

Scheduling & Dispatch

Treatment of Non-Priority Dispatch Renewables (NPDRs)

17th January 2024

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”



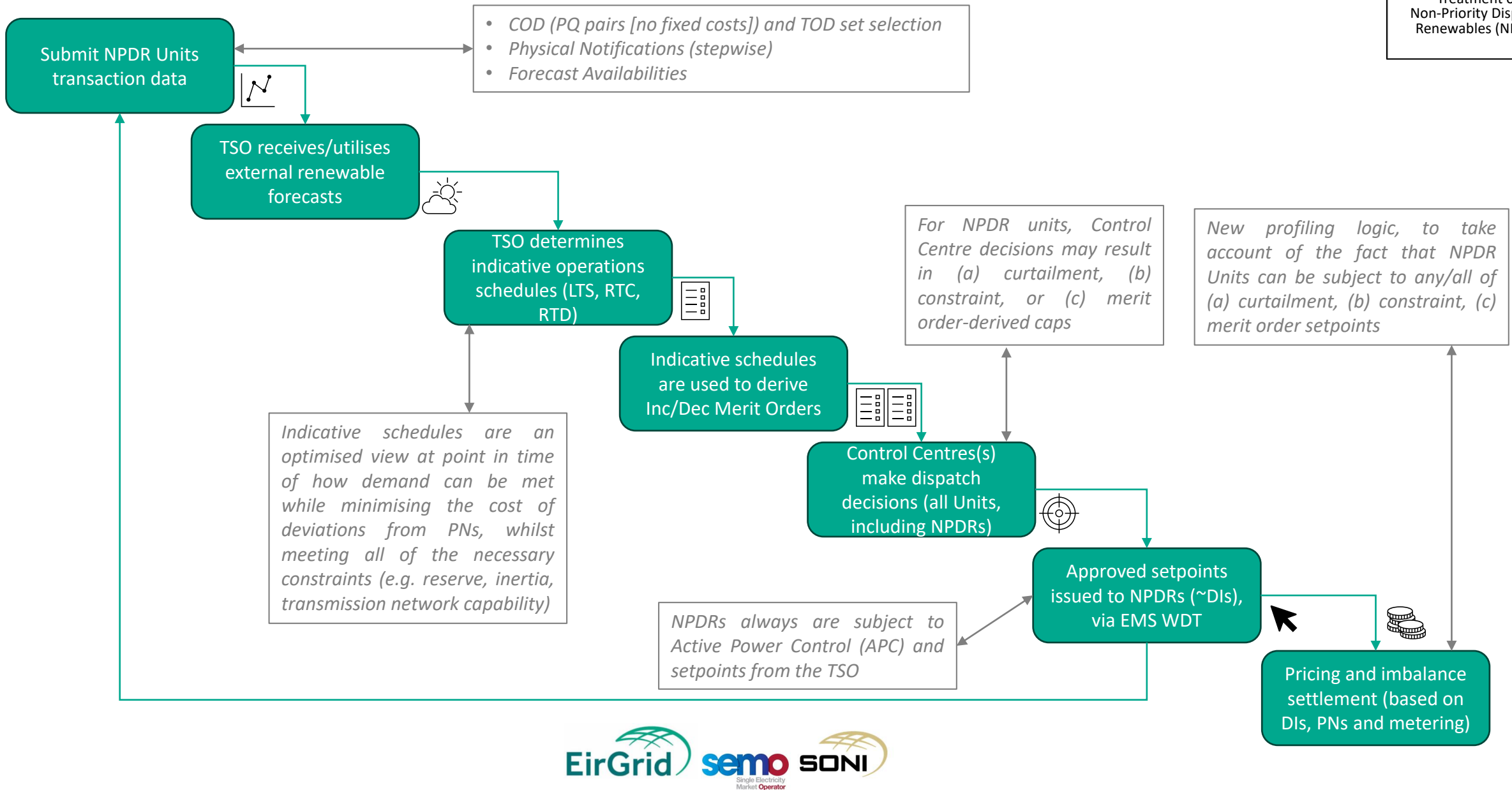
Regulatory Context

- 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 (a.k.a. Non-Priority Dispatch Renewables, 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.
- For an interim period, NPDRs will be treated similarly to renewable generators with priority dispatch for non-market based ‘redispatch’ (i.e. constraint and curtailment).



