

Scheduling & Dispatch

Treatment of Non-Priority Dispatch Renewables (NPDRs)

Modifications Committee

5th December 2023

This presentation provides background, content, and an explanation for the proposed changes to the Trading & Settlement Code for the Scheduling & Dispatch Programme initiative SDP_001: Treatment of Non-Priority Dispatch Renewable (NPDR) Units.

Achievable - Valuable - “Simple”



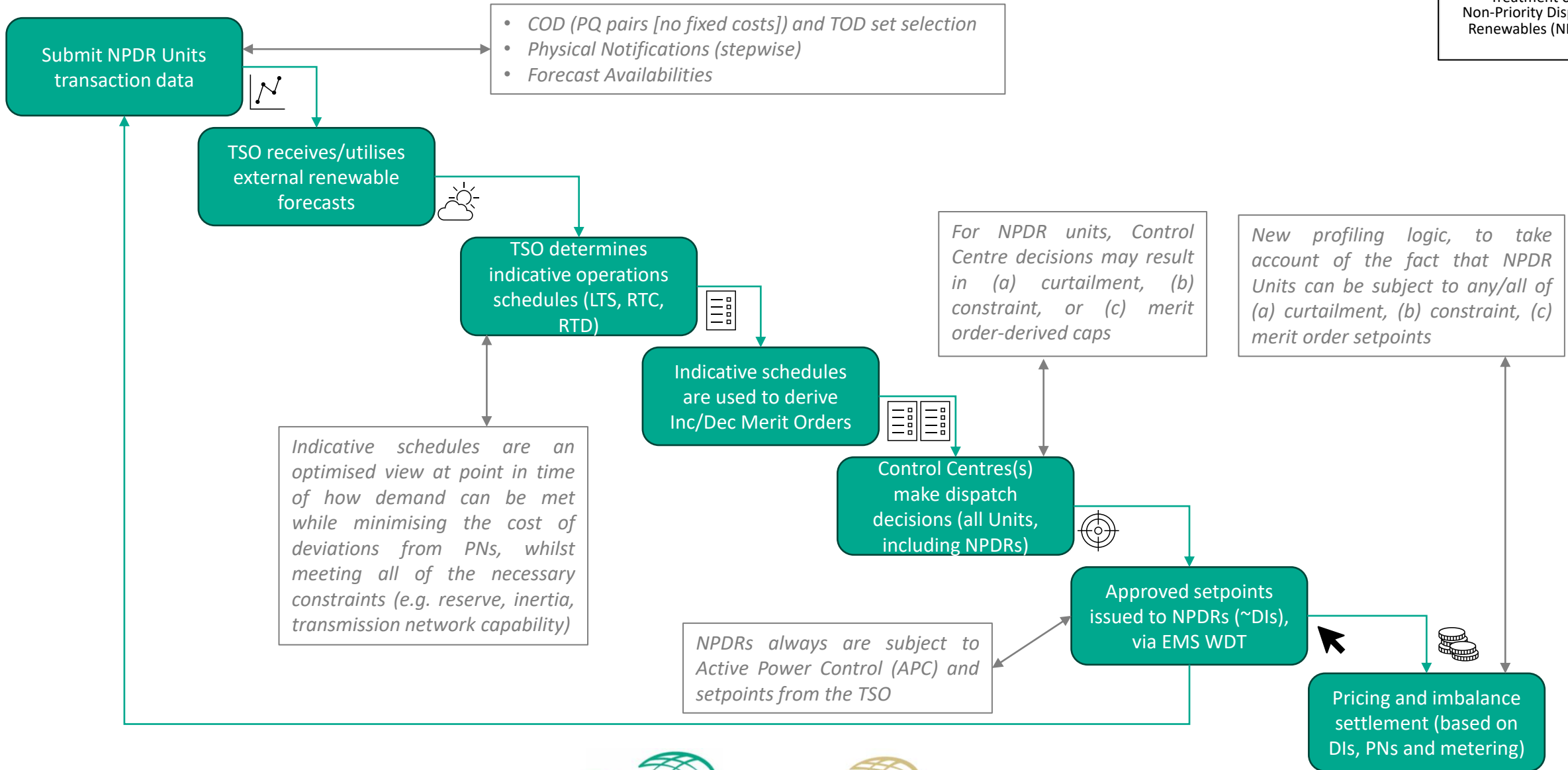
Regulatory Context

- The SEM Committee published a proposed decision on the treatment of new renewables, SEM-21-027, based on parts of Articles 12 and 13 of Regulation (EU) 2019/943.
- Controllable non-dispatchable generators without priority dispatch (NPDRs) are referred to as Category 2 in this proposed decision.
- NPDRs are to be treated on an economic basis in a similar manner to dispatchable generators for ‘dispatch’ (i.e. energy balancing), including:
 - Submission of Commercial Offer Data,
 - Submission of Technical Offer Data, and
 - Submission of Physical Notifications reflective of ex-ante position.
- NPDRs are to be treated similarly to renewable generators with priority dispatch for non-market based ‘redispatch’ (i.e. constraint and curtailment).



Treatment of Non-Priority Dispatch Renewables (NPDR)

SDP_001: Day in the life



Commercial Offer Data (COD)

- Controllable non-dispatchable generators without priority dispatch will be required to submit Commercial Offer Data in a similar manner to dispatchable generators.
- Must submit standing Complex Commercial Offer Data as a minimum.
- May also submit Simple Commercial Offer Data.
- May update Commercial Offer Data up to gate closure 2 for each imbalance settlement period.

SEM-21-027: In order to accommodate new units which would have previously qualified for priority dispatch and have been categorised to date as non-dispatchable but controllable (Category 2), the RAs are of the view that such units would be required to ... submit PNs, COD and TOD in so far as it is applicable to them.



Fixed Costs

The TSOs and SEMO propose that Start-Up and No-Load will be mandated to be submitted as zero.

- Start-up costs primarily represent additional fuel costs associated with a thermal generator moving from a desynchronised state to its minimum stable generation.
