve required by the FCRPS.
 - The current decomposition of balancing capacity into these three components is unique to the BPA BAA.
- BPA proposes to define balancing capacity as regulation and “non-regulation” capacity to promote consistency with definitions in the EIM.
 - Regulation Capacity = 100% Spin Balancing Reserves
 - The difference between actual Load net Generation and the net EIM dispatch operating target (DOT) of Load net Generation
 - “Non-Regulation” Capacity = TBD
 - BPA anticipates making available to the EIM the “non-regulation” reserve portion of its balancing reserve, by bidding or designating as Available Balancing Capacity (ABC)



Participating Resources in EIM

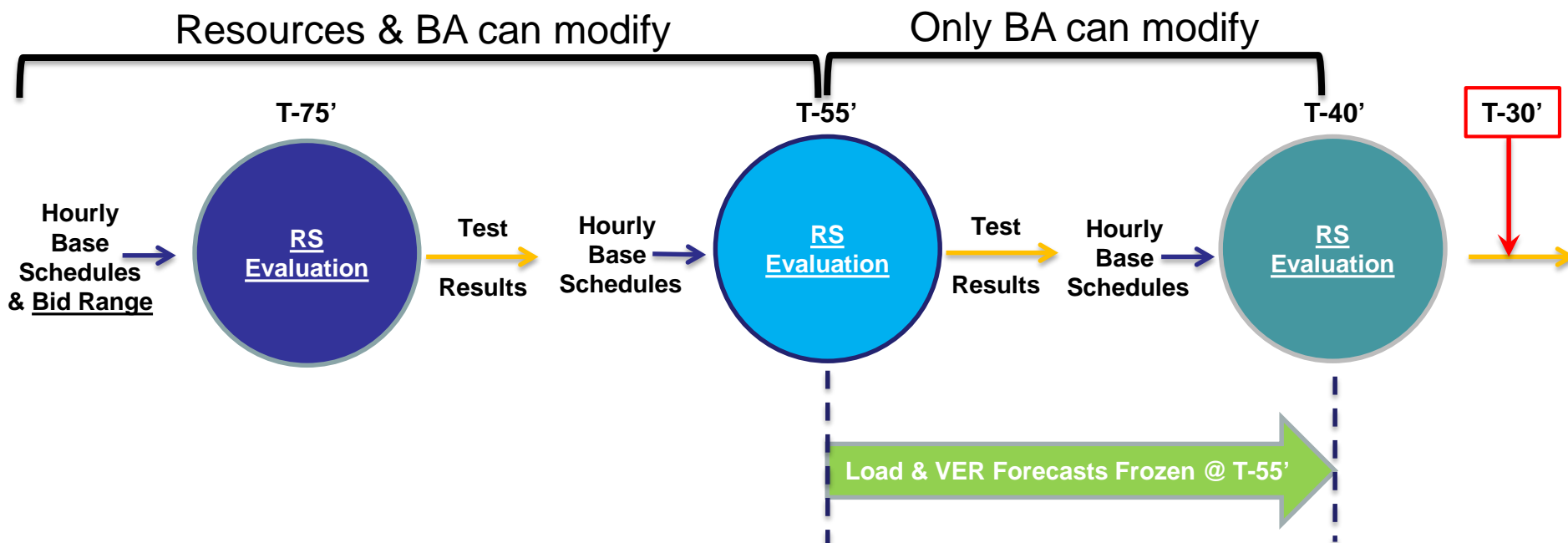
- Regardless of resource EIM participation status (PR and NPR):
 - Capacity for Generator Balancing Service is still required to meet the variability of resources
 - The resource may acquire these services from BPA (VERBS/DERBS) or the resource may elect to self-supply
- Does the EIM PR's capacity bid replace FCRPS BR capacity?
 - BPA needs certainty that sufficient capacity is available to the BA in order to maintain reliability and to meet the NERC standards
 - BPA sets the BR need in advance of the start of each two-year rate period
 - By the time the EIM PR's bid is known, BPA will have already committed to provide the BR capacity
- Thus, unless customers self-supply, they will have to purchase VERBS/DERBS whether they bid into the market or not

VERBS Scheduling Elections

- Current VERBS scheduling election options for wind and solar resources:
 - 30/60 Committed Scheduling -- customer commits to receive BPA's 30-minute signal for each 60-minute schedule period
 - 30/15 Committed Scheduling -- customer commits to receive BPA's 30-minute signal for each 15-minute schedule period
 - Uncommitted Scheduling -- customer does not commit to 30/60 or 30/15 committed scheduling

VERBS Scheduling Elections in EIM

- Issue:** Under the EIM scheduling timeline, current BPA-offered scheduling elections of 30/60 Committed and 30/15 Committed are no longer feasible, as hourly base schedules are finalized by T-55, with allowance for the BA to modify until T-40.



Intentional Deviation & Persistent Deviation

- Intentional Deviation (applied to variable generators) and Persistent Deviation (applied to load and dispatchable generators) are BPA penalty rates meant to discourage **leaning on the BA**
- In EIM:
 - Scheduling accuracy still impacts balancing reserves capacity need
 - BPA still has a need to not incur excess accumulated imbalance on the FCRPS
 - BPA still wants to incentivize accurate scheduling between the base schedule, e-tag, and forecast
- Need to evaluate Intentional Deviation and Persistent Deviation vs Over/Under Scheduling Penalty
 - Over/Under Scheduling Penalty: penalty meant to discourage entities from **leaning on the market**

Energy Imbalance & Generation Imbalance Service Rates

- Today, Energy Imbalance (EI) and Generation Imbalance (GI) are priced based on three “bands.”

| | |
|--------|--|
| Band 1 | EI and GI deviations of 1.5% or lower are settled at BPA’s incremental cost of energy |
| Band 2 | EI and GI deviations above 1.5% but below 7.5% are settled at BPA’s incremental cost of energy adjusted by a percentage (e.g., 110%/90%) |
| Band 3 | EI and GI deviations above 7.5% are settled at BPA’s highest/lowest incremental cost of energy adjusted by a percentage (e.g., 125%/75%) |

- EI/GI band structure will need to be further evaluated given the potential EIM entry
- Need to consider charge code allocation methodology regarding Uninstructed Imbalance Energy (UIE)/Instructed Imbalance Energy (IIE) charges

Next Steps

- Please provide feedback via techforum@bpa.gov (with copy to your account executive)

- The next Gen. Inputs Workshop will be tentatively on April 28th
 - Step 3: Analyze the Issue
 - Step 4: Discuss Alternatives