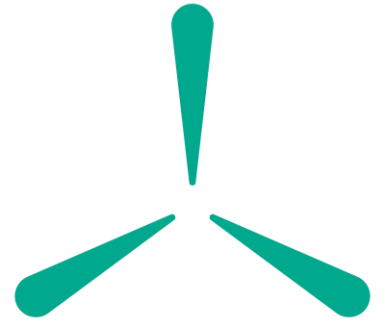
Treatment of
Non-Priority Dispatch
Renewables (NPDR)

SDP_001: Day in the life



Registration

- No changes to the Trading and Settlement Code required.
- Work is ongoing with vendors to be able to convert existing wind and solar units to NPDRs rather than de-registering and re-registering.
- This conversion will include ensuring appropriate Commercial Offer Data (COD), Technical Offer Data (TOD), Physical Notifications (PNs), etc. are in place for the cutover.
- More detail on this conversion process will be provided as soon as it is available.



Data Submission

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.



Commercial Offer Data (COD)

	Status	Timing	Contents	Granularity
Default Complex COD	Required	Submitted at registration and reviewed at least once per quarter.	<ul style="list-style-type: none"> Incremental price-quantity pairs representing short run marginal costs as per Bidding Code of Practice (BCOP) Decremental price-quantity pairs representing short run marginal costs as per BCOP Start-up costs (submitted as zero) No load costs (submitted as zero) 	Trading Day
Complex COD	Optional (default complex COD used if not submitted)	May be submitted between 12:00 19 days ahead of Trading Day and 1 hour before Imbalance Settlement Period (Gate Closure 2).	As above	<ul style="list-style-type: none"> Imbalance Settlement Period for P-Q pairs Trading Day for fixed costs
Simple COD	Optional (complex COD used if not submitted)	May be submitted between 12:00 19 days ahead of Trading Day and 1 hour before Imbalance Settlement Period (Gate Closure 2).	<ul style="list-style-type: none"> Incremental price-quantity pairs Decremental price-quantity pairs 	Imbalance Settlement Period



Fixed Costs

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

- 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.*
 - *No load costs means the element of operating cost for a Generator Unit, submitted as part of Commercial Offer Data, that is invariant with the level of Output and is incurred at all times when the level of Output is greater than zero.*
- Wind and solar units will not synchronise or desynchronise, do not have warmth states.
- These units will be permanently energised unless on outage.
- We do not believe that there will be costs that are ‘incurred at all times when the level of output is greater than zero’ but are not incurred when the unit is energised at zero output.



Forecasts

- May be submitted between 12:00 19 days ahead of Trading Day and 1 hour before each Imbalance Settlement Period (Gate Closure 2).
- 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 (TOD)

	Status	Timing	Contents
Validation TOD Sets	1 set required, up to 5 additional sets optional	Submitted at registration and reviewed at least once per quarter.	<ul style="list-style-type: none"> Data which represents how a unit can physically operate. As per the current treatment of priority dispatch renewables, we have assumed instantaneous ramping. 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 currently being confirmed with MMS vendor.
Validation TOD Set Number	Required (TOD set 1 used as default if not submitted)	May be submitted between 12:00 19 days ahead of Trading Day and 13:30 on the day before the Trading Day (Gate Closure 1).	<ul style="list-style-type: none"> Number between 1 and 6 corresponding to selected TOD set



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 (PNs)