- Wind and solar units will not synchronise or desynchronise, do not have warmth states.
- These units will be permanently energised and subject to a control set point unless on outage.
- *T&SC Glossary: Start up means the process of bringing a Generator Unit to a Synchronised state, from a cold, warm or hot (Desynchronised) Warmth State.*

We have requested that participants send supporting evidence for the application of fixed costs to NPDRs for consideration by the TSOs and SEMO. We will keep this under review and make updates to the mod proposal if necessary.



Forecast Availability, Minimum Output and Minimum Stable Generation

- May be submitted up to gate closure 2 for each imbalance settlement period.
- Forecast Availability
 - Participant's forecast of average level of availability for the unit for each imbalance settlement period.
 - Control centre engineers may choose to use this forecast as an input to scheduling.
- Forecast Minimum Output
 - Must be submitted as zero (similar to all other generators except for battery storage units and pumped storage units).
- Forecast Minimum Stable Generation
 - Must be submitted as zero. This is to reflect that these units will be considered 'on' when Forecast Availability is greater than zero, and can be scheduled to anywhere in the range between zero and Forecast Availability.



Technical Offer Data

- Controllable non-dispatchable generators without priority dispatch will be required to submit Technical Offer Data in a similar manner to dispatchable generators.
- Given the nature of NPDRs, most of the VTOD parameters will not be relevant and will therefore be NULL or set to a value which denotes that it does not apply.
- Expected values for non-applicable parameters current being confirmed with MMS vendor



Physical Notifications

- The SEM Committee have requested that NPDRs submit PNs reflective of ex-ante position in a similar manner to dispatchable generators, with no change to the timing of submission of PNs.

SEM-21-027: The RAs are of the view that no change to the timing of submission of PNs for different units is required at this stage.

