

Scheduling & Dispatch

Stakeholder Engagement

Industry Workshop

01 November 2023

This presentation provides an update on the Scheduling & Dispatch Programme.

Achievable - Valuable - “Simple”



Scheduling & Dispatch: Industry Workshop (November 2023)

Agenda for today's workshop

Time	Topic
10:00	Coffee & Catch-up
10:30	Introduction
10:45	Programme Status Update
11:00	Functional Review SDP_001: NPDR, SDP_002: ESPS, SDP_004: WSDT
12:15	Systems Delivery Update
12:30	Break
12:50	Stakeholder Engagement: Upcoming Meetings
13:00	SDP Readiness
13:30	Meeting Adjourns



Since We Last Met

- Developed Approach and Plan for Readiness
- Developing Training Approach
- Presented MODS changes (SDP_002 ESPS)
- Preparing MODS changes (SDP_001 NPDR)
- Submitted Plain English Changes for ESPS
- Progressing integrated delivery plan (with key milestones)
- Engaged with technology vendors on detailed design for system changes

Scheduling & Dispatch Programme- Industry Outreach

Why Are We Here?



Inform

We are here is to provide information about the ongoing work with the SDP initiatives and the impact on the market participant community. We will provide a view of the programme’s drivers, functional details, structure, timelines, and stakeholder engagement.



Discuss

We will discuss the functional changes and how this impacts you and your portfolio. We will discuss the formal arrangement changes, and stakeholder management. We are happy to field all questions – and we may not be able to answer all of them today.



Listen

We are here to listen. What are you thoughts on the SDP, the functional details and the impacts to your business? What questions do you need answers to? What clarity do you need?



Ask

We will ask for your participation throughout – we are better together.

Scheduling & Dispatch Programme - Industry Workshop

Setting Expectations



Meeting Rules

1. **Engage:** actively listen and ask questions. This session is for you.
2. **Show Courtesy:** allow everyone the time and space to participate in the discussion. Don't talk over another speaker.
3. **Scope Discipline:** maintain focus on SDP.



Scheduling & Dispatch Programme Overview

Key Principles

For this complex programme...

1. Be **pragmatic** about solution pathways.
2. Solve the **immediate and urgent** problems at hand.
3. Don't allow perfect to be the enemy of **good**.
4. **Communicate** early and often - to all **stakeholders**.
5. Maintain **support of industry**.
6. **Actively manage** multidisciplinary delivery team.

Achievable - Valuable - "Simple"

SDP Objective & Drivers

To enhance and improve the technology and capability of scheduling and dispatch in Ireland and Northern Ireland. This is driven by market participant needs, the EU Clean Energy Package mandates, and in support of the broader goals of renewables and System Non Synchronous Penetration (SNSP) penetration targets.

- Clean Energy Package requirements - NPDR treatment
- Ireland and Northern Ireland Government renewables targets for the 80%/70% total renewable energy and 95+% system non-synchronous penetration (SNSP) on an instantaneous basis.
- Market Participant requests for certainty on treatment of renewable assets, batteries - revenue certainty.
- Market Participant requests for improvement in re-balancing and re-dispatching (prevailing weather).

Scope of SDP

One component of the broader SOEF programme.

1. **SDP_001**: Operation of non-priority dispatch of renewables (NPDR)
2. **SDP_002**: Energy Storage Power Station (ESPS) integration
3. **SDP_003**: Fast Frequency Response (FFR)
4. **SDP_004**: Wind/solar dispatchability improvements
5. **SDP_005**: Reserve services scheduling and dispatch
6. **SDP_006**: Synchronous condenser scheduling and dispatch

Delivery Groupings

Group 1

- SDP_001
- SDP_002
- SDP_004

Group 2

- SDP_003
- SDP_005
- SDP_006

SDP Timeline



SDP Programme Status Update

Programme is split into workstreams to manage the successful delivery of all SDP initiatives;

1. Programme Management
2. Operational Capability
3. Central & Market Arrangements
4. Systems Delivery
5. Readiness

Key on-going points:

- Funding from the CRU and UR for Phases 3-5 is required
- To finalise delivery timelines, the programme is dependent on three key areas:
 - Required Funding in place,
 - Discussions with IT vendors on detailed design, and
 - Sign off on design with market participants.
- We are engaging with industry in parallel on the changes, code modifications, etc and these need to be finalised as soon as possible to finalise the design
- We are engaging with our IT Vendors on the detailed design and delivery schedules and are awaiting final timelines

Tranche 1:

- Requirements Phase is complete & Design phase is on-going.
- Workshops are taking place with vendors (Brady, Hitachi, GE) to agree systems delivery dates.
- Trading & Settlement Code modification for SDP_02 (ESPS) submitted to & discussed at Mods Committee on the 19th of October.
- Trading & Settlement Code modification for SDP_01 (NPDR) to be submitted for discussion at Mods Committee in December

Tranche 2:

- Work on Tranche 2 requirements has commenced.
- Requirements refinement expected to be completed by Q1 2024.

OVERALL STATUS	SCHEDULE	RESOURCE	FINANCES

SDP Initiatives	
Tranche 1	
SDP-01	Operation of Non-Priority Dispatch Renewable of renewables
SDP-02	Energy Storage Power Station (ESPS) integration
SDP-04	Wind dispatchability improvements
Tranche 2	
SDP-03	Fast Frequency Response (FFR)
SDP-05	Reserve services scheduling and dispatch
SDP-06	Synchronous condenser scheduling and dispatch

Scheduling and Dispatch: Timelines

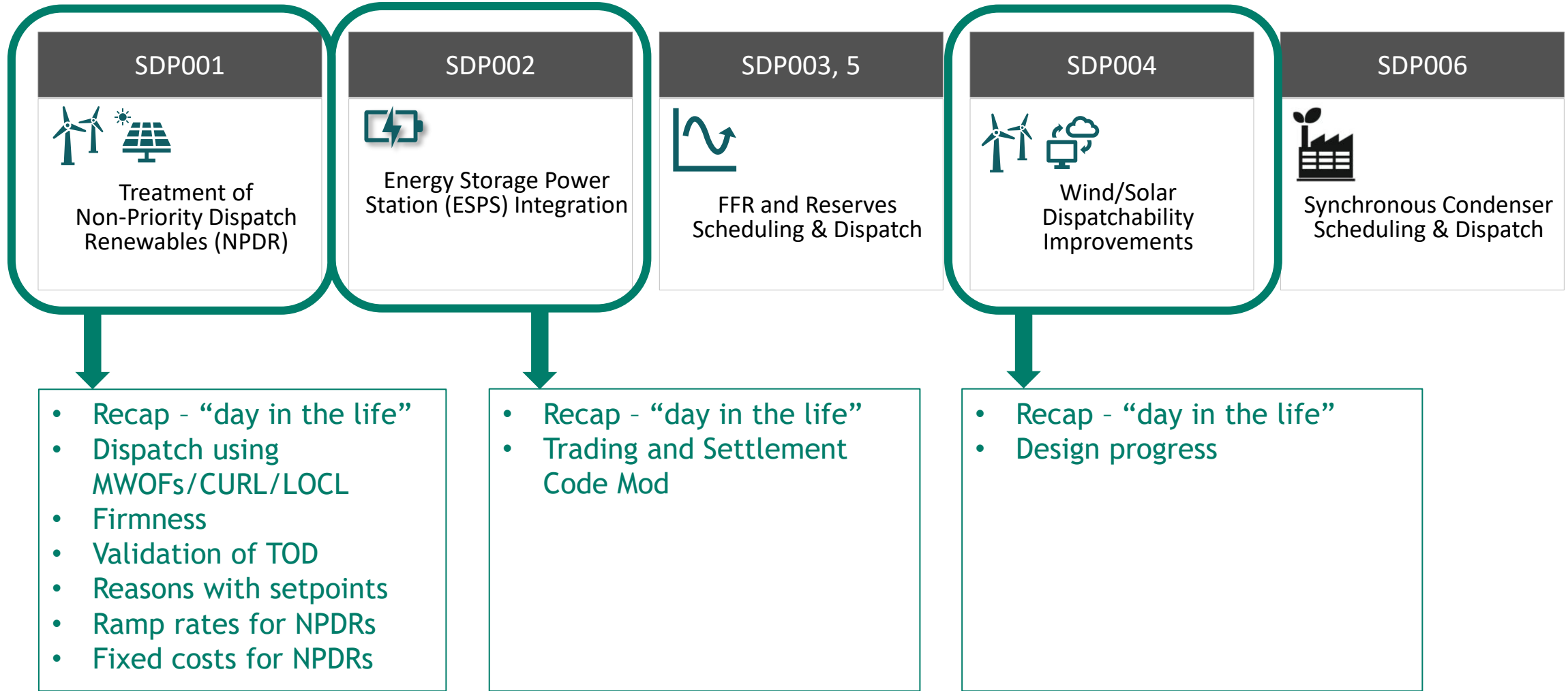
SOEF Milestone ID	Milestone	Milestone Date
SOEF 1.1 SDP.M01	Requirements Definition Complete for Scheduling and Dispatch Programme Tranche 1 Initiatives	Jul - Sep 2023
SOEF 1.1 SDP.M02	Publication of key milestones for testing and go-live, including revised ISEM Technical Specification of Scheduling and Dispatch Programme Tranche 1 Initiatives	TBC
SOEF 1.1 SDP.M03	System Design Complete for Scheduling and Dispatch Programme Tranche 1 Initiatives	Jan - Mar 2024
SOEF 1.1 SDP.M04	System Build Commenced for Scheduling and Dispatch Programme Tranche 1 Initiatives	TBC
SOEF 1.1 SDP.M05	TSC, CMS & GC Mods Review Complete for Scheduling and Dispatch Programme Tranche 1 Initiatives by the relevant review group (Mods Committee, Grid Code Review Panel, Capacity Market Workshops respectively)	Jan - Mar 2024
SOEF 1.1 SDP.M06	Publication of milestones for Scheduling and Dispatch Programme Tranche 2 Initiatives	Jan - Mar 2024
SOEF 1.1 SDP.M07	Regulatory Authority approval for TCS, CMC & GC Mods for Scheduling and Dispatch Programme Tranche 1 Initiatives	Apr - Jun 2024
SOEF 1.1 SDP.M08	Implementation and Go Live for Scheduling and Dispatch Programme Tranche 1 Initiatives	TBC



We currently have an overall **low – medium** level of confidence on the timelines. More detailed timelines cannot be provided until the following are all completed:

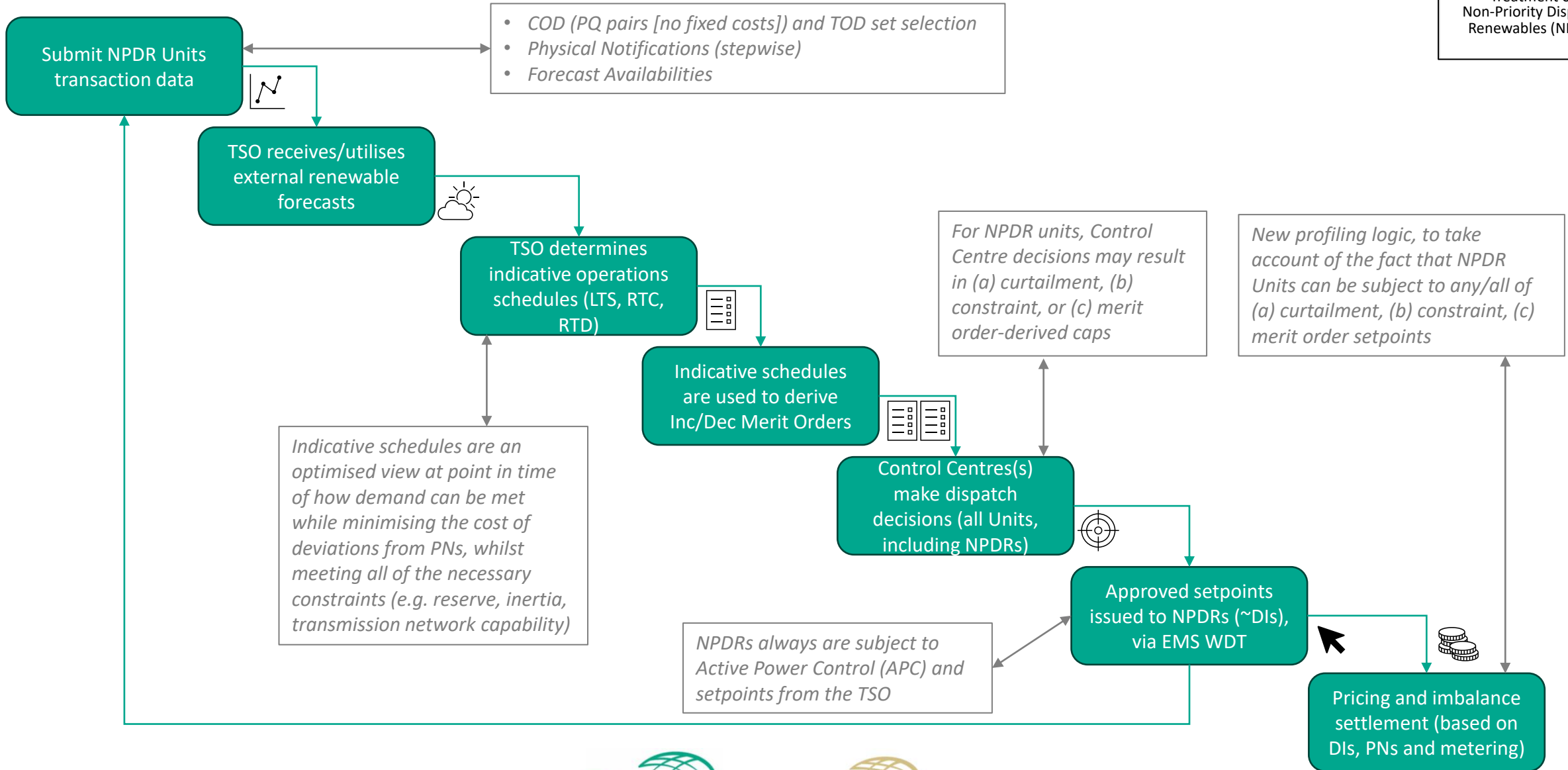
- Funding from the CRU and UR for Phases 3-5 is required
- We are engaging with industry in parallel on the changes, code modifications, etc and these need to be finalised as soon as possible to finalise the design
- We are engaging with our IT Vendors on the detailed design and delivery schedules and are awaiting final timelines

