

Joint Operating Committee

May 27th, 2015

Bart McManus & Frank Puyleart



May 27th, 2015 JOC

- JOC Rules Overview
- DSO 216 Re-Design for 15 Minute Scheduling
 - DSO 216 Trigger Levels
 - DSO 216 Timing Levels
- BA Reliability Tool

May 27th, 2015 JOC

JOC Rules:

1. JOC meetings are open meetings to all interested parties, though they are targeted towards generation owners/operators.
2. Non-JOC member participation can be limited to ensure JOC members (BPA and generator owners/operators) are able to address all issues.

DSO 216 Re-Design for 15 Min Schedules

DSO 216 Level Trigger Thresholds

- Level at which BRD must be above for a DSO 216 event to initiate.

DSO 216 Level	Current Value	Proposed Value
Warnings	85%	85%
Level 1	90%	90%
Level 2	100%	97.5%

- Decreasing Level 2 to 97.5% gives time for DSO 216 to implement prior to over-deploying the FCRPS, which can be intensified by 15 min scheduling.

DSO 216 Re-Design for 15 Min Schedules

Dispatcher Review Time

- The time from a DSO 216 Alarm in which BPA Dispatchers have to review the event, discard the event or implement the event immediately
- After this time, the event will auto-implement, if criteria for the DSO 216 Alarm still exist.

DSO 216 Re-Design for 15 Min Schedules

Dispatcher Review Time, continued

- Current Dispatcher Review Time = 4.5 Minutes
- Proposed Review Time = 0 Minutes with Auto-Suspend for certain system events:
 - AC & DC RAS
 - Oversupply Management Protocol
 - The auto-re-enable after an oversupply management resolution will occur after a 5 minute delay
 - Large ACE Detection
 - Large ACE without corresponding Frequency change indicates a telemetry error.

DSO 216 Re-Design for 15 Min Schedules

Dispatcher Review Time, continued

- Why?
 - Dispatch rarely discards events
 - DSO 216 is explicitly designed to only impact the parties that are causing the problem.
 - Dispatch has the ability to Suspend DSO 216 for system problems in addition to the events listed above.

DSO 216 Re-Design for 15 Min Schedules

Minimum Time Between Event Levels

- Once a DSO 216 event level has been implemented, the system will pause for a specified amount of time before it will begin re-evaluating the Balancing Reserves Deployed for the next level.
- Currently the length of time the system pauses before re-evaluating Balancing Reserves Deployed is 10 minutes