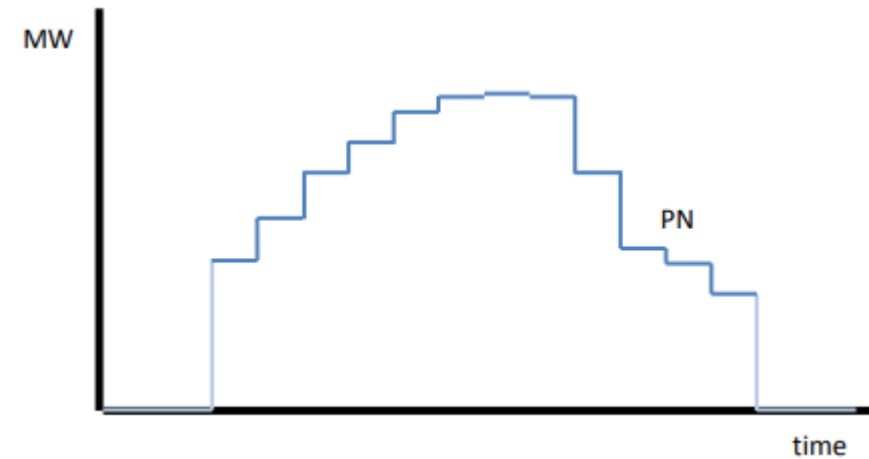
SEM-20-028: A participant's PN submission represents the participant's best estimate of its intended level of generation and expected trade volumes. At gate closure, these are linked to ex-ante trades, i.e. FPNs which reflect traded volumes.



Physical Notifications

As is described in the existing text in the Trading and Settlement Code Appendix I, Physical Notifications for non-dispatchable generators must be stepwise linear ('A04' format).

- (d) A Participant submitting Physical Notification Data shall submit Physical Notification Data for a Supplier Unit, for a Generator Unit which has a Registered Capacity of less than the De Minimis Threshold, or a Generator Unit which is not Dispatchable, and the Aggregator of Last Resort submitting Physical Notification Data shall submit Physical Notification Data on behalf of Generator Units, in the following way while being deemed to be compliant with the requirements in paragraphs D.7.1.3 and D.7.1.4:
- (i) Each From MW Time and To MW Time must be at the start of a minute which corresponds to the start of a thirty minute period, starting on each hour, and half hour;
 - (ii) Each From MW Time must have the same value as the immediately previous To MW Time, with the exception of the first From MW Time for a Trading Day;
 - (iii) Each From MW Level must have the same value as the To MW Level;
 - (iv) Each From MW Level and To MW Level submitted in respect of a Dispatchable Generator Unit cannot be less than the Registered Minimum Output for the Unit, and cannot be greater than the Maximum Generation for the Unit, submitted in accordance with Appendix H "Data Requirements for Registration"; and
 - (v) All Physical Notification Data for a Trading Day must be submitted in this way if Physical Notification Data for any time within that Trading Day is submitted in this way.



Price of Energy Balancing Actions

- Bid Offer Acceptances resulting from dispatch (energy balancing actions, MWOFF dispatch instructions or resulting pseudo instructions) will be settled using participant-submitted Commercial Offer Data as is currently done for dispatchable generators.

SEM-21-027: New generators which are no longer eligible for priority dispatch will be subject to energy balancing actions by the TSOs, will be considered in TSO dispatch tools as part of the economic merit order, and settled like any other instance of balancing energy.



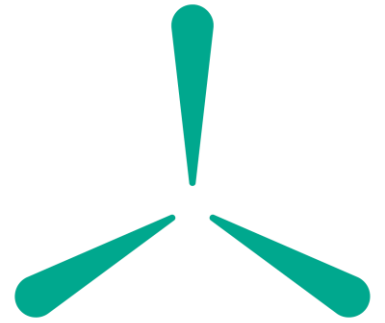
Price of Constraint and Curtailment Actions

- Bid Offer Acceptances resulting from redispatch (constraint or curtailment, LOCL or CURL dispatch instructions) will have a deemed decremental price of zero applied as is done currently done for controllable non-dispatchable generators with priority dispatch.