Functional Updates - what will we cover today?





SDP_001: Day in the life



SDP_001: Query on setpoint reasons

Queries from 5 Oct 2023 workshops regarding provision of reasons for NPDR setpoints

Dispatch

- In IE, control setpoints are issued from WDT (EMS) to units
- In NI, control setpoints are issued from WDT via EDIL to units
- Control setpoints are translated into Dispatch Instructions for use in pricing and settlement

Pricing and Settlement

- Dispatch Instructions are provided to MMS (shortly after issuance)
- A MPI publication (hourly) contains Dispatch Instructions for the preceding hour

SDP_001: Dispatch using MWOFs/CURL/LOCL

When wind units are MWOF'd down in future is this from FPN or from forecast? When a unit is short and its FPN > forecast, can it buy back this difference using a bid?

- Bid Offer Acceptance Quantities (QBOAs) are calculated as the volume between each dispatch instruction (order) and the previous order, with order zero being the FPN.
- Decremental QBOA volumes are capped by availability, so a decremental volume that a unit was unavailable to deliver is considered an imbalance and is bought at the imbalance price.
- *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.*

SDP_001: Dispatch using MWOFS/CURL/LOCL

Can you walk us through the process of redispatch under MWOFS?

We believe this will be done using a set point, and that the set point must be below the forecast availability of the unit.

- Dispatch will be enacted through control set points as it is today.
- These set points can relate to energy balancing, constraint or curtailment.
- Forecast availability is used in scheduling, real time availability is used in dispatch.
- Energy balancing set points can be issued above real time availability if in merit. Units will be expected to follow availability up to a ceiling of the energy balancing set point. For the purposes of instruction profiling, pricing and settlement, MWOFS will be generated at regular intervals equal to availability so that the difference between the FPN and actual output is considered an instructed imbalance rather than an uninstructed imbalance.
- If real time availability is above the energy balancing set point the unit will be expected to run to the set point and an MWOFS will be generated to the level of the set point.

SDP_001: Dispatch using MWOFs/CURL/LOCL

In the SDP-001 Day in the Life slide at the last meeting it states that:
“NPDRs are always subject to APC and setpoints from TSO”

Does this mean that the FPN is a setpoint? There are likely to be issues here if this is the case, as there will be times when units over generate (higher than forecast wind) and spill the extra above PN into the BM. If units are limited to the FPN, this will reduce wind/solar generation.

- Units will be dispatched economically for energy balancing actions using the Merit Order List.
- If a unit is in merit up to its availability it will be dispatched for that full amount.
- *SEM-21-027: “New units without priority dispatch which are dispatched away from their ex-ante market positions for energy balancing reasons should be considered in dispatch on an economic basis like any other instance of balancing energy, accounting for system security considerations. Such units would be dispatched for balancing energy in merit order with other units and these would be treated as energy actions.”*

SDP_001: Dispatch using MWOFS/CURL/LOCL

SDP-001: In “SDP_001: Treatment of NPDRs in profiling/BOA”, it is stated that “MWOFF (when issued) will always be under the lowest active curtailment / constraint.” and in “SDP_001: Scheduling Approach” “NPDRs will always have an MWOFF instruction in place (and may also have curtailment/constraint)”
Can the scenario ever arise where a generator has an accepted INC (MWOFF above FPN), and the Renewable Dispatch Tool determines that the generator needs to accept a LOCL or CURL? Or would the MWOFF with the INC be cancelled first and then any residual LOCL or CURL be issued by the Renewable Dispatch Tool?

- Yes, a unit could have an inc MWOFF (settled at better of COD price and imbalance price) followed by a dec LOCL or CURL.
- Constraint and firm curtailment dec volumes above the FPN will be settled as undo actions.

SDP_001: Dispatch using MWOFS/CURL/LOCL

In “SDP_001: Scheduling Approach”, it says “Given the volume of NPDR Units, they will be grouped within control centre online merit orders, grouped into price bands”, are those merit orders included in standard scheduling and dispatch optimisation of the Real-Time Dispatching Tool?

- Units will be included in scheduling optimisations individually.
- These units will be included in existing Merit Order Lists in the Market Management System (MMS) and information will be passed to the Wind Dispatch Tool (WDT) so that they can be issued with control set points via the Energy Management System (EMS).

If there is a conventional generator available willing to accept a DEC bid (and pay €20/MWh), and replace that with a price-banded renewable merit order (requiring a payment of €2/MWh), will that order be automatically presented to the NCC operator, or will they need to identify that arbitrage opportunity manually?

- This will be done manually as it currently is by control centre engineers through the use of Inc and Dec Merit Order for conventional units with different prices.

SDP_001: Dispatch using MWOFS/CURL/LOCL

Where a price-banded renewable merit order offer is partially (MW) accepted by the NCC, will all generators within that price band be accepted pro-rata (all contributing generators receive a partial MWOFF relative to their contribution to that order) or will generators within the order receive sequential MWOFF instructions?

- Dispatch actions won't be based on price bands, but on individual unit prices - which will be on a merit order basis.
- If multiple units have exactly the same price then the intention is to pro rate between these units.
- Discussions are ongoing with the system vendors on how best to implement this.
- The TSO preference is to dispatch pro rata in tie break situations as it reduces the chance of causing local network security issues.

Will MWOFF orders (in real time to windfarms and solar farms) be in 1MW tranches? Or will the scheduler take a price-banded offers in 1MW tranches (which might be subsequently pro-rated amongst generators)?

It is expected that it will be possible to issue non-integer energy balancing set points.

SDP_001: Dispatch using MWOFS/CURL/LOCL

Is there any possibility of consideration at this late stage of a “max output” FPN to be submitted for a windfarm/solar farm, indicating that all efforts have been made to maximise its output in trading? Where such a FPN is received by the TSO a MWOFS instruction is not issued to the generator but rather the windfarm is let “run free” to its availability instead (subject to any constraint/curtailment)?

- RAs have said that FPNs should reflect ex-ante position as is the case for dispatchable generators today.
- If a unit is in merit up to its availability it will be dispatched for that full amount.
- If the full output is in merit a set point could be issued to MEC allowing the unit to run freely to its availability provided it stays in merit.
- *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.*

SDP_001: Firmness

Does firm capacity apply to instructions under MWOFF - as it does to Constraint / Curtailment actions?

- Yes, firmness will be applied to energy balancing actions as it is for dispatchable generators.

Does firmness affect the price paid for an MWOFF action? For example, if a unit is MWOFF'd down does it buy back at the bid price regardless of whether the unit is firm or non firm?

- Non-firm quantities are not included in CDISCOUNT payments, meaning that non-firm volumes are bought at the imbalance price only (similar to settlement of constraint volumes and energy balancing actions on dispatchable generators).

SDP_001: Validation of TOD

Query from 5 Oct 2023 workshops regarding validation of TOD for NPDRs

- Established process will apply to NPDRs
 - *Participant submits VTOD set via MPI (with values complying with the T&SC)*
 - *TSO reviews VTOD set and approves where the values are accepted*
 - *Once approved, the VTOD set may be utilised by the Participant in submission of “VTOD set selection” for a target Trading Day (to be submitted day-ahead)*
- 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*

SDP_001: Query on ramp rates

Queries regarding infinite ramp rates for NPDRs

- Instantaneous ramp rates already apply to constraint and curtailment instructions on priority dispatch wind and solar units at present; no proposal to change this.
- **Dispatch**
 - From experience, when control centre issues control set-points wind generators have the ability to achieve the target MW within seconds
- **Settlement**
 - Tolerance bands in Uninstructed Imbalance calculations should ensure that any difference will not be material.
 - Uninstructed Imbalance parameters are kept under review and can be updated if appropriate.

We request that participant send examples and/or supporting evidence for the use of non-instantaneous ramp rates for consideration by the TSOs.

SDP_001: Fixed costs for NPDRs

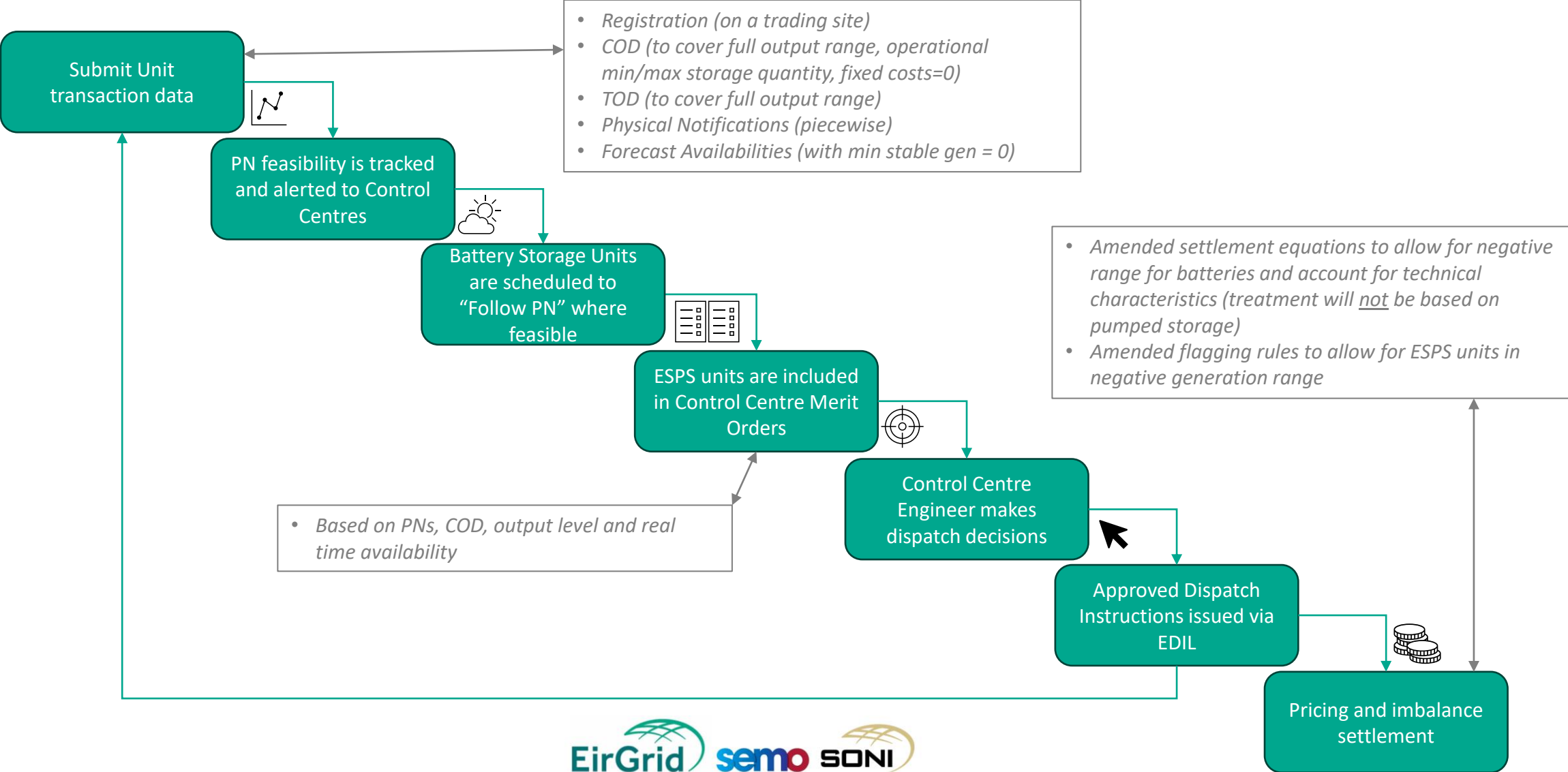
Query regarding zero fixed costs for NPDRs

- **Technology considerations**

- T&SC: Start up means the process of bringing a Generator Unit to a Synchronised state, from a cold, warm or hot (Desynchronised) Warmth State.
- Grid Codes: The action of bringing a Generation Unit from Shutdown to Synchronous Speed.
- Start-up costs primarily represent additional fuel costs associated with a thermal generator moving from a desynchronised state to its minimum stable generation.
- No-load costs also relate to a unit's commitment status (synchronised or desynchronised).
- 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.