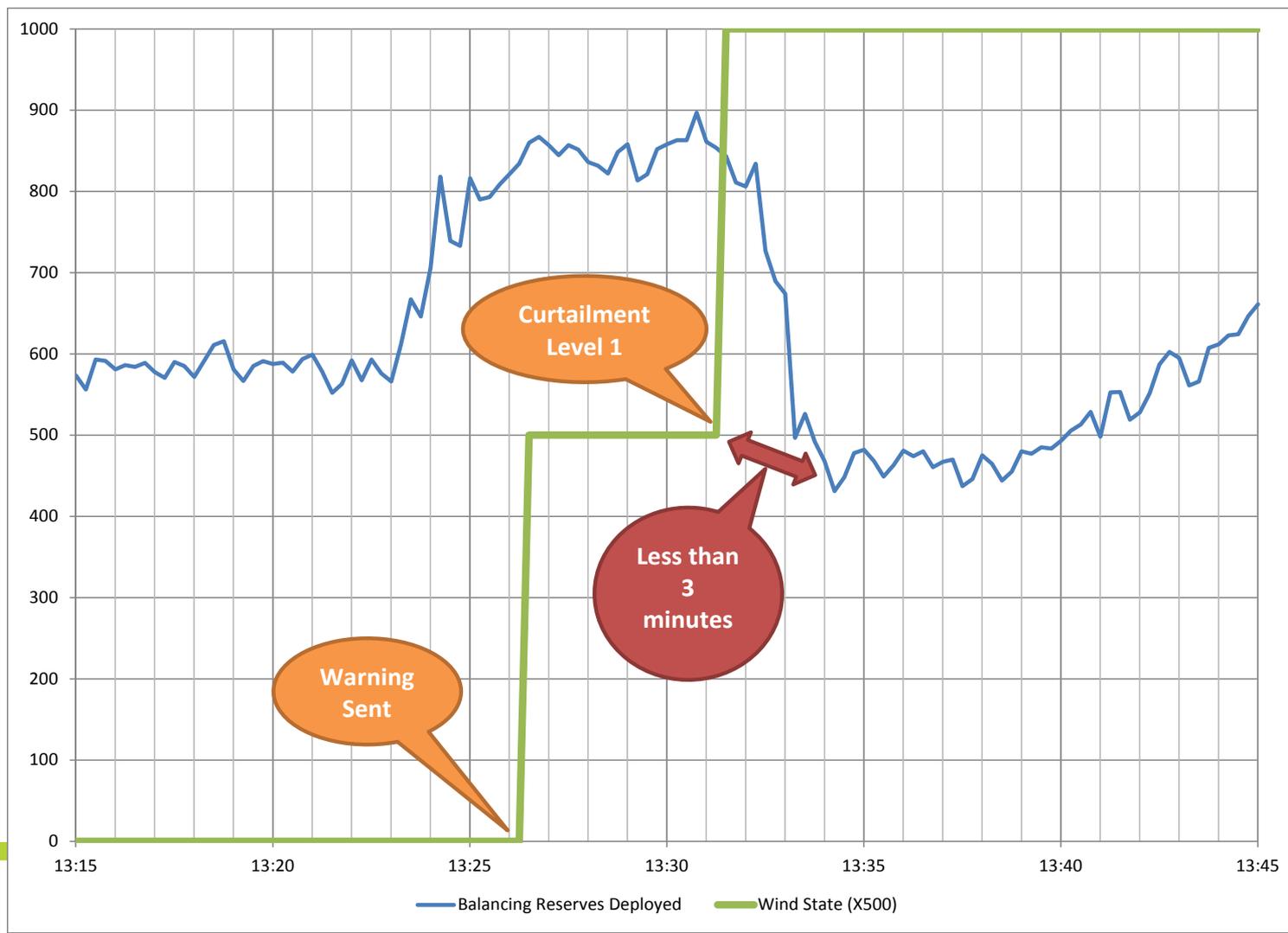
DSO 216 Re-Design for 15 Min Schedules

Minimum Time Between Event Levels, continued

- Proposed Minimum Time Between Levels is 5 Minutes
 - With 15 minute scheduling windows, 10 minutes is too long of a period to wait to re-examine use of Balancing Reserves Deployed.
 - Wind Curtailment events are reflected within 5 minutes of the onset of the event in the Balancing Reserves Deployed.
 - Wind Limit event performance has shown that 5 minutes is easily attainable.
 - Wind parties will still be given 10 minutes before strikes are assessed.

