Scheduling & Dispatch

Treatment of Non-Priority Dispatch Renewables (NPDRs)

Modifications Committee

8th February 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"

EirGrid semo Single Electricity Market Operator SONI

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, or 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).
- The Regulatory Authorities' minded-to position for an **enduring** solution includes market-based application of constraints for NPDRs and continuation of pro-rata curtailment across all renewables regardless of priority dispatch status.

SDP_001: Day in the life

SDP001

Treatment of Non-Priority Dispatch Renewables (NPDR)

Submit NPDR Units transaction data

- *COD (PQ pairs [no fixed costs]) and TOD set selection*
- *Physical Notifications (stepwise)*
- *Forecast Availabilities*

TSO receives/utilises external renewable forecasts

TSO determines indicative operations schedules (LTS, RTC, RTD)

Indicative schedules are an optimised view at point in time of how demand can be met while minimising the cost of deviations from PNs, whilst meeting all of the necessary constraints (e.g. reserve, inertia, transmission network capability)

Indicative schedules are used to derive Inc/Dec Merit Orders

For NPDR units, Control Centre decisions may result in (a) curtailment, (b) constraint, or (c) merit order-derived caps

New profiling logic, to take account of the fact that NPDR Units can be subject to any/all of (a) curtailment, (b) constraint, (c) merit order setpoints

Control Centres(s) make dispatch decisions (all Units, including NPDRs)

Approved setpoints issued to NPDRs (~DIs), via EMS WDT

NPDRs always are subject to Active Power Control (APC) and setpoints from the TSO

Pricing and imbalance settlement (based on DIs, PNs and metering)

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.

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.	• 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	• 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).	• 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.	• 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).	• Number between 1 and 6 corresponding to selected TOD set

Physical Notifications (PNs)

- 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).	Submitted PNs need to reflect: • 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. PNs can include 'Under Test' flag if agreed with the TSO as per the procedure set out in the T&SC.	Imbalance Settlement Period

Physical Notifications (PNs)

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:

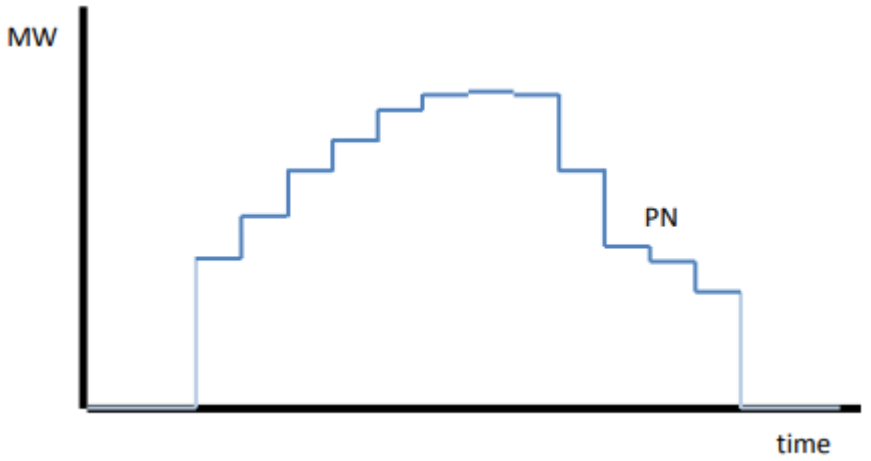
(i) Each From MW Time and To MW Time must be at the start of a minute which corresponds to the start of a thirty minute period, starting on each hour, and half hour;

(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

- 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.
- Bid Offer Acceptances resulting from 'dispatch' (i.e. energy balancing actions, MWOF 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.
- In future as part of an enduring solution, market-based application of constraints for NPDRs may be introduced. In that case a further mod may be required to allow COD prices to be used for constraint actions.