We request that participant send examples and/or supporting evidence for the application of fixed costs to NPDRs for consideration by the TSOs.

SDP_002: Day in the life



Registration as Part of a Trading Site

- Battery Storage Units will be required to register as part of a Trading Site like other generator units.
- Previously Battery Storage Units were required not to register as part of a Trading Site to match the treatment of Pumped Storage Units.
- Non-firm quantities are calculated on a Trading Site basis, so without being part of a Trading Site non-firm quantities will not be applied to Battery Storage Units.

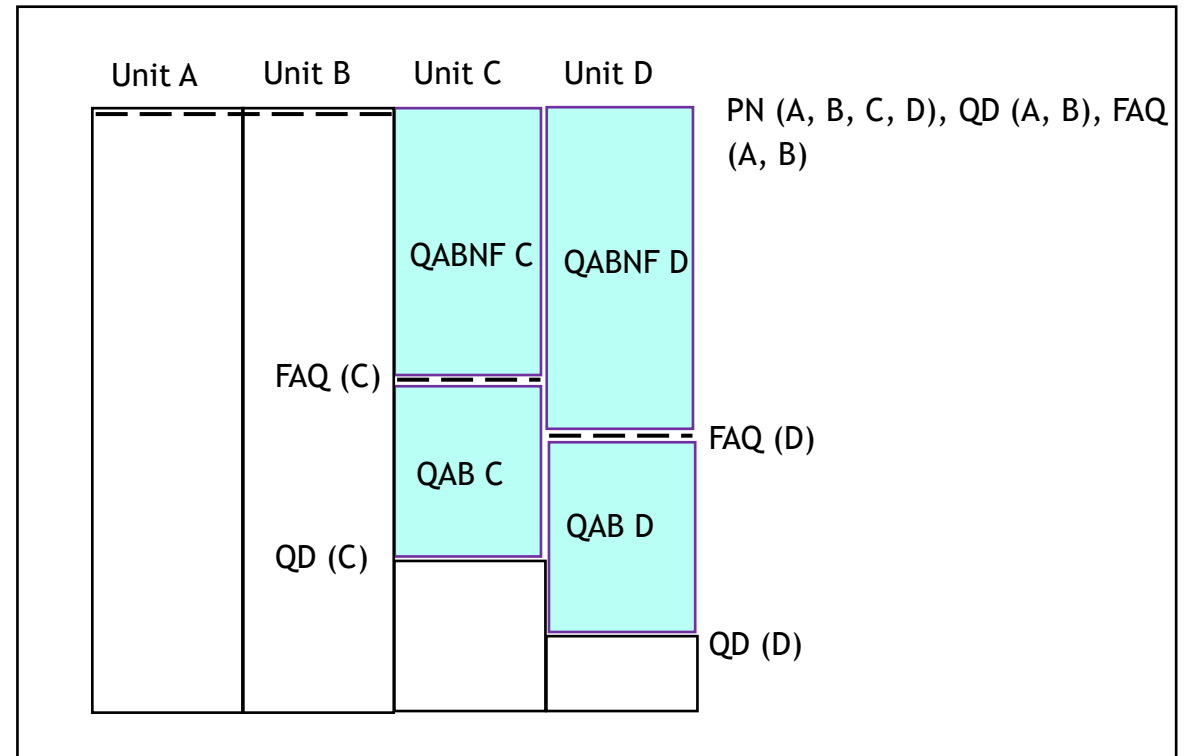


Non-Firm Quantities

- Firm Access is a Trading Site concept, therefore there needs to be functionality to assign the Firm Access Quantity to the units under the Trading Site to allow for unit-level non-firm quantities to be calculated:

FAQ is divided in a way which is inversely proportional to the Accepted Bid Quantity on each unit:

- If unit dispatched to PN, fully firm;
- If unit dispatched below PN, non-firm;
- The greater the dec volume, the lower the firmness.



Example for a Battery Storage Unit registered as the only unit on a Trading Site with an Associated Supplier Unit

F.6.5.2 QFPNNF (Non-Firm Final Physical Notification Quantity for Trading Site)

$$QFPNNF_{SY} = \text{Max} \left(\sum_{u \in S} QFPN_{uy} + \sum_{v \in S} QM_{vy} - (qFAQ_{SY} \times DISP), 0 \right)$$

≥ 0 or < 0

= 0 as there is
no Trading Site
Supplier Unit
(ASU instead)

Trading Site FAQ will
be ≥ 0 as per
Connection Agreement

- If FPN ≥ 0 :

Trading Site Non-Firm FPN Quantity $QFPNNF = \text{Max}(\text{positive} - \text{positive}, 0) = \text{between } 0 \text{ and FPN}$
(non-firm FPN quantity can be any value between zero and positive FPN quantity)

- If FPN < 0 :

Trading Site Non-Firm FPN Quantity $QFPNNF = \text{Max}(\text{negative} - \text{positive}, 0) = 0$
(no portion of FPN quantity is non-firm)

Example for a Battery Storage Unit registered as the only unit on a Trading Site with an Associated Supplier Unit

F.6.5.2

If $\sum_{u \in s} \sum_o \sum_i QAB_{uoiy} < 0$, then

$$qFAQ_{uy}(t) = \frac{\text{Max} \left(QFPN_{uy} - QFPNNF_{sy} \left(\frac{\sum_o \sum_i QAB_{uoiy}}{\sum_{u \in s} \sum_o \sum_i QAB_{uoiy}} \right), 0 \right)}{DISP}$$

Else

$$qFAQ_{uy}(t) = \frac{QFPN_{uy}}{DISP}$$

- When no dec actions are taken, Unit Firm Access Quantity qFAQ always = FPN
- When dec actions ($QAB < 0$) are taken on the single unit Trading Site:

If $FPN \geq 0$:

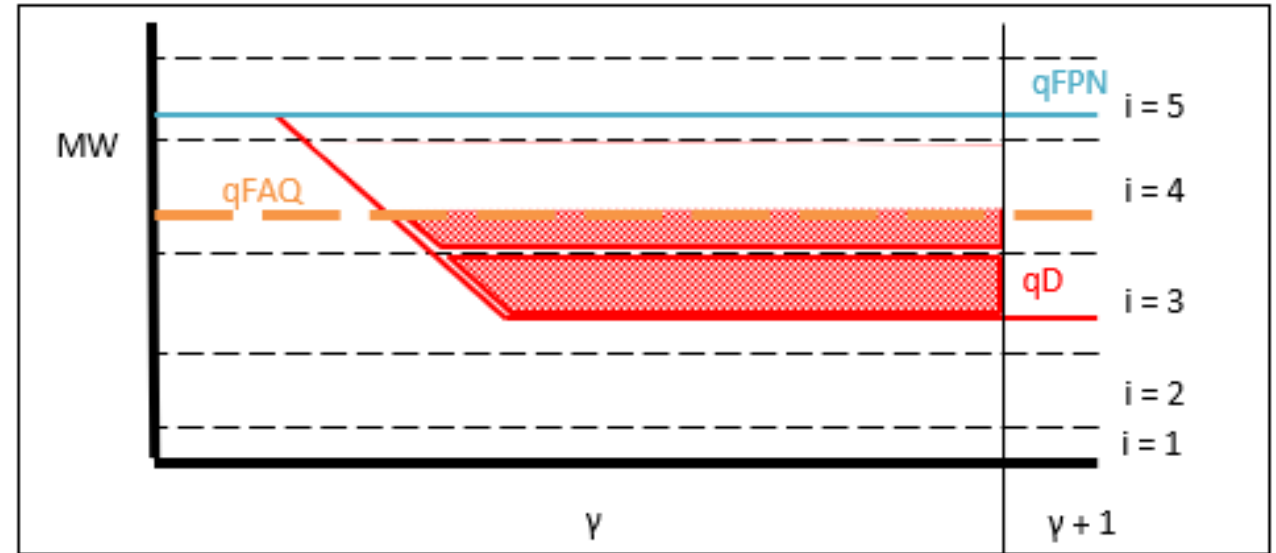
Unit Firm Access Quantity qFAQ = FPN - non-firm portion of FPN = Trading Site FAQ

If $FPN < 0$:

Unit Firm Access Quantity qFAQ = Max(negative - positive, 0) = 0

Example for a Battery Storage Unit registered as the only unit on a Trading Site with an Associated Supplier Unit

The Non-Firm Accepted Bid Quantity Q_{ABNF} for a unit used in the calculation of CDISCOUNT payments represents the reduction in electricity output that has been accepted for levels of output above the Firm Access Quantity of the unit.



As shown above for a Battery Storage Unit on a single unit Trading Site with an Associated Supplier Unit subject to decremental actions:

- If $FPN \geq 0$ then $q_{FAQ} = \text{Trading Site FAQ}$ which will be ≥ 0 as per Connection Agreement
- If $FPN < 0$ then $q_{FAQ} = 0$

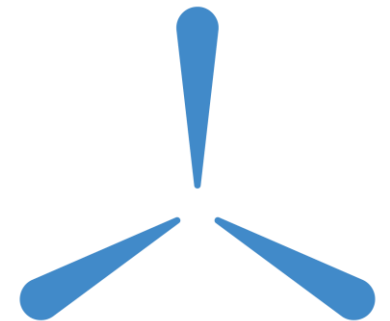
Therefore, quantities below zero will not be settled as non-firm.

Commercial Offer Data

- *Additional fields for battery storage units:*
 - Operational Minimum Storage Quantity (MWh)
 - Operational Maximum Storage Quantity (MWh)

These fields will allow a warning to be provided to the control centre if Physical Notifications submitted by a participant for a battery unit cause the unit's storage level to fall outside of these operational limits.

- *Forecast Minimum Stable Generation:*
 - To be mandated to be submitted as zero for all imbalance settlement periods.
 - This will allow unit to be synchronised to import or export.



Technical Offer Data

- *Updated field names:*
 - Storage Cycle Efficiency (for both Pumped Storage and Battery Storage)
 - Minimum Storage Quantity (for both Pumped Storage and Battery Storage)
 - Maximum Storage Quantity (for both Pumped Storage and Battery Storage)
- *Field to be removed:*
 - Battery Storage Capacity (exists to allow units to be profiled to storage capacity when a GOOP PUMP instruction is received, these units will not receive these instructions and so will not need this field, will instead be profiled to Target Instruction Level)



Charging Mode

- Definition of Battery Storage Unit in charging mode is proposed to be removed:

F.2.1.4 The Market Operator shall determine whether a Battery Storage Generator Unit, u , is in Charging Mode for the purposes of the calculations in this Code as follows:

- (a) If the value of a Battery Storage Unit's Dispatch Quantity ($qD_{uOy}(t)$) at all times within an Imbalance Settlement Period, γ , is positive (i.e. in the generating range of the Unit's output), then the Unit is deemed to be in Generating Mode for the entirety of that Imbalance Settlement Period; and
- (b) If the value of a Battery Storage Unit's Dispatch Quantity ($qD_{uOy}(t)$) at any time within an Imbalance Settlement Period, γ , is negative (i.e. in the charging range of the Unit's output), then the Unit is deemed to be in Charging Mode for the entirety of that Imbalance Settlement Period.