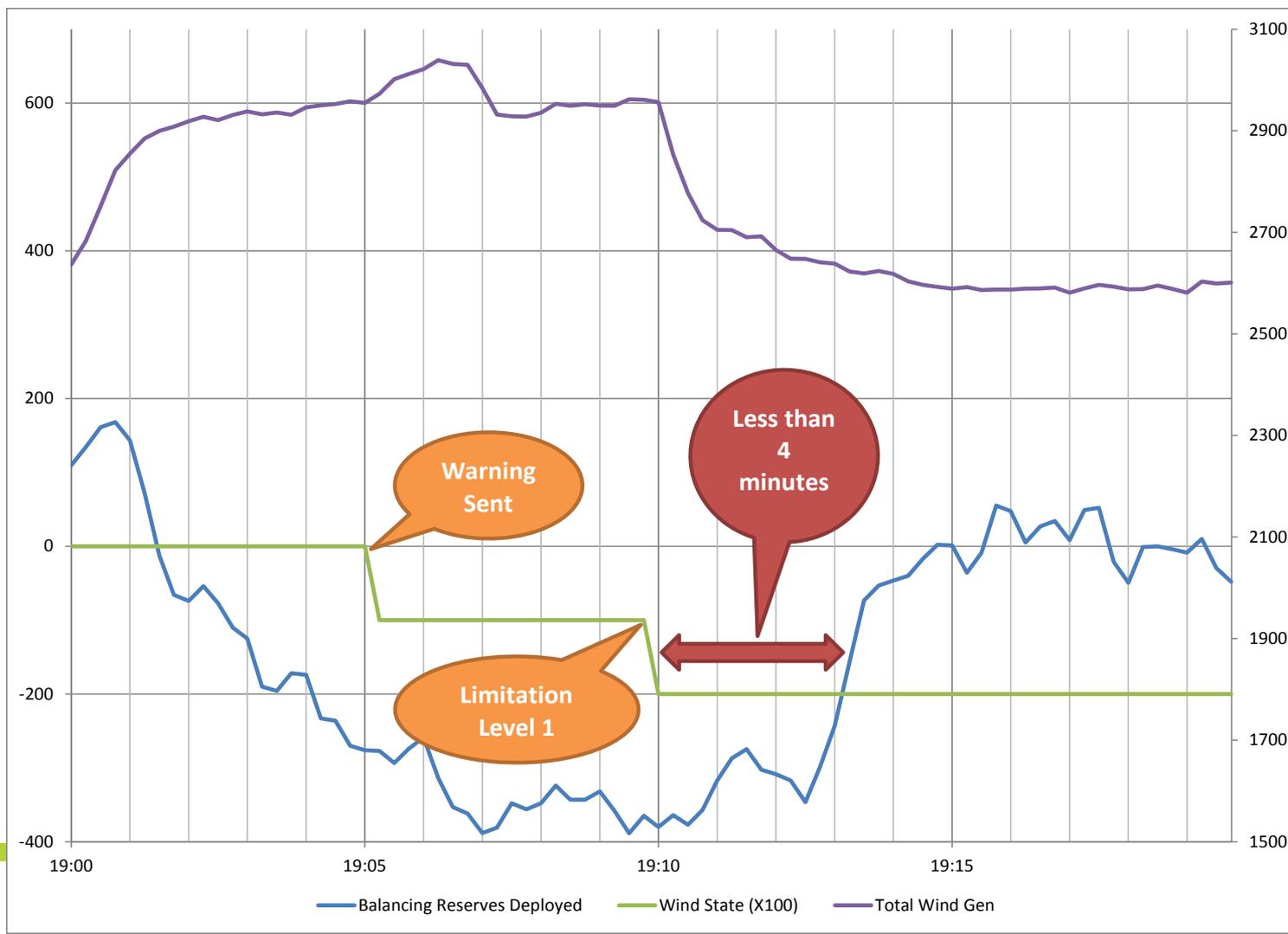
DSO 216 Re-Design for 15 Min Schedules

- Balancing Reserves Deployed response to a Curtailment



DSO 216 Re-Design for 15 Min Schedules

- Balancing Reserves Deployed response to a Limitation



DSO 216 Re-Design for 15 Min Schedules

In-Effect Periods

- The length of time in which the system remains in DSO event level.
- If a prior level is in effect, the next level can be reached during this time
- Currently:
 - Both Curtailments and Limitations are in effect for the remainder of the hour
 - During Limitations, the Wind State Flag resets to Normal at the top of the hour
 - During Curtailments, the Wind State Flag resets to Normal at 10 minutes prior to the top of the hour.