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 ($qLIMENG_{u\gamma}$) for each Generator Unit, u, in each Imbalance Settlement Period, γ, as follows:

$$qLIMENG_{u\gamma} = Max\left(\left|\frac{QD_{u\gamma}}{DISP}\right| \times TOLENG_{u}, TOLMW_{t}\right)$$

where:

(a) $QD_{u\gamma}$ is the Dispatch Quantity for Generator Unit, u, in Imbalance Settlement Period, γ;

(b) $TOLENG_{u}$ is the Engineering Tolerance for Generator Unit, u;

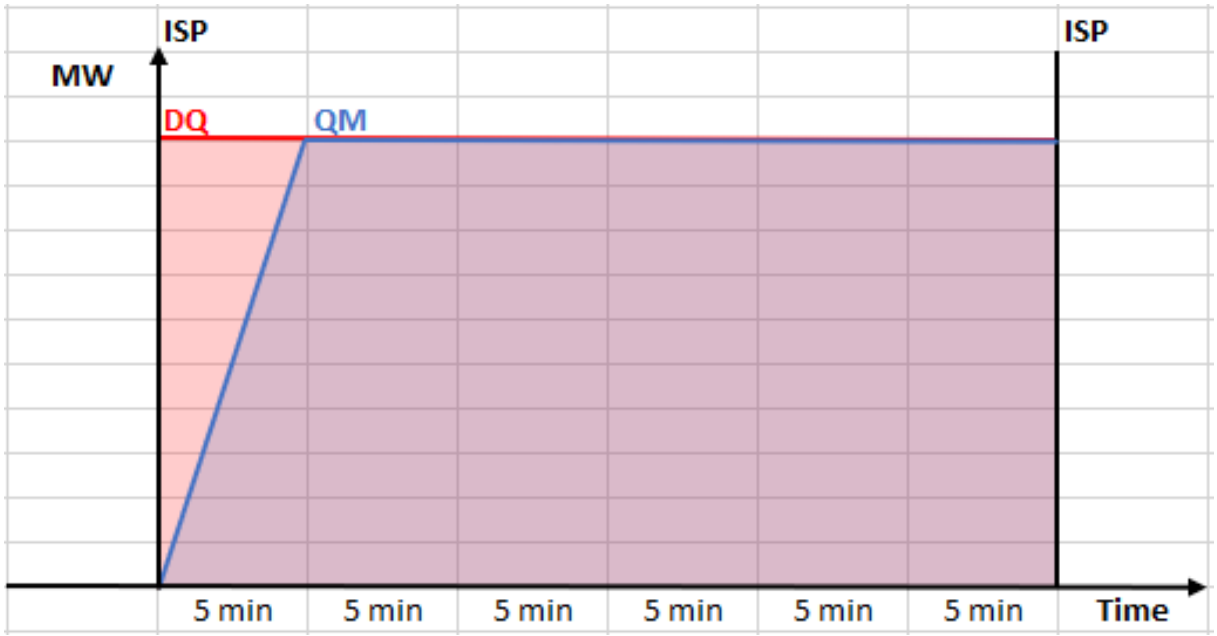
(c) DISP is the Imbalance Settlement Period Duration; and

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



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 - Proposals

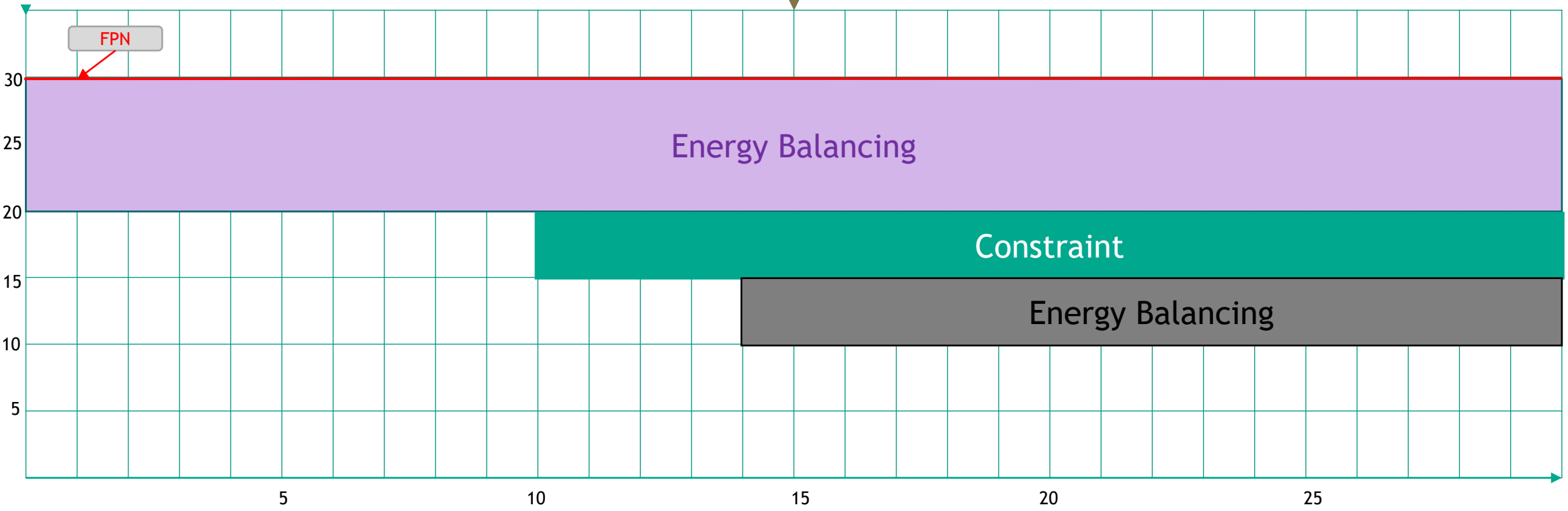
- Energy balancing actions (MWOF dispatch instructions and resulting pseudo instructions) will not close on receipt of a constraint or curtailment dispatch instruction (LOCL, CURL, LCLO or CRLO).
- Energy balancing actions will only close on receipt of the next energy balancing action. This will allow profiles for energy balancing/constraint/ curtailment to be open at the same time.
- Ordering of instruction profiles for these units will be updated to ensure that energy balancing actions are the first or 'top' orders, followed by constraint/curtailment below.