- The current text is based on legacy arrangements which recognised that Pumped Storage Units cannot control the exact level to which they consume power when dispatched to pump.
- Battery Storage Units are currently aligned with pumped storage units in the Trading and Settlement Code.
- However, unlike Pumped Storage Units, Battery Storage Units can control the level to which they consume power and can run to specific negative MW Target Instruction Levels when dispatched to charge, and so do not need different treatment while importing and exporting.

Imbalance Charge

- We propose that Battery Storage Units be removed from the clause below so that the Imbalance Charge is applied the same while charging as discharging.

F.5.3.3 The Market Operator shall calculate the Imbalance Component Payment or Charge ($CIMB_{uy}$) for each Pumped Storage Unit or Battery Storage Unit, u , in each Imbalance Settlement Period, γ , for which it is in Pumping Mode (as determined in paragraph F.2.1.3) or in Charging Mode (as determined in paragraph F.2.1.4), as the case may be, as follows:

$$CIMB_{uy} = PIMB_{\gamma} \times \left(\sum_o \sum_i \left(QAOLF_{uoi\gamma} - \text{Max}(QAObIAS_{uoi\gamma}, QAOUNDEL_{uoi\gamma}) \right) + \sum_o \sum_i \left(QABLF_{uoi\gamma} - \text{Min}(QABBias_{uoi\gamma}, QABUNDEL_{uoi\gamma}) \right) \right)$$

- As described above this exception was put in place to account for the technical limitations of Pumped Storage Units, which do not apply to Battery Storage Units.
- This change is required in order to comply with regulatory requirements for Balance Responsible Parties under the EU's Clean Energy Package (CEP), Energy Balancing Guidelines (EBGL), and Imbalance Settlement Harmonisation Proposal methodology (ISHP).
- The need for this change was identified in SEM-21-017: EirGrid and SONI Analysis of SEM Compliance with Commission Regulation (EU) 2017/2195 of 23 November 2017 Establishing a Guideline on Electricity Balancing.

Uninstructed Imbalance

F.9.4.2 When a Pumped Storage Unit or Battery Storage, u , is in Pumping Mode or Charging Mode, as the case may be, for an Imbalance Settlement Period, γ , or any part thereof, the Market Operator shall calculate the Uninstructed Imbalance Charge ($CUNIMB_{u\gamma}$) for that Pumped Storage Unit or Battery Storage Unit, u , in that Imbalance Settlement Period, γ , as having a value of zero.

- We propose that Battery Storage Units be removed from the clause above so that the Uninstructed Imbalance Charge is applied while charging as it is while discharging.
- Unlike Pumped Storage Units, Battery Storage Units can control the level to which they consume power when dispatched to charge, and so do not need different treatment while importing and exporting.

Pre-Agreed Charging (“Trickle Charge”)

- Due to the inability to send negative Dispatch Instructions within EDIL, it has not been possible for Control Centre Engineer to charge a battery unit to date. As a result, a “Pre-Agreed Charging” approach was agreed by the TSOs to allow battery operators to charge themselves without the need for a dispatch instruction from the TSOs.
- The Scheduling and Dispatch Programme will allow negative Dispatch Instructions to be sent via EDIL, and so pre-agreed charging is no longer required.
- Participants will also have the ability to obtain a position to charge in ex-ante markets, or price themselves to do so in the balancing market.
- Under the SEM’s central dispatch arrangements, the TSOs schedule and dispatch all units (SEM-12-105b).
- With an increasing volume of Battery Storage Units connecting to the grid, allowing these units to self-dispatch to charge could cause risks to system security.
- EirGrid’s recently approved Grid Code modification MPID304: Incorporation of Battery ESPS Grid Code Implementation Note included the following:
 - “Pre-Agreed Charging was not deemed appropriate for inclusion in this modification. Pre-Agreed Charging is a temporary operational measure that was included in V3 to give guidance to industry, not necessarily to advise on Grid Code alterations.”

Minimum Output in the Calculation of Accepted Bid Offer Quantities for Incs

- At present Outturn Availability is included in the algebra for calculating Accepted Bid Offer Quantities for decs to ensure that any decrease in output from PNs due to reduced availability is seen as an imbalance, rather than an Accepted Bid:

F.6.2.4

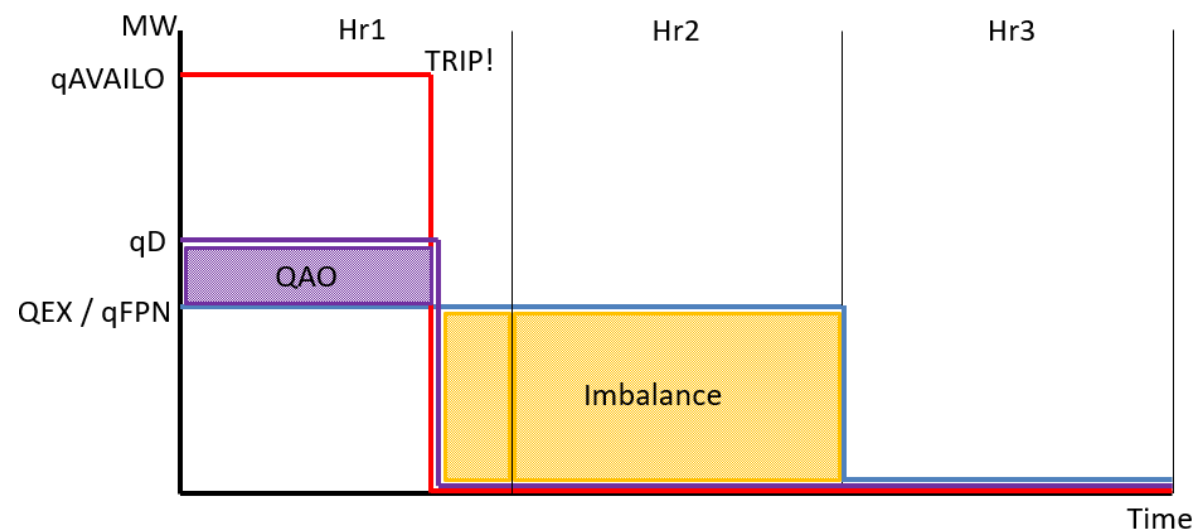
$$qDA_{uoh}(t) = \text{Min} \left(qD_{uoh}(t), qDA_{u(o-1)h}(t) \right)$$

$$qDA_{u(o-1)h}(t) = \text{Min} \left(qD_{u(o-1)h}(t), qAVAILO_{uh}(t) \right)$$

$$qD_{u(o=0)h}(t) = qFPN_{uh}(t)$$

$$qBOUR_{u(i=0)h}(t) = 0$$

$$qBOLR_{u(i=0)h}(t) = 0$$



Minimum Output in the Calculation of Accepted Bid Offer Quantities for Incs

- Minimum Output under the Trading and Settlement Code is the minimum level of output at which a Generator Unit may operate.
 - For units other than Pumped Storage and Battery Storage Units Minimum Output is always zero.
 - For Pumped Storage and Battery Storage Units Minimum Output is their availability to import.

To mirror the inclusion of Outturn Availability in the algebra for calculating Accepted Bid Offer Quantities for decs, and to ensure that any increase in output from PNs due to reduced minimum output (i.e. incs from PNs that the unit did not have sufficient storage capacity to reach) is seen as an imbalance rather than an Accepted Bid, we propose that Outturn Minimum Output is included in the algebra for calculating Accepted Bid Offer Quantities for incs as shown below:

- F.6.2.3

$$qDA_{uoh}(t) = \text{Max} \left(qD_{uoh}(t), qDA_{u(o-1)h}(t) \right)$$

$$qDA_{u(o-1)h}(t) = \text{Max} \left(qD_{u(o-1)h}(t), qMINOUT_{uh}(t) \right)$$

$$qD_{u(o=0)h}(t) = qFPN_{uh}(t)$$

$$qBOUR_{u(i=0)h}(t) = 0$$

$$qBOLR_{u(i=0)h}(t) = 0$$

Minimum Output in the Calculation of Accepted Bid Offer Quantities for Incs

Trade Opposite TSO Accepted Bid Offer Quantities for Incs (F.6.4)

- Trade Opposite TSO is where a unit can increase the volume of a Bid or Offer accepted by the SOs after the time it has been accepted.
- For completeness the Outturn Minimum Output is proposed to be included in the same way in the calculation of Trade in the Opposite Direction to the TSO Quantities.
- Where Outturn Availability is included in the algebra for Without Trade Opposite TSO Accepted Bid Offer Quantity for Decs resulting from Bid Offer Acceptance (F.6.4.8), Outturn Minimum Output will be included in the algebra for Without Trade Opposite TSO Accepted Bid Offer Quantity for Incs resulting from Bid Offer Acceptance (F.6.4.7).
- This functionality is not currently switched on for any unit in the market.

Accepted Offers Below Physical Notification and Accepted Bids Above Physical Notification Quantities (F.7)

- Similarly, Outturn Minimum Output is proposed to be included in the same way in the calculation of Accepted Offers Below Physical Notification and Accepted Bids Above Physical Notification Quantities.
- Where Outturn Availability is included in the algebra for Price Only Accepted Bid Offer Quantity for Decs resulting from Bid Offer Acceptance (F.7.1.4), Outturn Minimum Output will be included in the algebra for Price Only Accepted Bid Offer Quantity for Incs resulting from Bid Offer Acceptance (F.7.1.3).

Testing Charge

Testing Charge for Generator Units other than Interconnector Error Units (F.13.2.1):

$$CTEST_{uy} = - \text{Max}(QMLF_{uy}, 0) \times PTESTTARIFF_{uy}$$

Testing Charge for Interconnector Error Units (F.13.2.2):

If $QMLF_{uy} > 0$ then

$$CTEST_{uy} = - \text{Max}(QMLF_{uy}, 0) \times PTESTTARIFF_{uy}$$

else

$$CTEST_{uy} = QMLF_{uy} \times PTESTTARIFF_{uy}$$

We propose that Battery Storage Units also be included under F.13.2.2 so that negative meter quantities can be handled appropriately, and the Testing Charge can be incurred for testing while importing and exporting.

Application of Loss Adjustment Factors

Application of Loss Adjustment Factors for most Generator Units (F.4.3.2):

$$XXXLF_{\gamma} = XXX_{\gamma} \times FCLAF_{\gamma}$$

Application of Loss Adjustment Factors for Interconnectors, Interconnector Error Units, Interconnector Residual Capacity Units, Capacity Market Unit related to an Interconnector (F.4.3.3):

If $XXX \geq 0$ then

$$XXXLF_{uy} = XXX_{uy} \times FCLAF_{ly}$$

else

$$XXXLF_{uy} = \frac{XXX_{uy}}{FCLAF_{ly}}$$

Application of Loss Adjustment Factors

Application of Loss Adjustment Factors to QABLF and QAOLF for Interconnectors, Interconnector Error Units, Interconnector Residual Capacity Units, Capacity Market Unit related to an Interconnector (F.4.3.4):

If $QD_{uy} \geq 0$ then

$$QAOLF_{uy} = QAO_{uy} \times FCLAF_{ly}$$

$$QABLF_{uy} = QAB_{uy} \times FCLAF_{ly}$$

else

$$QAOLF_{uy} = \frac{QAO_{uy}}{FCLAF_{ly}}$$

$$QABLF_{uy} = \frac{QAB_{uy}}{FCLAF_{ly}}$$

Application of Loss Adjustment Factors to qCLF for Capacity Market Unit related to an Interconnector (F.4.3.5):

$$qCLF_{uy} = qC_{uy} \times FCLAF_{ly}$$

Application of Loss Adjustment Factors

We propose:

- excluding Battery Storage Units from F.4.3.2

and including Battery Storage Units in

- F.4.3.3,
- F.4.3.4 and
- F.4.3.5

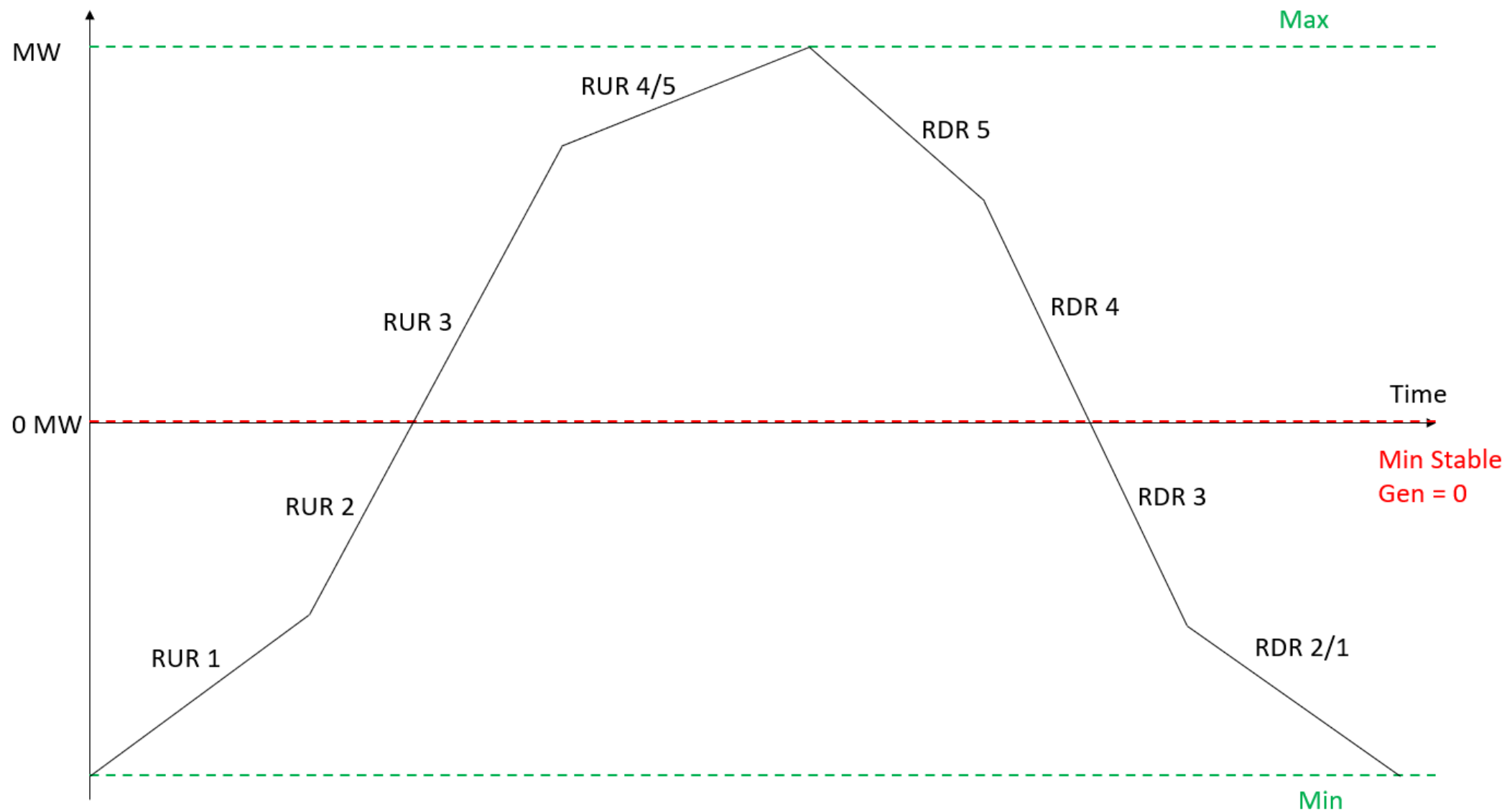
so that loss adjustment factors are applied similarly to Battery Storage Units as they are for Interconnector Units, taking into consideration import as well as export.



Instruction Profiling

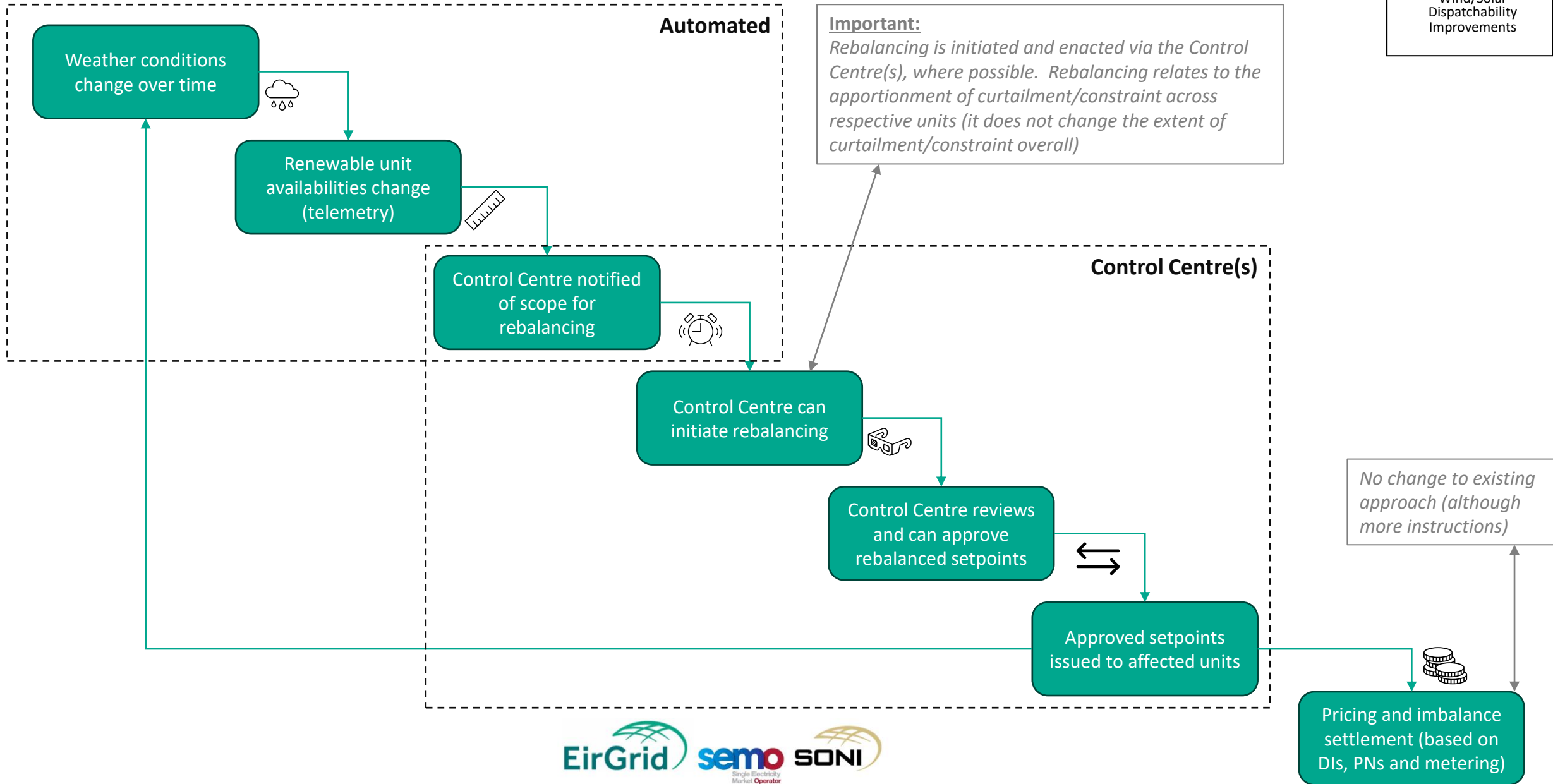
- Battery Storage Units will be dispatched using MWOFF Dispatch Instructions rather than GOOP instructions as GOOP instructions are more aligned to the technical characteristics of Pumped Storage Units and are not well suited to Battery Storage Units.
- Minimum Stable Generation to be submitted as zero.
- SYNC instructions may be issued to charge or discharge.
- Ramp Rates will be used between Registered Minimum Output and zero as well as between Minimum Stable Generation and Maximum Generation.

Sample Technical Offer Data Profile





SDP_004: "Day in the life"

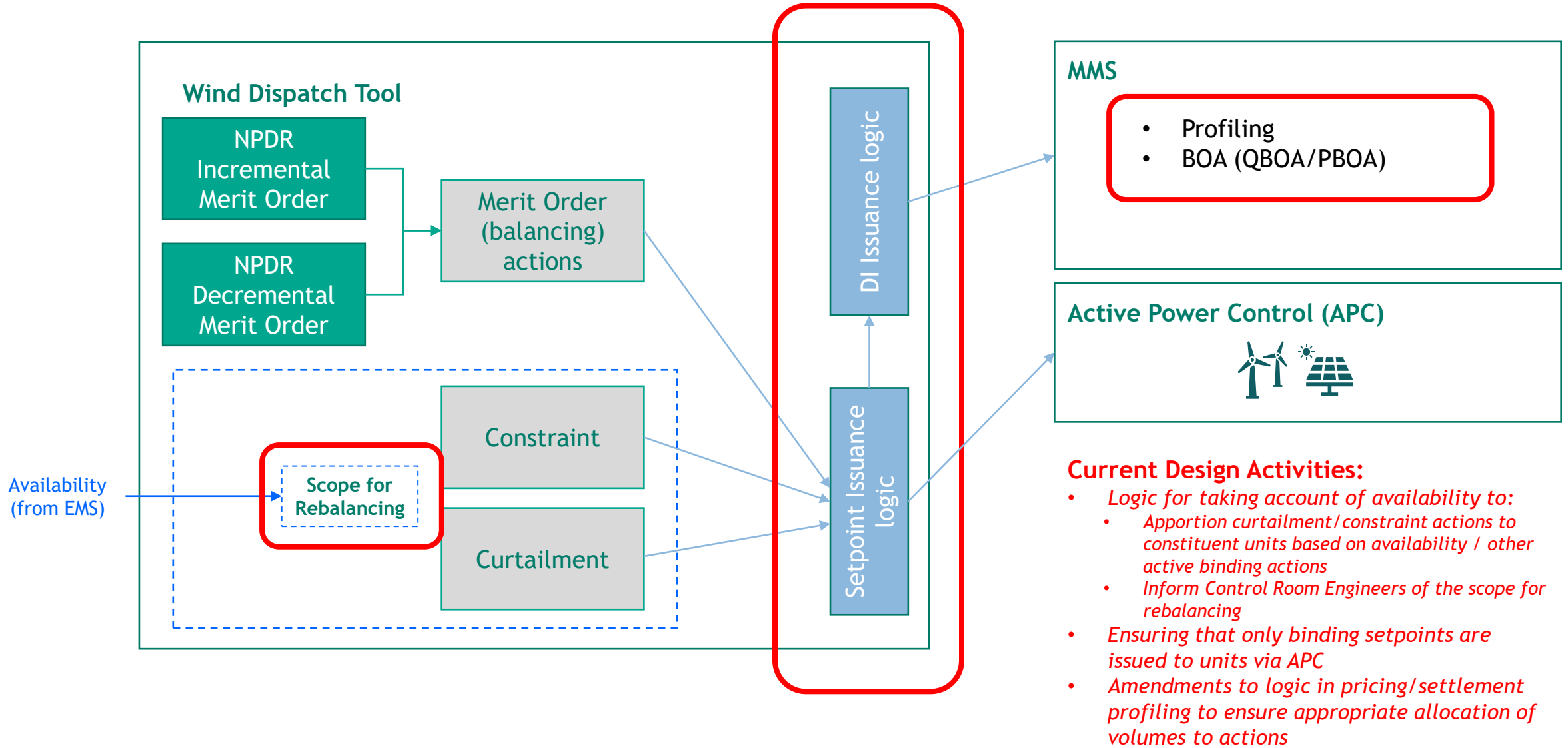


SDP_004: Some principles for apply/relax/remove/rebalancing calculations

IMPORTANT NOTE: below is part of design discussions and may be amended

- **Take Availability into account where possible (to reflect changing weather conditions)**
 - Application/relaxation/removal/rebalancing must be with respect to already approved “actions”
 - *For NPDRs: availability, Merit Order setpoints, Curtailment, Constraints*
 - *For PDRs: availability, Curtailment, Constraints*
 - A change in availability may not change a unit’s setpoint (if it is bound by another action)
- **Scope for rebalancing will be calculated and provided to Control Centre engineers**
 - Scope for re-balancing will be calculated by the systems and provided to CC engineers
 - Re-balancing must be Control Centre-led/approved, as it can require changing the output of large numbers of units across the jurisdiction (impacting on system security). Re-balancing cannot be automated.