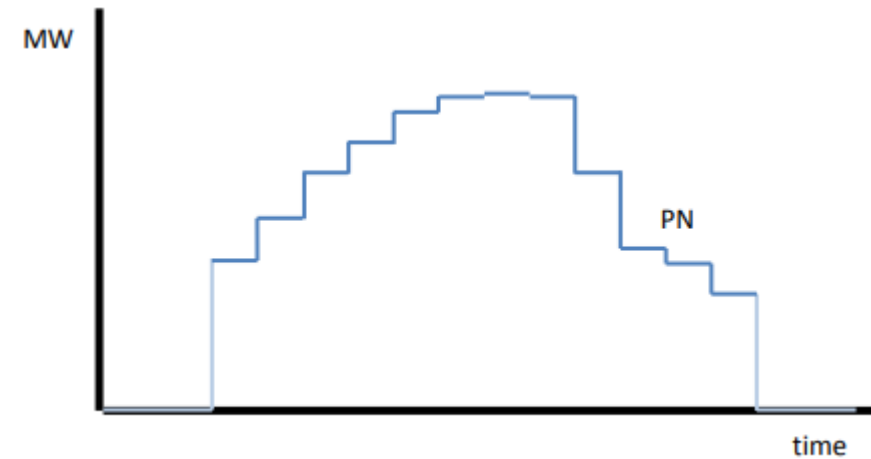
	Status	Timing	Contents	Granularity
Physical Notifications	Required (Assumed to be zero if not submitted)	May be submitted between 12:00 19 days ahead of Trading Day and 1 hour before Imbalance Settlement Period (Gate Closure 2).	<p>Submitted PNs need to reflect:</p> <ul style="list-style-type: none"> • The intended output of the unit in the absence of balancing market actions; • Physically feasible dispatch according to Technical Offer Data; • At Gate Closure 2, the final net market trade position. <p>PNs can include 'Under Test' flag if agreed with the TSO as per the procedure set out in the T&SC.</p>	Imbalance Settlement Period



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.



Scheduling - Renewables Forecasts

- Currently the control centre uses an average of two renewables forecasts provided by independent vendors to provide availability values for wind and solar units for the purposes of scheduling runs.
- For scheduling runs closer to real time these forecasts are blended with real time availability and this blended output is used as availability.
- Following the implementation of the Scheduling and Dispatch Programme it will be possible to include participant submitted forecasts in the average above.
- Forecast availabilities are used for *scheduling* only. Real time *dispatch* will always use real time availability.



Scheduling

- Scheduling optimisation runs use COD, TOD, PNs, and forecasts to produce Indicative Operating Schedules (IOSs).
- Optimisation aims to meet all constraints while minimising the cost of diverging from PNs.
- Indicative Operating Schedules include unit commitment status and output levels for each unit.
- Outputs from scheduling are used to generate merit order lists and make dispatch decisions.



Dispatch - Merit Order Lists

- Dispatch decisions are made in real time using incremental and decremental merit order lists generated as part of scheduling.
- Current output and availability determines how a unit's available output is split between incremental and decremental merit orders.
- PNs and COD determine the prices to be used in the merit order list and the resulting position on the list.