DSO 216 Re-Design for 15 Min Schedules

In-Effect Periods, continued

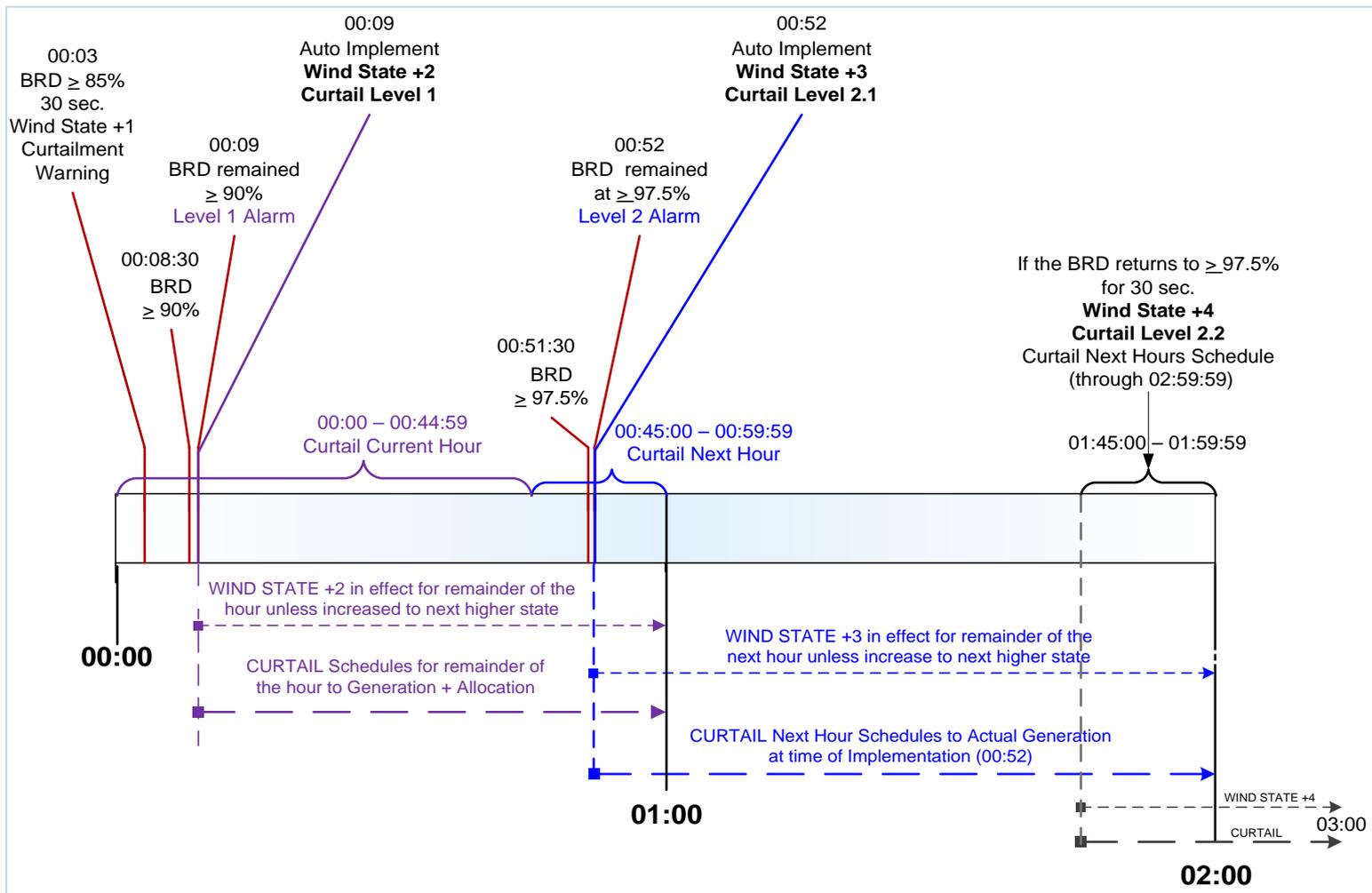
- Proposed In-Effect Periods when Events are implemented at:
 - xx:00 – xx:44:59
 - Limitations remain in-effect until to the top of current hour (1 hour max)
 - Curtailments apply to eTags currently in-effect and until to the top of current hour (1 hour max)
 - Reliability Limit placed on the current hour's eTags, not allowing adjustments above the Reliability Limit
 - Next higher Level can be reached anytime until the top of the current hour (1 hour max).

DSO 216 Re-Design for 15 Min Schedules

In-Effect Periods, continued

- Proposed In-Effect Periods when Events are implemented at:
 - xx:45 – xx:59:59
 - Limitations remain in-effect until to the top of next hour (1 hour 15 min max)
 - Curtailments apply to eTags in-effect for the next hour (1 hour max)
 - Reliability Limit placed on the next hour's eTags, not allowing adjustments above the Reliability Limit
 - Next higher Level can be reached anytime until the top of the next hour (1 hour 15 min max).

DSO 216 Re-Design for 15 Min Schedules



DSO 216 Re-Design for 15 Min Schedules

Blackout Periods

- During a blackout period, DSO 216 events are not implemented.
- Currently:
 - Limitations are not implemented between 10 minutes prior to the top of the hour and the top of the hour.
 - Curtailments are not implemented between 15 minutes prior to the top of the hour and the top of the hour.

DSO 216 Re-Design for 15 Min Schedules

Blackout Periods, continued

- Proposed Blackout Period = None
 - With 15 minute scheduling and the current blackout periods, it is possible that a schedule could exist completely within the blackout period.
 - Limitation Events with the new In-Effect Period can carry forward beyond the top of the current hour.
 - Curtailment Events with the new In-Effect Period can provide relief beyond the top of the current hour

DSO 216 Re-Design for 15 Min Schedules

Summary

- Level 2 Trigger Threshold = 97.5%
- Dispatcher Review Time = 0 Minutes w/auto suspend
- Minimum Time Between Event Levels = 5 Minutes
- In-Effect Periods are implemented at:
 - xx:00 – xx:49:59 to the top of current hour (1 hour max)
 - xx:50 – xx:59:59 to the top of the next hour (1hr. 10 min. max)
 - If a prior level is in effect, the next level can be reached.
- Blackout Periods = None