SDP_004: current status



Stakeholder Engagement: Industry Workshop

Code Change Schedule

Initiative	Introduced to T&SC Mods Committee	Target Date for Vote in T&SC Mods Committee	Grid Code Review Panel/ Joint Grid Code Review Panel
SDP_02 - ESPS Integration	19/10/2023	05/12/2023	Q1 2024 (TBC)
SDP_01 - Operation of Non-Priority Dispatch of Renewables and SDP_04 - Wind/Solar Dispatchability Improvements	05/12/2023	Q1 2024 (TBC)	Q1 2024 (TBC)



T&SC Mods Next Steps

- SDP team are organising standalone sessions on the SDP_02 (battery) mod, provisionally for the w/c 06/11/2023 and w/c 13/11/2023.
- Targeting a vote on this mod in next Mods Committee meeting in December.
- Mod for NPDRs will be introduced at December meeting for vote in the following meeting, with additional sessions offered if necessary.
- **Participants may email a request to SchedulingandDispatch@Eirgrid.com if they would like to be included in these standalone mod sessions.**

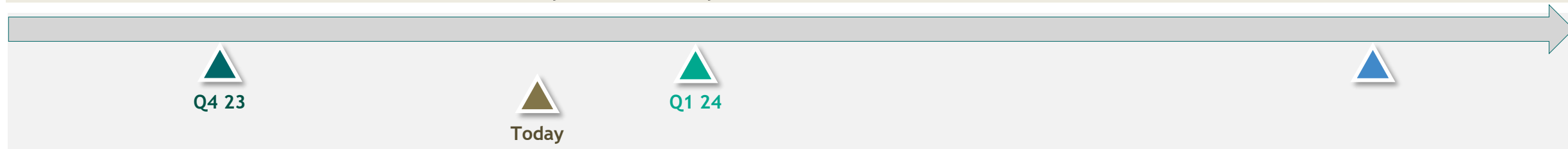


Stakeholder Engagement: Industry Workshop

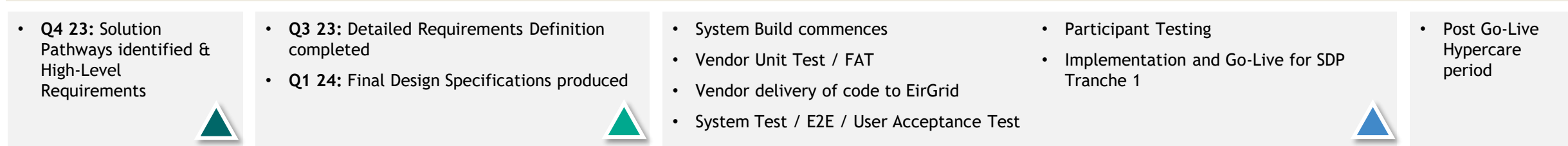
Systems Delivery Update - SDP Tranche 1



System Delivery Phase Timeline / Milestones



System Delivery Milestones



SDP Initiative - Tranche #1

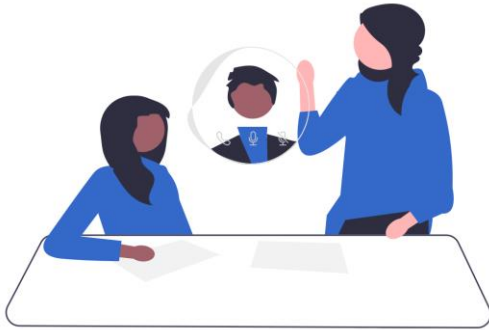
- SDP_01: Treatment of Non-Priority Dispatch Renewables
- SDP_02: Energy Storage Power Stations
- SDP_04: Wind Dispatch Improvement

Key Progress Updates

- Detailed Requirements complete and system vendors engaged
- High Level design complete with majority of core design elements now defined. Work ongoing to refine design and detail outstanding elements including UI, reports, event timings and parameter formulas
- Draft designs and impact assessments from vendors are currently being received and analysed
- Work ongoing to consolidate vendor updates into an overall deliver plan and a Test Strategy/Approach

Stakeholder Engagement: Industry Workshop

Ongoing Stakeholder Engagement



Stakeholder Engagement

Stakeholder Engagement will continue. We will host more industry-wide workshops and focused sessions for different groups (technical, programme management).

Engagement is bi-directional. We need to hear from you! You will hear from us.

Bilateral Meetings

Ongoing bilateral meetings to discuss SDP details.


Industry-Wide Engagement

- Monthly cadence for Industry workshops
- Standing placeholder at Market Operator User Group

Stakeholder Engagement: Industry Workshop

Contacting SDP

To raise an issue or query for the Scheduling & Dispatch Programme:

Contact 	SDP Queries SchedulingandDispatch@Eirgrid.com
	Operating Hours 9:00am - 5:00pm IPT (Mon-Fri)
	<i>Queries received outside of operating hours will be addressed the next business day.</i>

Information to Provide
<ul style="list-style-type: none">• Your Name• Your email & phone number• Your organisation• Topic of Issue/Query• Description of the issue or query• Any additional information to aid in understanding the issue or query

Scheduling & Dispatch: Industry Workshop (November 2023)

Future Workshop Schedule

Date	Day of Week	Time	Location
6 December 2023	Wednesday	1:00 p.m. - 4:00 p.m.	TBD + Virtual Option
10 January 2024	Wednesday	1:00 p.m. - 4:00 p.m.	TBD + Virtual Option
07 February 2024	Wednesday	1:00 p.m. - 4:00 p.m.	TBD + Virtual Option
06 March 2024	Wednesday	1:00 p.m. - 4:00 p.m.	TBD + Virtual Option
10 April 2024	Wednesday	1:00 p.m. - 4:00 p.m.	TBD + Virtual Option



Future Discussion Topics

- System Delivery Plan (w/ milestones)
- Tranche 2 Initiatives (Reserves, FFR, Synchronous Condensers)
- Market Participant Readiness
- Business Readiness
- Programme Readiness
- Technical Details (test environment, qualifications)
- Transition Plan (Registration, Data Readiness)
- Go-Live Plan

SDP Readiness?



SDP Readiness - What does this mean?







In short, SDP Readiness is an assessment of the degree of preparedness for SDP Go-live. This is an approach we are introducing that will traverse across all parties affected by the SDP changes to ensure with a high degree of confidence that Readiness will be achieved in time for SDP Go-live.

Why discuss Readiness now?

Even though more specific milestones and other information have not yet been nailed down, it is not too early to start thinking about what you need to be ready and how you are going to achieve this. The purpose of the Readiness approach is to help all parties make this determination.



SDP Readiness: An Overview

 <p>What is Readiness?</p>	<p>Readiness is the assessment of the level of preparedness for SDP Go-Live.</p>
 <p>To Whom Does it Apply?</p>	<p>MPs: Market Participant segments affected by the SDP changes Business: TSOs/MO Business Units affected by the SDP Changes SDP Team: Programme delivery of the SDP Changes</p>
 <p>When Will it be Conducted?</p>	<p>December 2023 through SDP Go-live. Conducted first for Tranche 1 Initiatives, then repeated for Tranche 2.</p>
 <p>How Will it be Used?</p>	<p>Use of self-assessment surveys to evaluate the level of readiness. Use these to identify gaps and other information needed, so that any outstanding issues are resolved in a timely matter.</p>
 <p>How Will it be Reported?</p>	<p>The degree of Readiness will be quantified and reported for individual MPs, the MP segments, and the MP community. It will be reported at IWs, bilateral meetings and other media. Similar reporting will involve the business units/teams within TSOs/MO. Reporting on the SDP Programme Readiness will also be forthcoming.</p>
 <p>Why Does it Matter?</p>	<p>It is important that all parties are aware of the level of Readiness within their organizations and that we are all aware of overall readiness among the MPs, the Business, and the SDP Programme itself so any issues can be resolved in time for SDP Go-Live.</p>

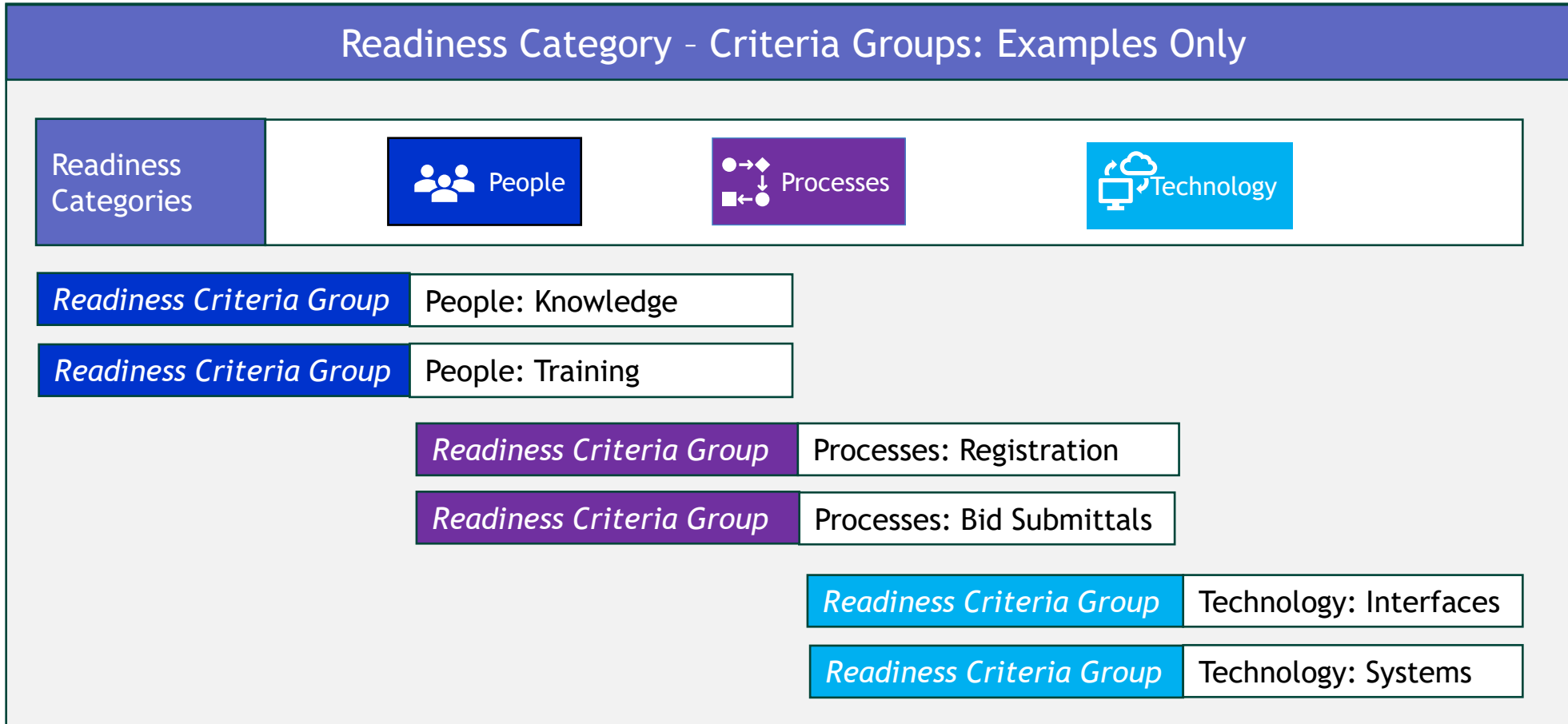
Key Principles

- 1. Transparent:** Provide a clear view of all Readiness Criteria and the methodology for evaluating, scoring, and publishing Readiness for the entire community.
- 2. Cooperative:** Must operate an open and cooperative exchange among the Business, the SDP Team, and the Market Participants.
- 3. Fair:** Must be consistent in the evaluation and reporting of Readiness across all parties.
- 4. Simple & Meaningful:** Must be relatively straightforward, while being thorough enough to adequately assess the degree of Readiness.
- 5. Outcome-Oriented:** Must focus on the data and outcome and less on the actual process. Must maintain flexibility in the process to achieve the objectives.