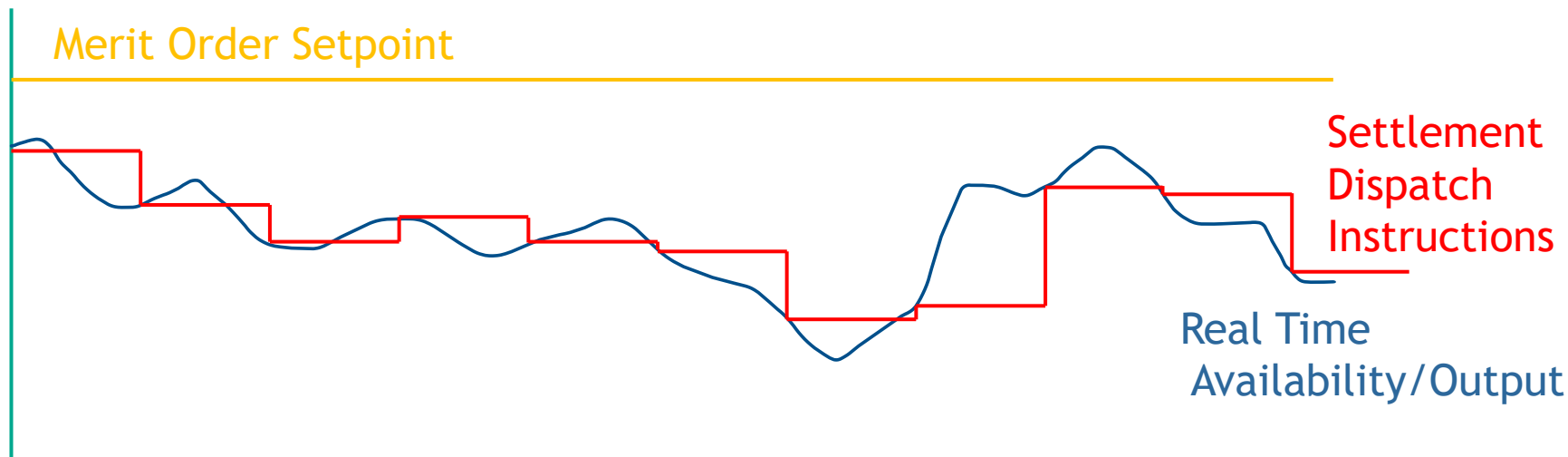
Dispatch - Merit Order Setpoints

- All NPDR units will be subject to an active merit order (energy balancing) setpoint at all times. This will be a reference point for the application of any constraints or curtailment.
- As a consequence, NPDR units will generally always have Active Power Control (APC) enabled. Note that APC is linked to tighter frequency regulation.
- Existing logic for applying, relaxing and removing constraint and curtailment requires updates to account for energy balancing actions on non-priority renewable units (NPDRs). New functionality - rebalancing - will also be added to ensure equitable allocation of constraints and curtailment across units. **Applying, rebalancing, relaxing and removing constraint and curtailment will be discussed in greater detail in the next session.**



Dispatch - Merit Order Setpoints above Availability

- NPDRs will appear in merit order lists for their full output range, not just up to availability. This will allow the control centre to issue merit order setpoints above availability if that volume is in merit. NPDRs may then run to their availability with a ceiling of the merit order setpoint.
- For settlement purposes within market systems dispatch instructions will be generated to follow availability when it is below the merit order setpoint to avoid uninstructed imbalance charges applying to the difference between the merit order setpoint and availability.



Prices

Energy Balancing Actions

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.

- 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.

Constraint and Curtailment Actions

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



Pricing and Settlement

- Once Bid Offer Acceptance Quantities (QBOAs) are attributed to the correct action type (energy balancing/constraint/curtailment) and the corresponding price is applied, no changes to pricing or settlement logic are required for NPDRs.
- Updates are proposed to the process for setting uninstructed imbalance tolerance parameters as detailed below.



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:

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

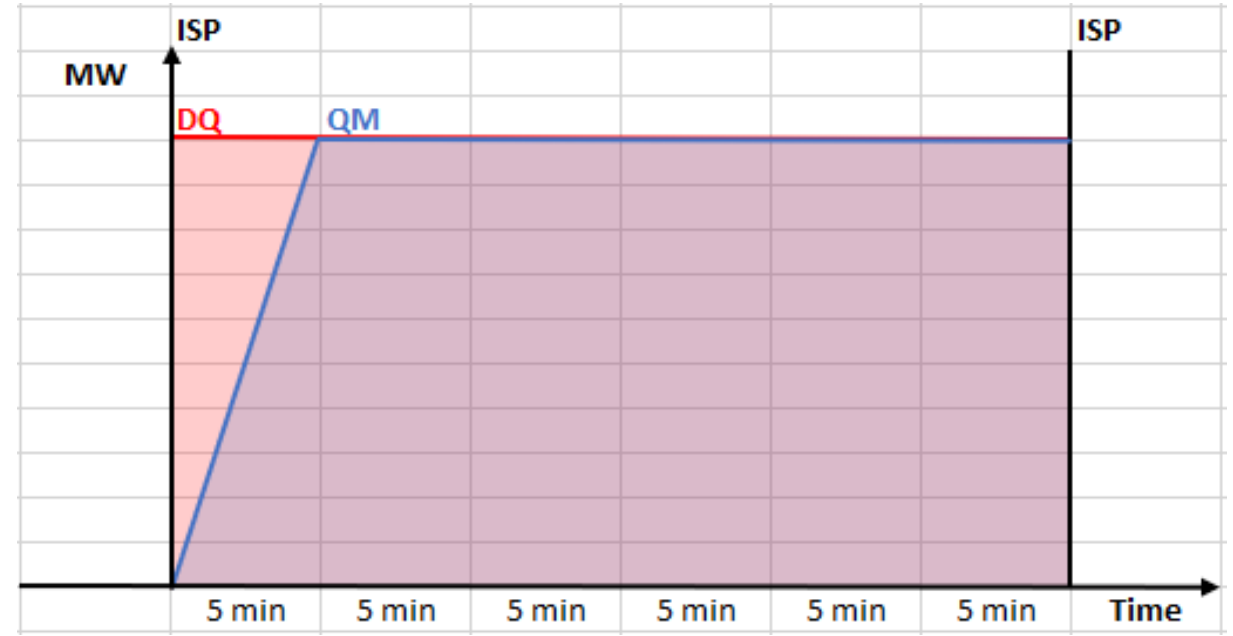
where:

- (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 .
- $qLIMENG$ acts as a minimum value for the tolerances for over-generation or under-generation within the calculation of the uninstructed imbalance charge.
 - Only volumes outside of these tolerances are subject to Uninstructed Imbalance charges.



Uninstructed Imbalance Tolerance

Scenario	
Max Export Capacity (MEC)	120MW
Dispatch Instruction from 0 at Minute 0	120MW
Loss Factor LF	1
Dispatch Quantity QD (Instantaneous Ramping)	60MWh
Meter Quantity QM (Ramping at 20% of MEC per Minute)	55MWh
Current TOLENG Values	
Engineering Tolerance TOLENG	0.01
MW Tolerance TOLMW	1 MW
Engineering Limit Quantity qLIMENG	1.2MW
Outside Tolerance Undelivered Quantity QUNDELOTOL	-4.4MWh
Proposed TOLENG Value to Mitigate Participant Risk	
Engineering Tolerance TOLENG	0.084
MW Tolerance TOLMW	1 MW
Engineering Limit Quantity qLIMENG	10.08MW
Outside Tolerance Undelivered Quantity QUNDELOTOL	0MWh



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 renewable 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 constraint or curtailment dispatch instruction (LOCL, CURL, LCLO or CRLO).
- Energy balancing actions will only close on receipt of the next energy balancing action. This will allow profiles for energy balancing/constraint/curtailment to be open at the same time.