Instruction Profiling – Updates since V01 of Mod Proposal

- 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.

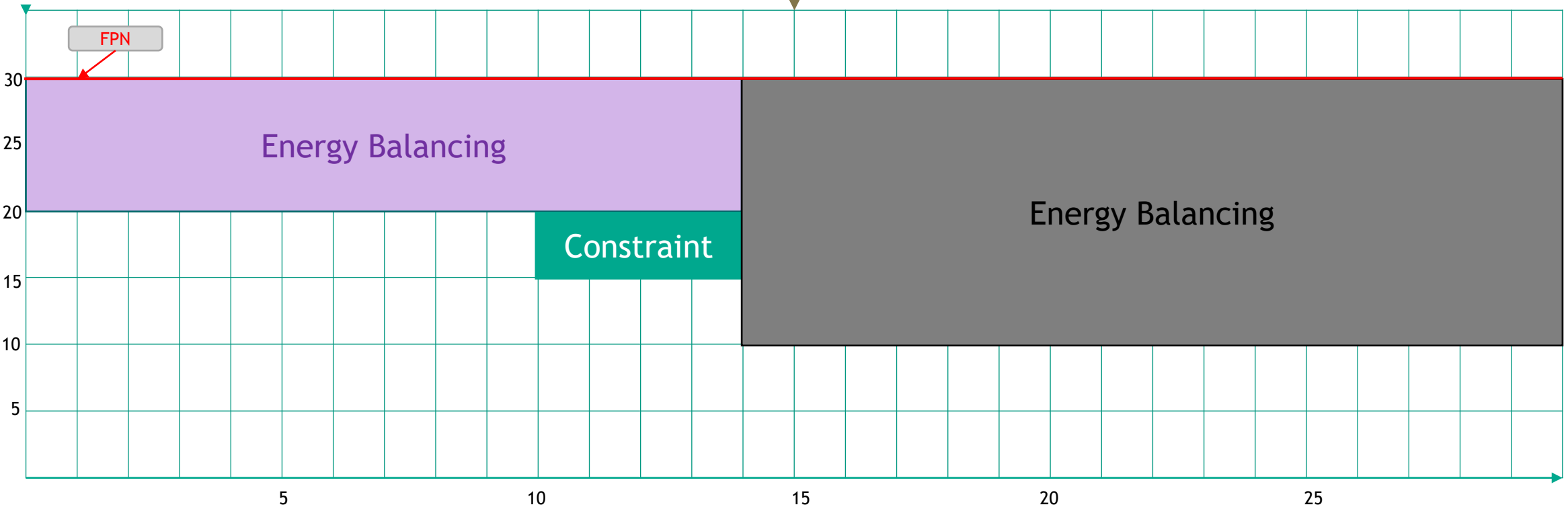
EX01: Previous Proposal

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 (Extended)

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