May 27th, 2015 JOC

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- **BA Reliability Tool**

Balancing Authority Reliability Tool

BA Reliability Tool and System Reliability

- The reliability of the system is at risk if BPA is unable to maintain load and resource balance in the balancing authority area because of extreme generator station control errors.
- The BA reliability tool is being designed to reduce generation station control error on the system when available balancing reserve capacity is exhausted to prevent the occurrence of a system emergency.
- For example, generation station control error may exceed available balancing reserve capacity from both the Federal system and third parties, as was observed this past Spring.
- During these rare events, BPA must be able to take steps to mitigate adverse impacts to system reliability.

Balancing Authority Reliability Tool

- Expands the operational reliability protocols to all non-controlling generation in the BA.
 - The Big 10 Generation (10 Federal Dams on the Columbia River and lower Snake River) are the excluded units, as they provide the FCRPS balancing reserves.
 - During under-generation events, schedules (or eTags) are cut to relieve the reliability event.
 - During over-generation events, only VERs must reduce generation to relieve the reliability event.
 - For Level 1 events (90% of balancing reserves deployed), reserve allocations are given to generators to allow for deviation from schedule within acceptable ranges.
 - For Level 2 events (currently 100% of balancing reserves deployed),
 - The system must have already recently experienced a Level 1 event.
 - No reserve allocations are given to greater assist the system in getting back to a reliable state.

Balancing Authority Reliability Tool

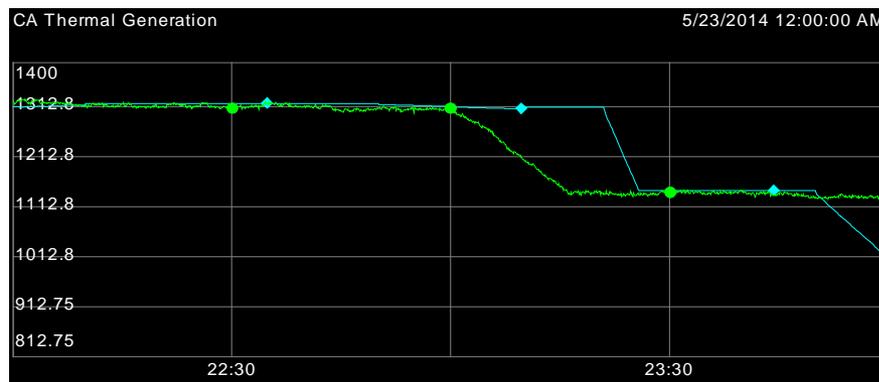
Federal Generation Impact: a Historical Look

- The BA Reliability tool is expected to have minimal impact to Federal resources.
- 2 years worth of DSO216 *inc* events were studied for Federal resource involvement.
- One event was found where a Federal resource may have been impacted by the BA Reliability tool.
- CGS actual generation ramped down faster than the submitted schedule.
- Total SCE was ~ 173 MW.
- This event occurred during a period of reduced reserves; with total *inc* reserves deployed being ~ 500 MW.

Balancing Authority Reliability Tool

Federal Generation Impact: a Historical Look

- It is not expected that the Federal System will be significantly affected by the Reliability Tool due to netting resources combined with the Federal allocation of reserves.
- However, should a similar event occur in the future; Hydro Duty would make changes to the schedule as needed to avoid being affected by the Reliability Tool.



Balancing Authority Reliability Tool

- “Netted” groups of plants will be allowed to combine their SCEs and reserve allocations for BA Reliability Tool events.
 - A “netted” group will combine its SCE for diversity benefits and its allocation of reserves for a larger operational deadband.
 - For under-generation (INC) events, when/if the group is subject to a curtailment, the curtailment amount will be a pro-rata curtailment applied across the plants within the netted group who are outside of their INC allocation.
 - For Level 1, this would be the difference between the “netted” groups basepoints and the “netted” groups generation plus allocated reserves
 - For Level 2, this would be the difference between the “netted” groups basepoints and the “netted” groups generation

Balancing Authority Reliability Tool

- “Netted” groups, continued
 - For over-generation (DEC) events, the “netted” group must keep their combined generation below:
 - For Level 1, this would be the “netted” groups basepoint (schedules) plus allocated DEC reserves
 - For Level 2 this would be the “netted” groups basepoint (schedules)
 - Any parties who wish to sign a netting agreement together may form a netted group, including different owners/operators and different resource types (VER, DER, etc.).