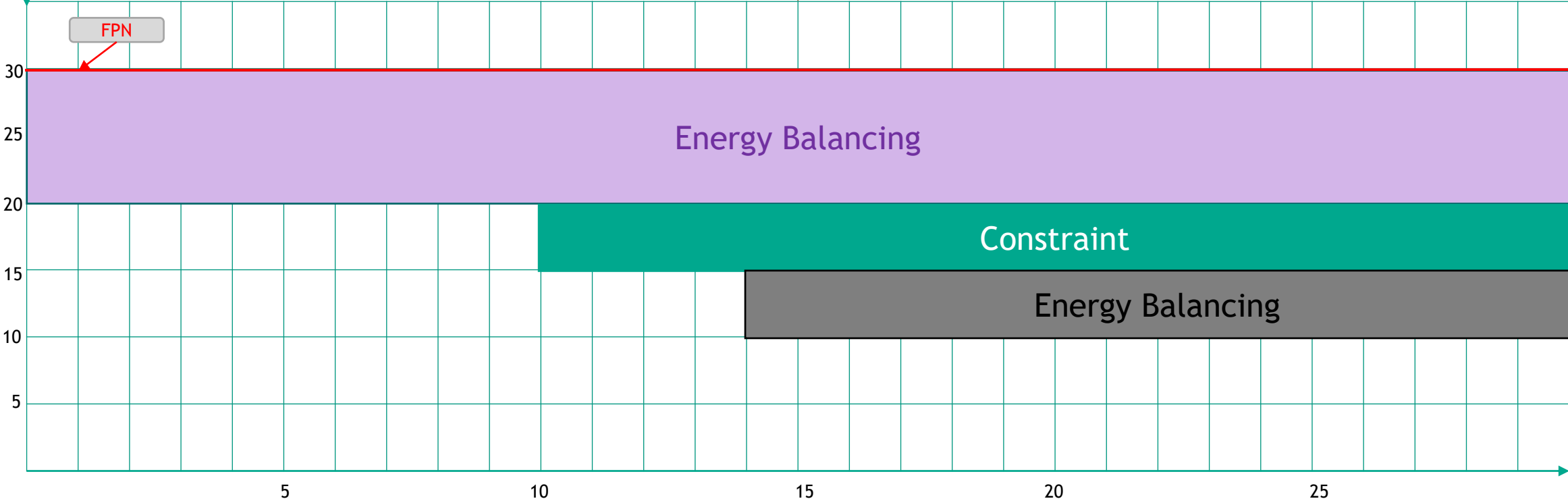
Instruction Profiling - Updates

- Based on further discussion with control centre engineers we have made updates to the instruction profiling approach presented previously to better reflect how these units will be dispatched.
- We also believe that these updates are better aligned with Articles 12 and 13 of Regulation (EU) 2019/943 and related SEMC papers.
 - ‘Dispatch’ or energy balancing is market-based (i.e. based on merit order lists) and is applied ahead of non-market based redispatch.
 - ‘Non-market-based redispatch’, i.e. constraint and curtailment, is applied from a unit’s market position.
- I.e. Energy balancing will supersede constraint and curtailment, constraint and curtailment will be ‘on top of’ energy balancing.