SDP Readiness: Criteria Hierarchy and Organisation



- For each focus (Market Participants, Business, SDP Programme), Readiness will be evaluated over three broad Categories of People, Processes, and Technology
- Each Readiness Category will be organised into Readiness Criteria Groups
- Readiness Criteria Groups will have specific Criteria to be evaluated



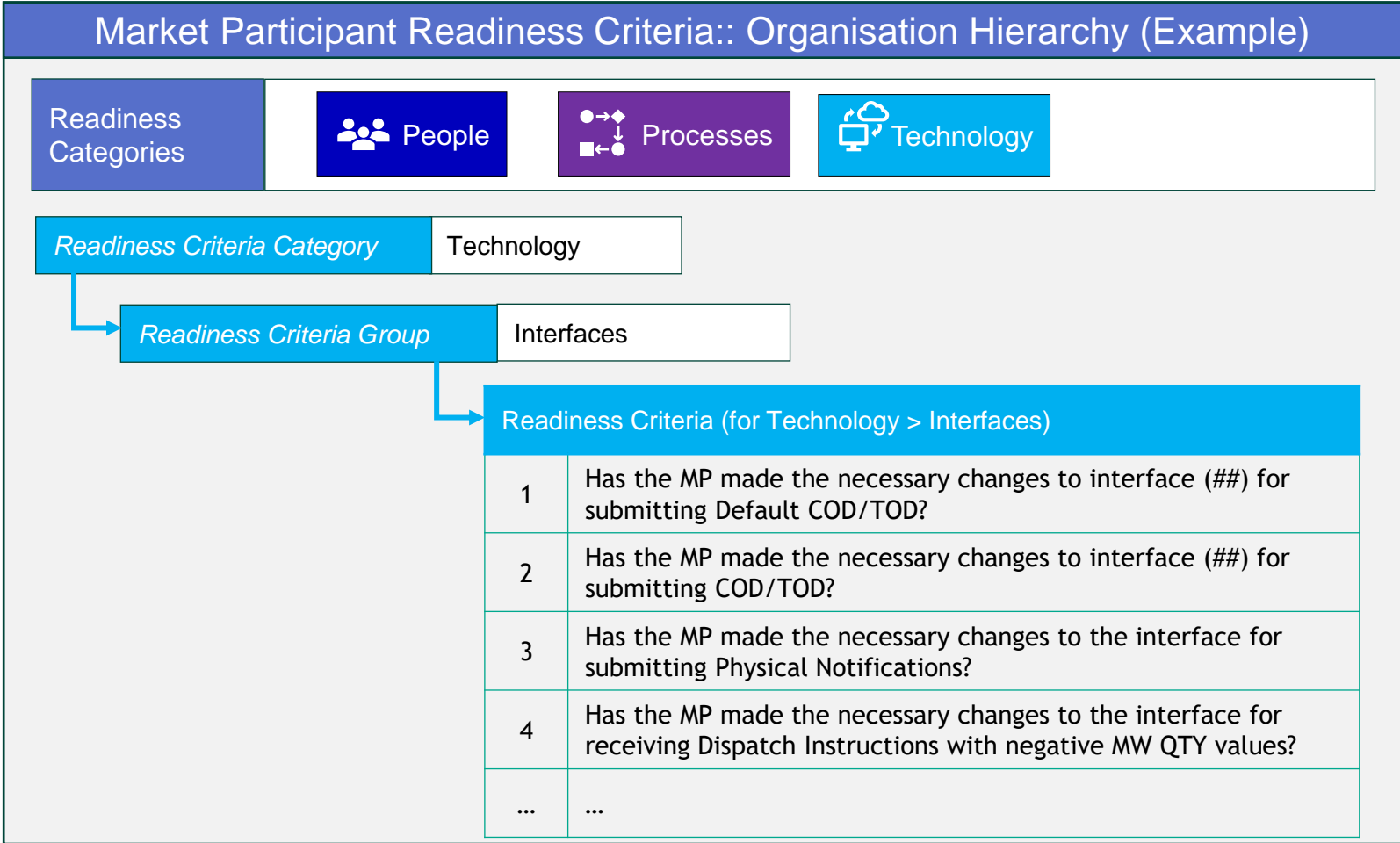
SDP Readiness: Market Participant Readiness Criteria Example



Market Participant Readiness Criteria are the questions asked of the Market Participants to fully evaluate and understand their degree of preparedness for SDP across the dimensions of their people, processes, and technology.

This particular example involves criteria we may be asking at later stages in the programme. Early on we will ask questions like, when do you need interface specifications.

These Criteria will ask questions about the Market Participants' understanding of the SDP changes, the measures they are taking to prepare for the changes, and the outcomes of those preparations they have observed to date.

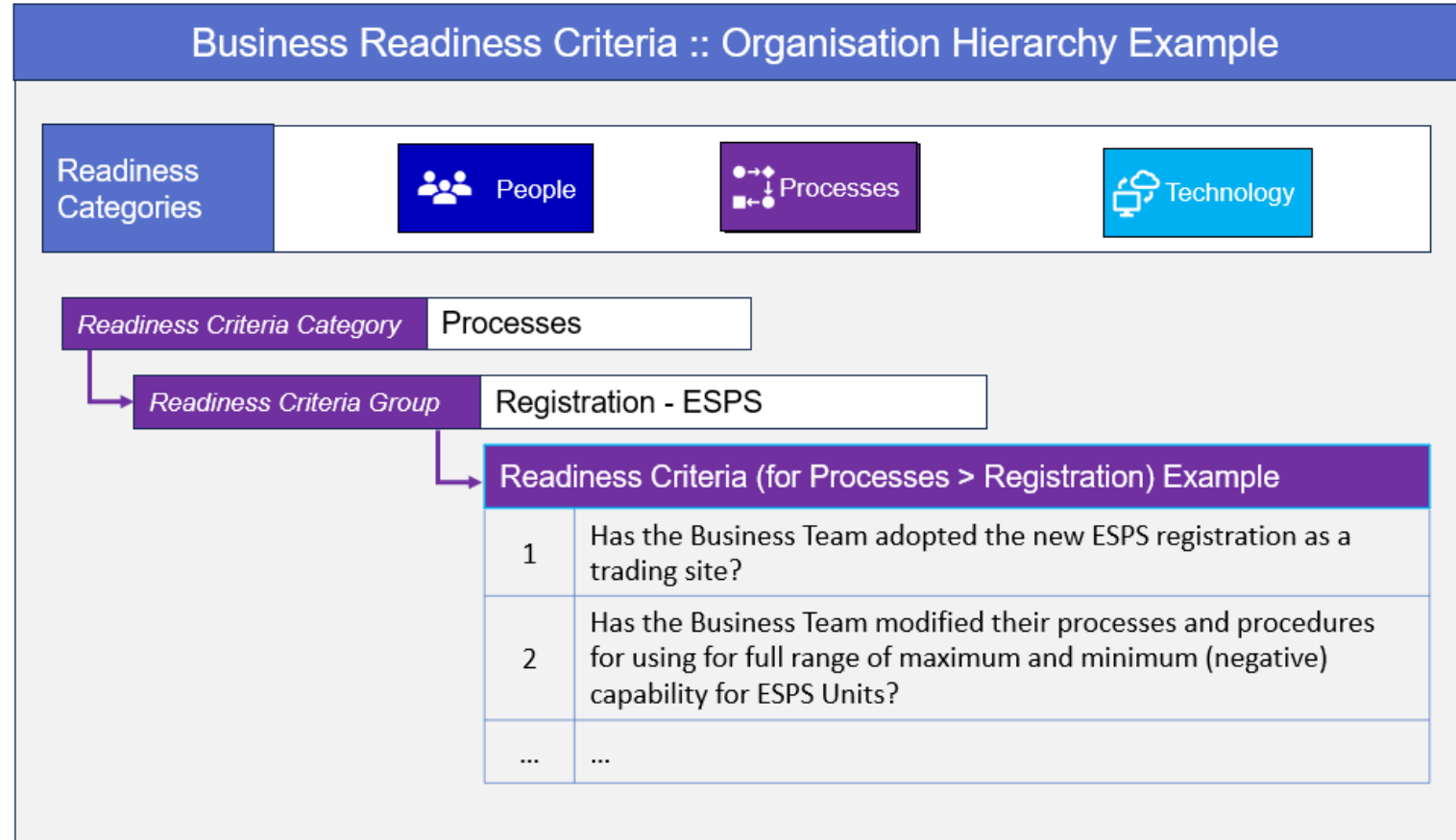




SDP Readiness: TSOs/MO Readiness Criteria Example

Business Readiness Criteria are the questions asked of the Business Units to fully evaluate and understand their degree of preparedness for SDP across the dimensions of their people, processes, and technology.

These Criteria will ask questions about the Business Units' understanding of the SDP changes, the measures they are taking to prepare for the changes, and the outcomes of those preparations they have observed to date.





SDP Readiness: Evaluation Methodology

- Readiness Criteria will be defined and issued via self-assessment surveys to each focus group (MPs, Business, SDP Team):



- Surveys will address Readiness Criteria across the Readiness Categories and Criteria Groups.
- Regarding Market Participants and the Business, initial surveys will be more general and seek understanding of what's needed from the SDP Team; later surveys will focus on the level of readiness across more specific criteria.
- Expect to issue surveys every 4 - 6 weeks; these are on-line and voluntary, but your participation will greatly in assessing the Readiness of the entire Programme for SDP Go-live.

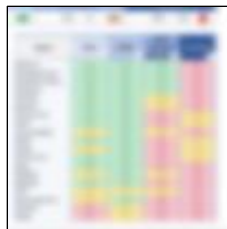
- Survey results and other intelligence gathered will be measured (scored):



5	Demonstrated Readiness
3-4	Still some work to be done
1-2	Has made some progress
0	Not Ready

- Using a consistent method to rate the degree of readiness facilitates early identification of gaps and areas of concern.
- Early detection of gaps allows us to act to remedy the situation in time for SDP Go-live.

- Readiness Reports will be issued, illustrating the level of Readiness and pinpointing areas of concern:



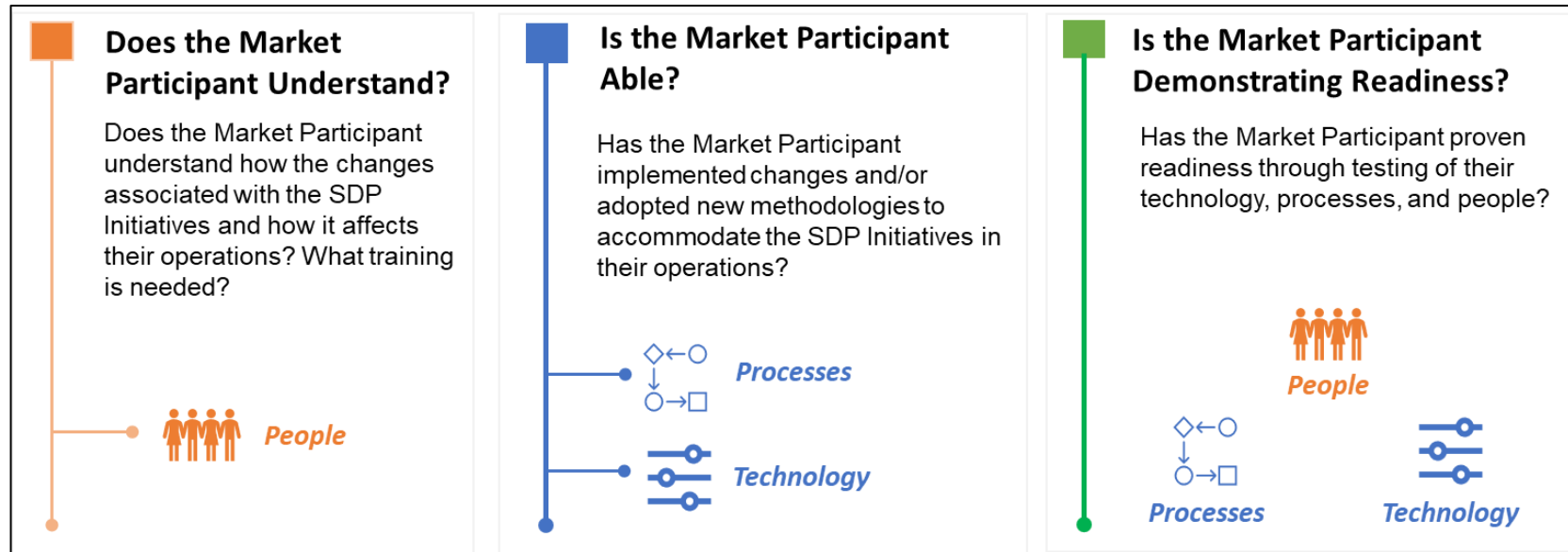
- Individual MP Report - issued only to that MP
- MP Segment Report - MP ratings rolled up within a particular segment (e.g., Wind, ESPS)
- MP Community - overall (aggregate) report on readiness of the MP community as a whole

- Individual Business Team Report
- Business Unit Report - Team ratings within a Business Unit rolled up
- Business Community - overall (aggregate) report on readiness of the Business community as a whole