Uninstructed Imbalance Tolerance

- We propose that the Engineering Tolerance Uninstructed Imbalance parameter (TOLENG) be redefined (to be confirmed with vendor) as a per-unit parameter so that a suitable value can be applied to controllable, non-dispatchable generators only, as provided for in SEM-21-027.
- This will allow for instantaneous ramp rates to be included in market systems as it is for controllable, non-dispatchable generators with priority dispatch, without penalising these generators for the difference between actual ramp rates and the assumed instantaneous rates.
- It will also allow for variations from Dispatch Quantity for these units caused by fluctuations in their underlying variable renewable resource (i.e. wind or solar irradiance).
- *Trading and Settlement Code Glossary: Engineering Tolerance (TOLENG) means the percentage tolerance between the Dispatch Quantity under a Dispatch Instruction and Actual Output of a Generator Unit, without accounting for frequency deviations, within which the Generator Unit is deemed to be operating in accordance with its Dispatch Instruction, and which is used in the calculation of Uninstructed Imbalances.*



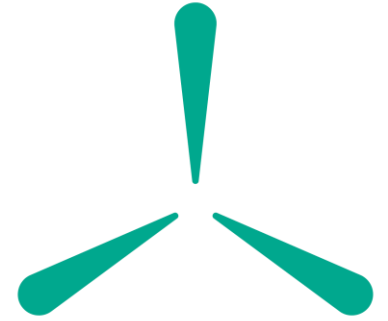
Uninstructed Imbalance Tolerance

F.9.2.4 The Market Operator shall calculate the Engineering Limit Quantity ($qLIMENG_{uy}$) for each Generator Unit, u , in each Imbalance Settlement Period, γ , as follows:

$$qLIMENG_{uy} = \text{Max} \left(\left| \frac{QD_{uy}}{DISP} \right| \times TOLENG_u, TOLMW_t \right)$$

where:

- (a) QD_{uy} is the Dispatch Quantity for Generator Unit, u , in Imbalance Settlement Period, γ ;
- (b) $TOLENG_u$ is the Engineering Tolerance for Generator Unit, u ;
- (c) $DISP$ is the Imbalance Settlement Period Duration; and
- (d) $TOLMW_t$ is the MW Tolerance for the relevant Imbalance Settlement Period, γ , within Trading Day, t .



Instruction Profiling - Requirements

- Need the ability to profile energy balancing, constraint and curtailment actions for NPDRs.
- Need the ability to assign the correct volumes and prices to each action.
- Final Physical Notifications are to be based on participant submitted data, not availability as is the case for controllable non-dispatchable generators with priority dispatch.
- Profiling of constraint and curtailment instructions for controllable, non-dispatchable generators with priority dispatch is to remain unchanged.

SEM-21-027: The RAs understand that the Wind Dispatch Tool currently only applies constraints and curtailment to renewable units and does not account for balancing energy. The functionality to accommodate new renewable units will need to account for several bid offer acceptances due to TSO actions on such units.



Instruction Profiling - Existing

CURL/LOCL Profiles	MWOF and Pseudo Instruction Profiles
FPN set to availability ex-post	FPN submitted by participant based on ex-ante position
Decs only	Incs or decs
Instantaneous ramping	Profiled as per TOD
CURL/LOCL profiles stay open until explicitly closed with CRLO/LCLO instructions	Continuous open acceptance until next MWOF or pseudo instruction
Can have CURL and LOCL profiles active simultaneously	Only one MWOF or pseudo instruction can be active at a time, each closes the last
Each CURL/LOCL is a single order, even if a subsequent CURL/LOCL instruction amends the MW target level, no pseudo instructions needed	Any change requires a new instruction/pseudo instruction and a new order
Profiles can span across ISPs (do not need to apply different prices in each ISP)	Open orders close at ISP boundary and new pseudo instructions create new orders so that correct prices can be applied