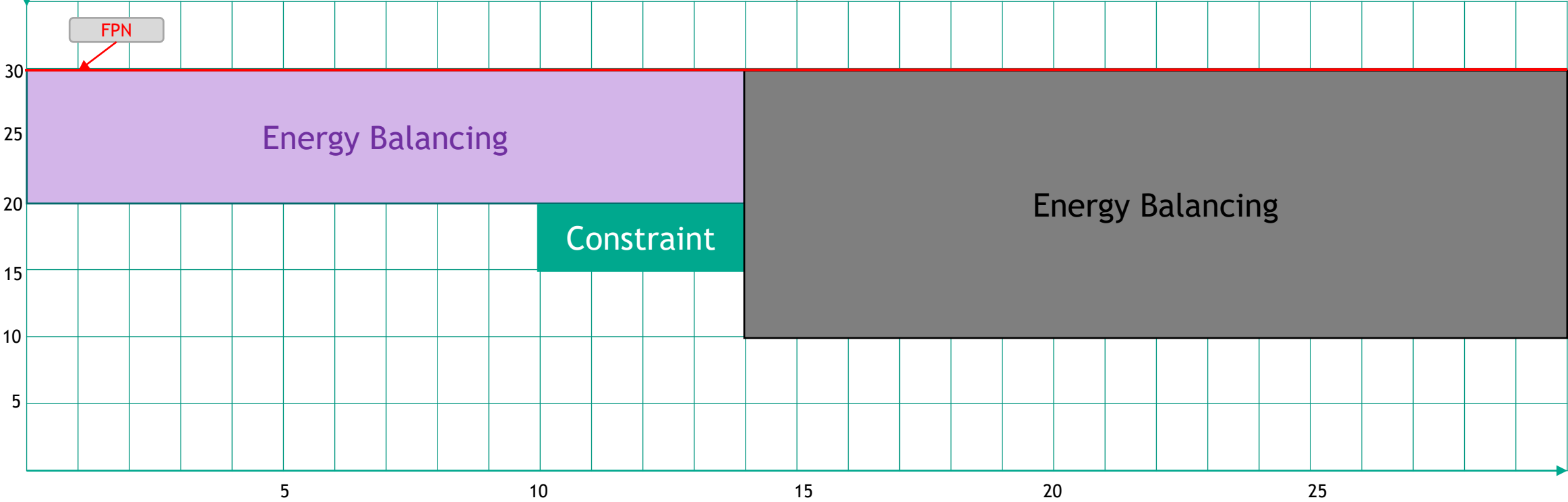
EX01: Previous Proposal

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



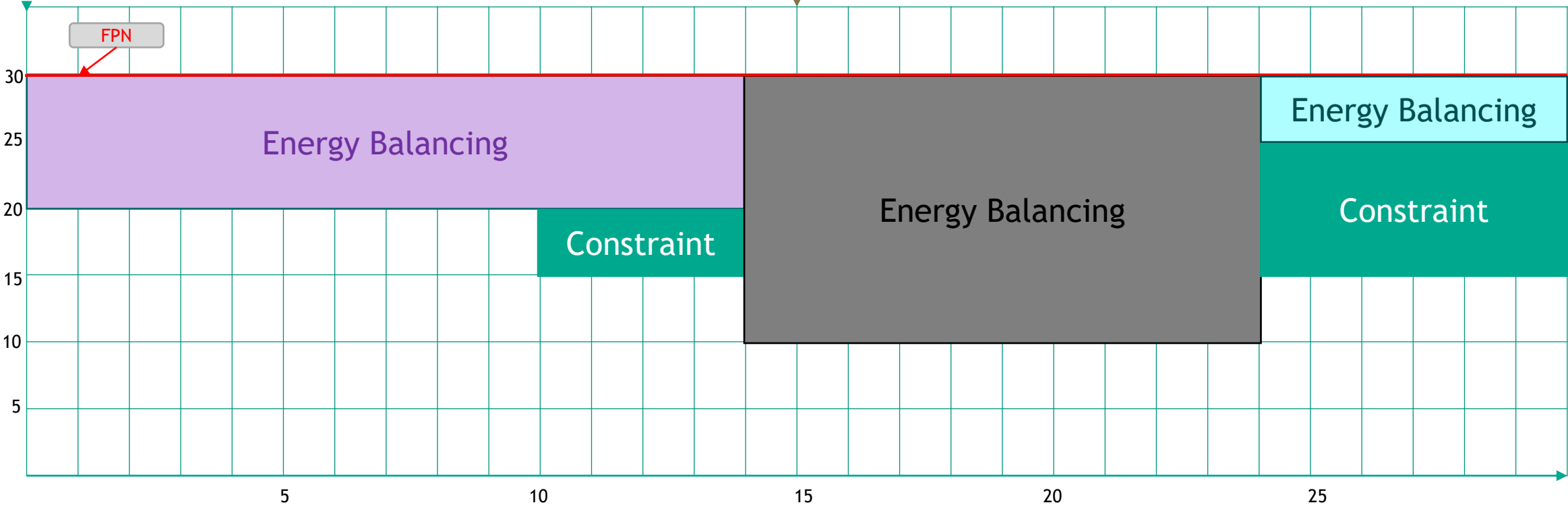
EX02: Updated Proposal

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



EX03: Updated Proposal

Issued Instructions Time (minute)	Type	MW
0	MWOF	20
10	LOCL	15
14	MWOF	10
24	MWOF	25



Next Steps

- Second session to be held at the same time next week (2pm 24/01).
- Contact us at SchedulingandDispatch@EirGrid.com with any requests for that session.
- Vote at next Mods Committee meeting in February.



Useful Resources

- [Balancing Market Principles Statement](#)
- [SEM-O Training Material](#)