Balancing Authority Reliability Tool: Under-Generation (INC) Events

- Under-generation events are the times where the BA uses all (or a majority) of its INC balancing reserves due to:
 - Under-generation of non-controlling generation within the BA
 - Over-consumption of loads within the BA
- For under-generation (INC) events, generators will automatically have their schedules (eTags) curtailed by:
 - For Level 1, the difference between their basepoint (sum of schedules) and generation plus allocated INC reserves
 - For Level 2, the difference between their basepoint (sum of schedules) and generation
 - No generator operator action is required.
- It is BPA's intent to apply the under-generation BA Reliability Tool events to all non-controlling generation within the BPA BAA.

Balancing Authority Reliability Tool: Under-Generation (INC) Events

- All of the federal non-controlling generation will be
 - Subject to BA Reliability Tool under-generation events
 - Treated as a “netted” group for the use of the BA Reliability Tool
 - Only export schedules will be curtailed for federal generation.
- Behind-the-Meter Generation will be exempt from BA Reliability Tool Under-Generation (INC) Events, due to these generators:
 - Only serve internal load
 - Do not have eTags to curtail; They submit generation estimates only.
 - BPA would receive no relief from the reliability event by altering their basepoints
 - These projects amount to 195 MW of thermal generation and 294 MW of hydro generation in the BPA BAA.

Balancing Authority Reliability Tool: Over-Generation (DEC) Events

- Over-generation events are the times where the BA uses all (or a majority) of its DEC balancing reserves due to:
 - Over-generation of non-controlling generation within the BA
 - Under-consumption of loads within the BA
- For over-generation (DEC) events, generators must keep their generation below:
 - For Level 1, the requirement is the generator's basepoint (sum of schedules) plus allocated DEC reserves
 - For Level 2, the requirement is the generator's basepoint (sum of schedules)
- It is BPA's intent to only apply the over-generation BA Reliability Tool events to variable generation (VER) within the BPA BAA.

Balancing Authority Reliability Tool

Reserve Allocation Example

- In July 2014, BPA held 942 MW of INC Balancing Reserves
 - VER generators paid for and were allocated 569 MW of the total.
 - Load and non-VER/non-controlling generation in the BA pay (directly or indirectly) for the capacity associated with the remaining 373 MW
 - Because BPA will not drop load (unless directed by the RC and/or an Energy Emergency Level 3 is reached) and not all generators/loads are going to be off at the same time in the same direction, the remaining 373 MW of INC reserves can get spread among all of the non-VER/non-AGC generation
 - Federal Non-VER Non-AGC Generation = 3467 MW Nameplate
 - Non-Federal Non-VER Non-AGC Generation = 3948 MW Nameplate
 - Federal Non-VER Non-AGC Generation would be treated as a netted group with an INC allocation of $\sim 174 \text{ MW} = 373 * 3467 / (3467 + 3948)$
 - Non-Fed Non-VER Generation would receive 199 MW, which would spread out as the greater of 4.75% of nameplate (rounded to the nearest MW) or 1 MW.
 - These generators could opt to form a netted group to potentially shield each other.

Balancing Authority Reliability Tool

■ Sample Curtailment Event #1

Plant	Nameplate	INC Allocation	SC E	Netted INC	Netted SCE	Curtailment
VER 1	100	15	-23	N/A	N/A	-8
VER 2	100	15	-12	N/A	N/A	NONE
VER 3	260	39	-60	N/A	N/A	-21
FED 1	300	15	5	30	-19	NONE
FED 2	100	5	-13			NONE
FED 3	200	10	-11			NONE
DER 1	600	29	-25	N/A	N/A	NONE
DER 2	100	5	-12	N/A	N/A	-7
DER 3	50	2	4	N/A	N/A	NONE

Balancing Authority Reliability Tool

■ Sample Curtailment Event #2

Plant	Nameplate	INC Allocation	SC E	Netted INC	Netted SCE	Curtailment
VER 1	100	15	3	N/A	N/A	NONE
VER 2	100	15	-37	N/A	N/A	-22
VER 3	260	39	-75	N/A	N/A	-36
FED 1	300	15	-17	30	-50	-1
FED 2	100	5	4			NONE
FED 3	200	10	-37			-19
DER 1	600	29	-45	N/A	N/A	-16
DER 2	100	5	13	N/A	N/A	NONE
DER 3	50	2	-5	N/A	N/A	-3