Instruction Profiling - Proposals

- Energy balancing actions (MWOFF dispatch instructions and resulting pseudo instructions) will not close on receipt of a LOCL, CURL, LCLO or CRLO dispatch instruction, only on receipt of the next adjacent energy balancing action, allowing profiles for energy balancing/constraint/curtailment to be open at once.
- A dispatch instruction or pseudo instruction is considered adjacent with another dispatch instruction or pseudo instruction if there is no active CURL or LOCL instruction with a target instruction level between the target instruction levels of those instructions at the effective time of the dispatch instruction being applied.
- An energy balancing profile will not be amended while there is a constraint or curtailment action active with a target instruction level below it. New pseudo instructions will not be created for energy actions in this case, the instruction open when the constraint or curtailment is applied will persist.
- As a result, COD applicable at the effective time of the energy balancing action will be used for the duration of time that the constraint or curtailment is active.



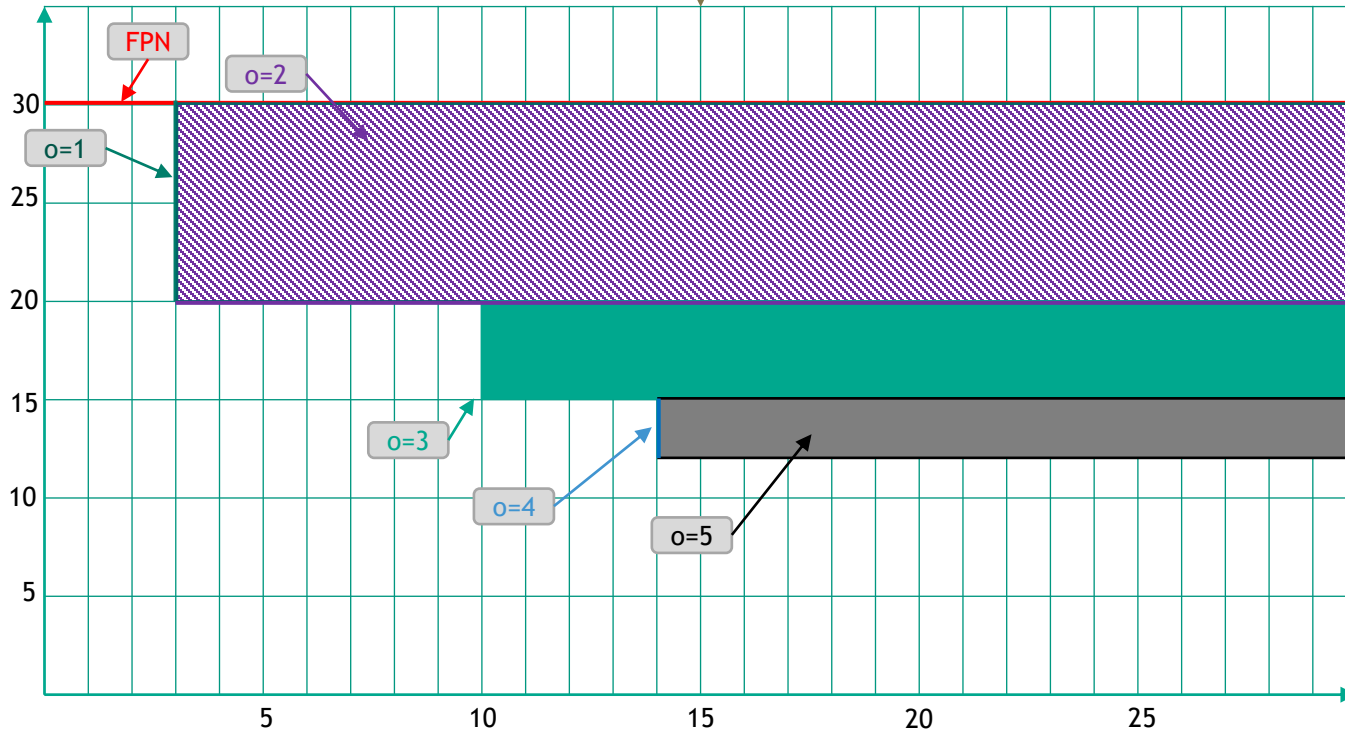
Instruction Profiling - Proposals (contd.)