SDP Readiness: Market Participants

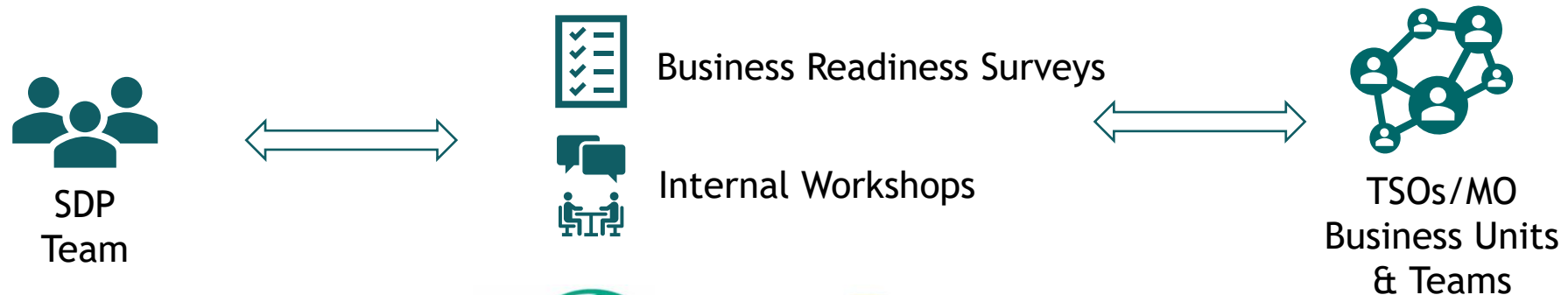
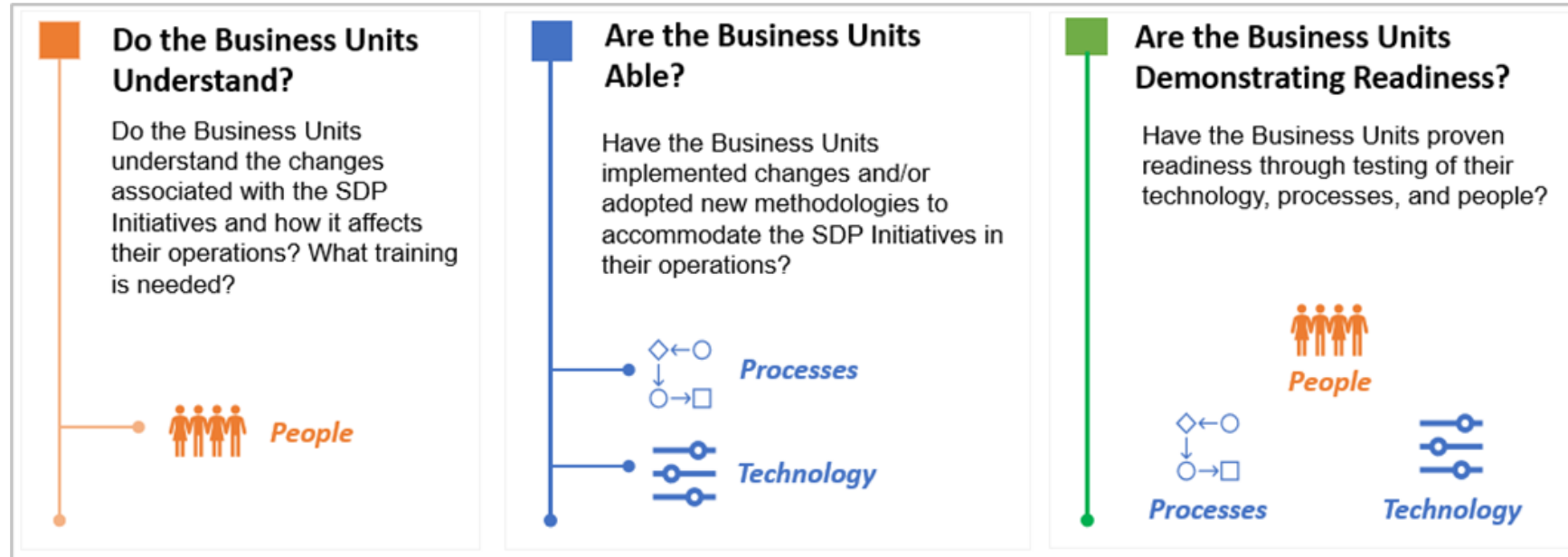
At its core, MP Readiness seeks to answer three fundamental questions, shown below.



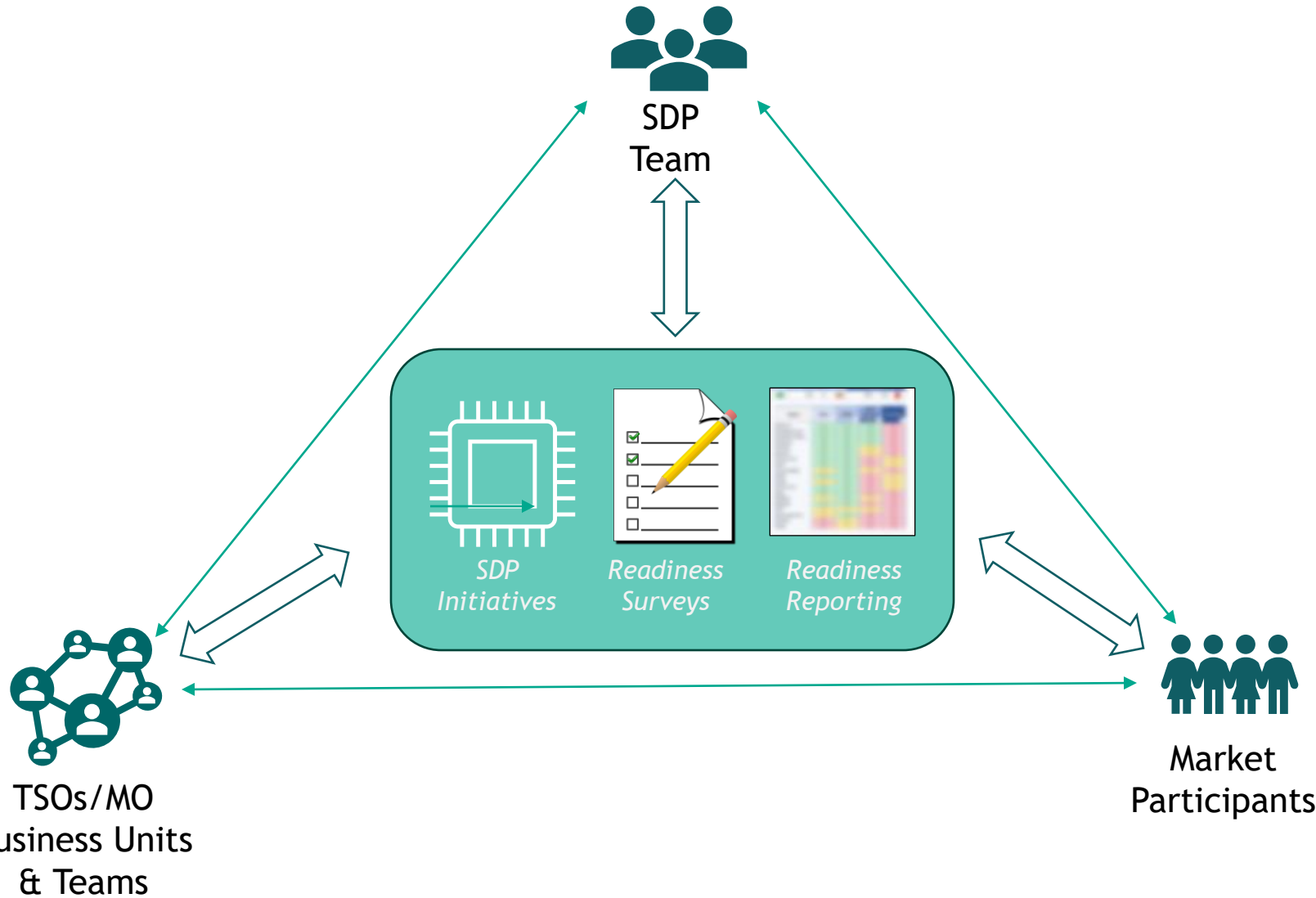


SDP Readiness: TSOs/MO Business

At its core, Business Readiness seeks to answer three fundamental questions, shown below.






SDP Readiness: Working Together to Achieve SDP Readiness



Key Principles

1. **Transparent:** Provide a clear view of all Readiness Criteria and the methodology for evaluating, scoring, and publishing Readiness for the entire community.
2. **Cooperative:** Must operate an open and cooperative exchange among the Business, the SDP Team, and the Market Participants.
3. **Fair:** Must be consistent in the evaluation and reporting of Readiness across all parties.
4. **Simple & Meaningful:** Must be relatively straightforward, while being thorough enough to adequately assess the degree of Readiness.
5. **Outcome-Oriented:** Must focus on the data and outcome and less on the actual process. Must maintain flexibility in the process to achieve the objectives.

SDP Readiness: Next Steps

	Determine What's Needed (Dec 2023 - Jan 2024)	Establish Criteria & Milestones (Q1 2024)	Evaluate, Report, Resolve (Q1- Q4 2024)
 <i>Focus</i>	Focus on what the Market Participants & Business Units need and timing in order to be Ready.	Deep dive into needs and timelines. Align this with SDP Program timelines.	Refine Criteria, Surveys, and Reporting. Identify gaps. Focus on plugging the gaps.
 <i>Activities</i>	Initial general surveys, IWs, and Bilateral Meetings with the external and internal communities.	Define specific Criteria & Criteria Groups pertinent to each MP/MP Segments; Business Units/Teams; and the SDP Programme/Team. Establish scoring protocol and thresholds for SDP Readiness.	Continue to refine Criteria; Work with MPs and Business to remedy issues. Ensure that all parties have the information needed in time to support SDP Go-live
 <i>Outcomes</i>	A clear and specific set of needs and timeframes across MPs, MP Segments, Business Units/Teams and the SDP Programme/Team.	More specific surveys across MPs, Business, and SDP Program. Reports on survey results and other intelligence gathered assessing level of Readiness. Reporting and feedback.	Specific artefacts (requirement changes, training, technical specifications, test site, etc.) and timelines to support SDP Go-live

Stakeholder Engagement: Industry Workshop

Next Steps

Next Steps

Please provide feedback when you have reviewed and considered the information from today's discussion.

Follow-up from any "Listen" item discussed today.

Be on the lookout for the next Industry Workshop, to be scheduled at a monthly cadence.



Stakeholder Engagement: Industry Workshop

Actions and Open Questions

SDP: Glossary

Term	Definition
BA	Business Analyst
BM	Balancing Market
CC	Control Centre
CCT	Control Centre Tools (LSAT, RMT & VTT)
COD	Commercial Offer Data
CSB	Counterparty Settlement and Billing
DI	Dispatch Instruction
DRDQ	Dispatch Regime Dispatch Quotient
EG	EirGrid / SONI / SEMO
EMS	Energy Management System
ESPS	Energy Storage Power Station
FFR	Fast Frequency Response
GDX	Group Data Exchange
GSP	Generator Setpoint
HIS	Historical Information Server
HLR	High Level Requirements
IPO	Innovation and Planning Office
IPQBOA	Instruction Profile Quantity Bid Offer Acceptance
JAPR	Jurisdictional Active Power Ratio
MI-STL	MMS to CSB integration
MMS	Market Management System
MOL	Merit Order List
MPI	Market Participant Interface
NF	Non-Functional
NPDR	Non-Priority Dispatch of Renewables Unit
OMS	Outage Management System

Term	Definition
OUI	Operator User Interface
PD RES	Priority Dispatch. Renewable Energy Source
PIMB	Imbalance Price Calculation
PIO	People and Information Office (IT)
PN	Physical Notification
PS	Pumped Storage
QD	Dispatch Quantity
QM	Metered Quantity
RMT	Ramping Margin Tool
ROM	Rough Order of Magnitude
RSD	Reserve Scheduling Dispatch
RT	Real Time
RTQBOA	Real Time Quantity Bid Offer Acceptance
RTU	Remote Terminal Unit
S&D	Scheduling and Dispatch
SCADA	Supervisory Control and Data Acquisition
SDP	Scheduling and Dispatch Programme
SEMO	Single Electricity Market Operator
SME	Subject Matter Expert
TOD	Technical Offer Data
TSO CSB	Transmission System Operator Counterparty Settlements & Billing
UC	Use Case
WDT	Wind Dispatch Tool
WEF	Wind Energy Forecast
WPRED	Wind Predictor