- Each instruction will be profiled from and to the profile of the previous order.
- Dispatch quantity will be equal to:
 - The minimum of availability and the minimum active target instruction level if the minimum target instruction level is associated with a constraint or curtailment action (as per the current treatment of constraint and curtailment profiles).
 - The minimum active target instruction level if the minimum target instruction level is associated with an energy balancing action (as per the current treatment of energy balancing profiles).



EX01: Basic example: MWOs either side of constraint (LOCL)

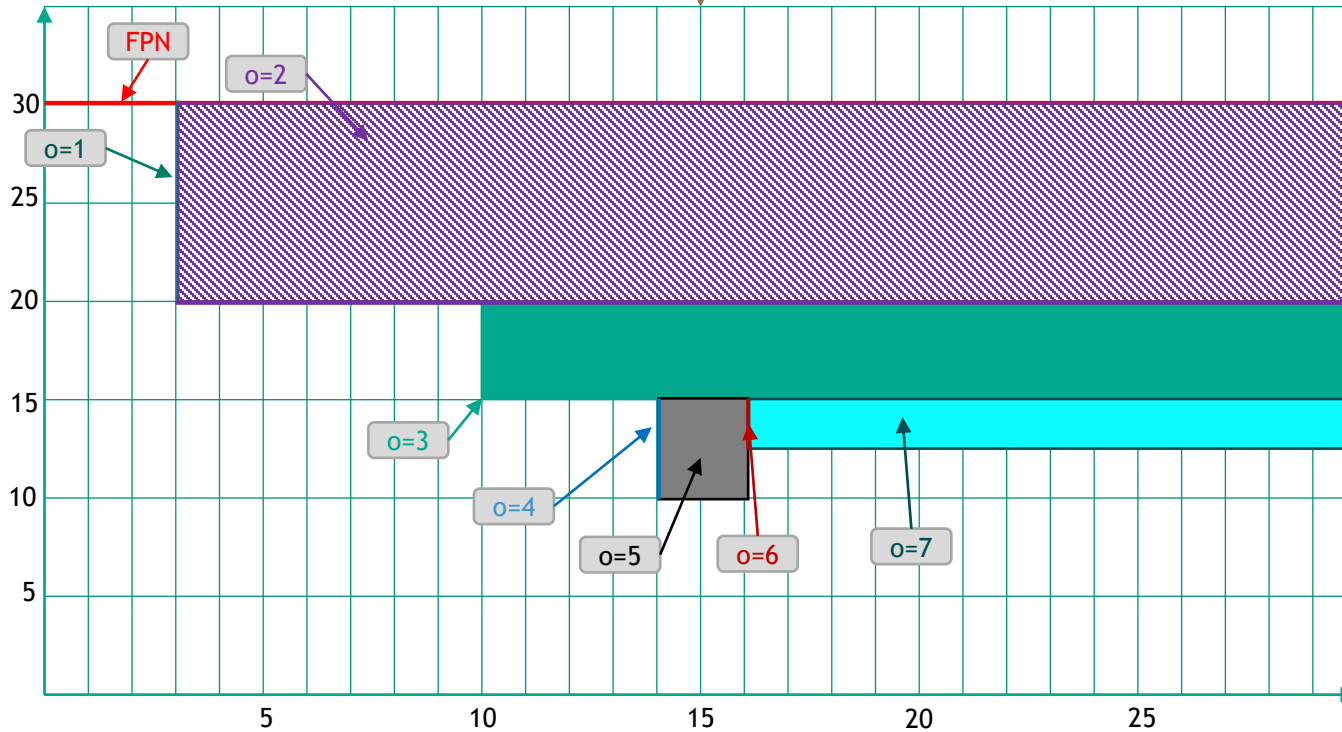
Issued Instructions		
Time (minute)	Type	MW
3	MWOF	20
10	LOCL	15
14	MWOF	12



Order	Profile					Notes
FPN	30					re: FPN (30)
o=1	30 @1-3	20 @ 3	30 @ 3-30			Profile to MWOF#1 target, return to previous profile
o=2	30 @1-3	20 @ 3-30				Create PMWO#1 profile (follow previous profile until MWOF target is met, then extend)
o=3	30 @1-3	20 @ 3-10	15 @ 10-30			Profile LOCL (go to target level and persist)
o=4	30 @1-3	20 @ 3-10	15 @ 10-14	12 @ 14	15 @ 14-30	Profile to MWOF#2 target and return to previous profile (do not close existing PMWO)
o=5	30 @1-3	20 @ 3-10	15 @ 10-14	12 @ 14-30		Create PMWO#2 profile (follow previous profile until MWOF target is met, then extend)

EX02: multiple MWOFs with reducing DEC

Time (minute)	Type	MW
3	MWOF#1	20
10	LOCL	15
14	MWOF#2	10
16	MWOF#3	12



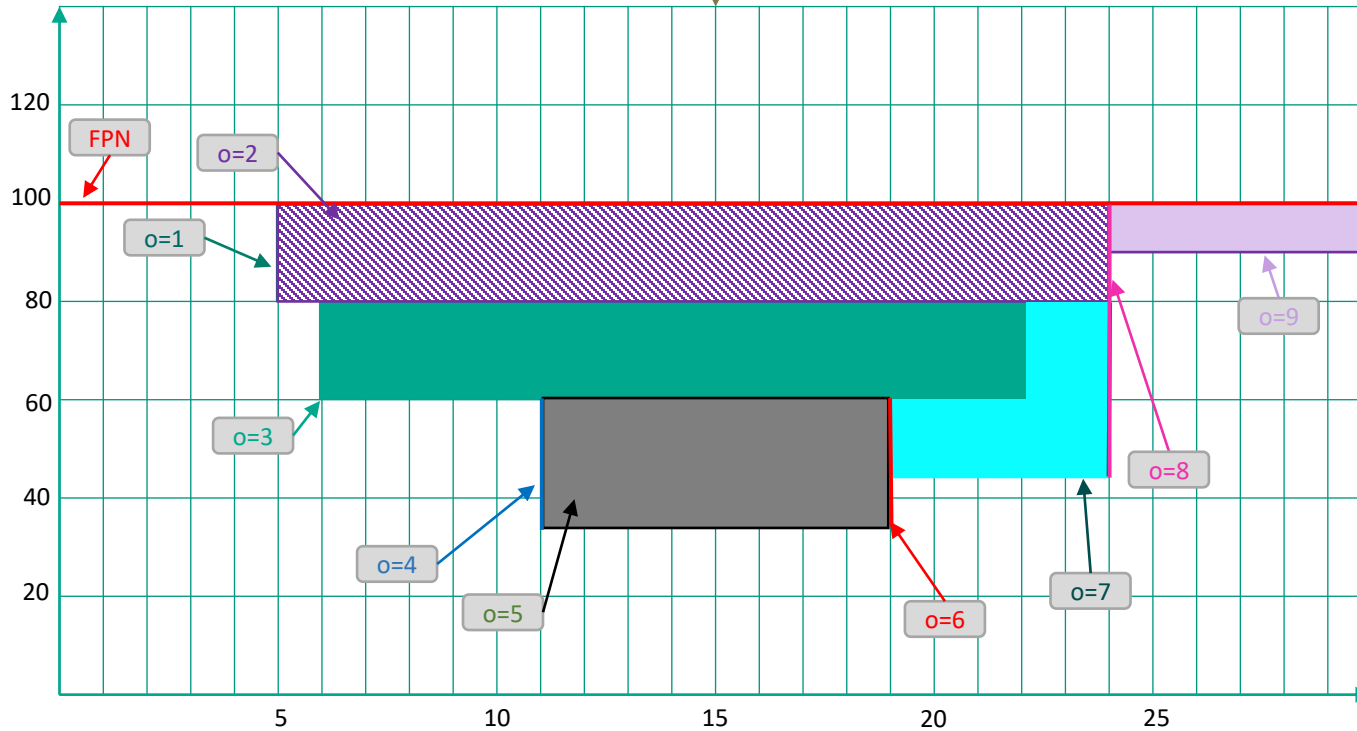
Order	Profile						Notes
FPN	30						re: FPN (30)
o=1	30 @1-3	20 @ 3	30 @ 3-30				Profile to MWOF#1 target, return to previous profile
o=2	30 @1-3	20 @ 3-30					Create PMWO#1 profile (follow previous profile until MWOF target is met, then extend)
o=3	30 @1-3	20 @ 3-10	15 @ 10-30				Profile LOCL (go to target level and persist)
o=4	30 @1-3	20 @ 3-10	15 @ 10-14	10 @ 14	15 @ 14-30		Profile to MWOF#2 target and return to previous profile (do not close existing PMWO)
o=5	30 @1-3	20 @ 3-10	15 @ 10-14	10 @ 14-16	15 @ 16-30		Create PMWO#2 profile (follow previous profile until MWOF target is met, then closed to previous profile when subsequent MWOF profiled)
o=6	30 @1-3	20 @ 3-10	15 @ 10-14	10 @ 14-16	12 @ 16 15 @ 16	15 @ 16-30	Profile to MWOF#3 target, return to previous profile
o=7	30 @1-3	20 @ 3-10	15 @ 10-14	10 @ 14-16	15 @ 16	12 @ 16-30	Create PMWO#3 profile (follow previous profile until MWOF target is met, then extend)

EX10: Multiple MWOFs, MWOFs closing towards FPN

Time (minute)	Type	MW
5	MWOF#1	80
6	LOCL	60
11	MWOF#2	35
19	MWOF#3	45
22	LCLO	
24	MWOF#4	90

Important Note:

PMWO is not closed when MWOFF instructions are not adjacent. Adjacent means there is no LOCL or CURL between the MWOFF actions. Logic is applied only when a new MWOFF is opened and not at any other time



Order	Profile						Notes
FPN	100						re: FPN (30)
o=1	100 @1-5	80 @ 5	100 @ 5-30				Profile to MWOF#1 target, return to previous profile
o=2	100 @1-5	80 @ 5-24	100 @24-30				Create PMWO#1 profile (follow previous profile until MWOF target is met, then extend)
o=3	100 @1-5	80 @ 5-6	60 @ 6-22	80 @ 22 - 24	100 @24-30		Profile LOCL (go to target level and persist)
o=4	100 @1-5	80 @ 5-6	60 @ 6-8	35 @ 11	60 @ 11-22	80 @ 22 -24 100 @24-30	Profile to MWOF#2 target and return to previous profile (do not close existing PMWO)
o=5	100 @1-5	80 @ 5-6	60 @ 6-8	35 @ 11-19	60 @ 19-22	80 @ 22 -24 100 @24-30	Create PMWO#2 profile (follow previous profile until MWOF target is met, then closed to previous profile when subsequent MWOF profiled)
o=6	100 @1-5	80 @ 5-6	60 @ 6-8	35 @ 11-19	45 @ 19 60 @ 19-22	80 @ 22 -24 100 @24-30	Profile to MWOF#3 target, return to previous profile
o=7	100 @1-5	80 @ 5-6	60 @ 6-8	35 @ 11-19	45 @ 19-24	100 @24-30	Create PMWO#3 profile (follow previous profile until MWOF target is met, then extend)
o=8	100 @1-5	80 @ 5-6	60 @ 6-8	35 @ 11-19	45 @ 19-24	90@24 100 @24-30	Profile to MWOF#4 target, return to previous profile
o=9	100 @1-5	80 @ 5-6	60 @ 6-8	35 @ 11-19	45 @ 19-24	90@24-30	Create PMWO#4 profile (follow previous profile until MWOF target is met, then extend)

Next Steps

- Further sessions to be offered by TSOs and SEMO as required.
- Vote at next Mods Committee meeting in February.

