

# Scheduling & Dispatch

## Stakeholder Engagement

Industry Workshop

06 December 2023

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

*Achievable - Valuable - “Simple”*



# Scheduling & Dispatch: Industry Workshop (December 2023)

## Agenda for today's workshop

Time	Topic
12:30	Lunch & Catch-up
13:00	Introduction, Opening Remarks
13:15	Programme Status Update
13:30	<u>Functional Review</u> ESPS MODS recap NPDR MODS introduction Tranche 2 initiatives
15:00	Break
15:15	Stakeholder Engagement: Upcoming Meetings
15:30	SDP Readiness
16:00	Meeting Adjourns


### Since We Last Met

- Developed Initial MP Readiness questions
- Developing Training Approach
- Preparing MODS changes for SDP\_001 NPDR
- ESPS presented @ MODS Committee
- 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 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 your 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

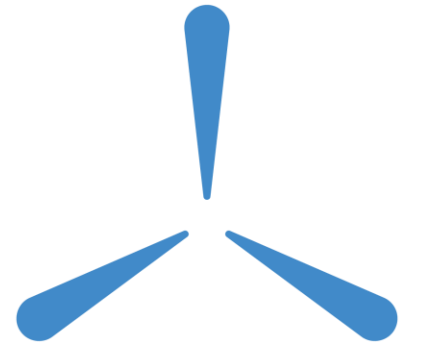
#### Group 2

- SDP\_003
- SDP\_005
- SDP\_006

## SDP Timeline



# Programme Status Update



# SDP: Status Update (December Industry Workshop)

- As planned, no issues    ↑ Improving
- Minor - moderate concern    ⇔ Steady
- Significant issue / concern    ↓ Worsening

Refreshed: 06 Dec 2023

This update is provided to the SDP industry workshop on 06 Dec 2023



SDP

## Summary Status

Overall Status		Overall programme status is amber - at risk due to timeliness of funding decision. Good pace of detailed design and stakeholder engagement. Strong support for SDP across stakeholder community.
Schedule		SDP team working with IT vendors on detailed design. Once funding is approved, an updated delivery timeline can be published. Involves multiple vendors.
Resourcing		TSO/MO programme teams are fully staffed and engaged to continue work at pace.
Finances		Pending RA decision on SDP Phases 3-5 funding.

## Key Messages



### MP Sentiment is Amber (steady)

- MPs actively engaged and driving forward solutions
- Strong support for SDP
- Serious concern over SDP timelines expressed



### Key Activities For Immediate Action

- Funding approval
- NPDR modification discussion
- Tranche 2 design and engagement
- Published SDP timelines



### Positive Developments (Since Last Report)

- Approval on ESPS changes in MODS Committee
- Continuing Detailed Design at pace (T1), HLR Validation (T2)
- Strong stakeholder engagement and alignment on f(x) approach



### Challenges (Since Last Report)

- Funding uncertainty
- SDP Timeline publication

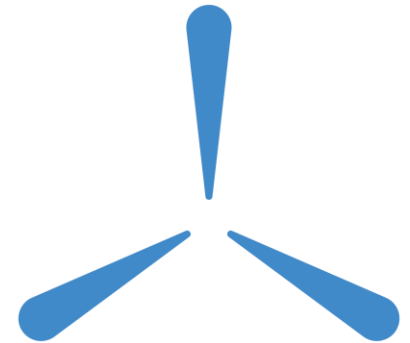
## Industry Queries:

Will NPDR units have to submit PNs in A04 formats (as opposed to A01)?

The Trading and Settlement Code currently states that non-dispatchable generators should submit PNs in A04 (stepwise linear) format. We are not proposing any changes to this.

NPDR units are classified as Dispatchable (rather than Non Dispatchable) units in regard to the need for Complex COD – is this correct?

Yes, NPDRs will be considered similarly to dispatchable generators for energy balancing and therefore will be required to submit complex COD.





# Industry Queries:

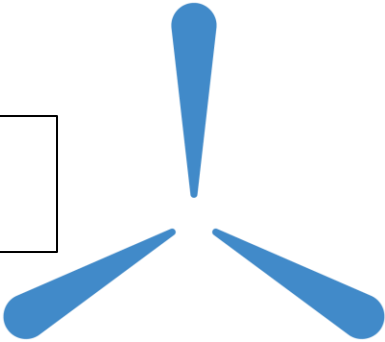
Are FPNs and Short-term availability at station gate (before losses) or at Trading Point (after losses)

Both are before losses.



If ramp up and down rates are assumed to be infinite, how do you submit the value Infinity in COD and what are the break points – 0MW for ramp down and capacity for ramp up?

Expected values for non-applicable parameters current being confirmed with MMS vendor.



## Industry Queries:

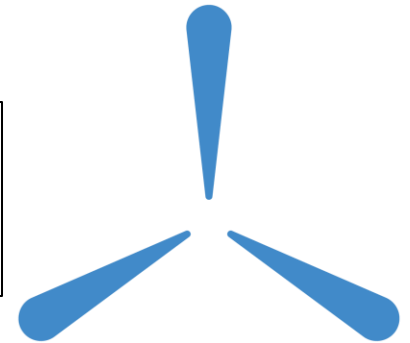
Does, or could, the concept of “Under Test” apply to NPDR units?

Under the Trading and Settlement Code this could apply to NPDR units.



Are undo bid and offers defined from the incremental and decremental price curves – e.g. the undo offer is the bid at that MW level – or do they need to be submitted as separate price curves?

Yes, undo bids and offers are from the same incremental and decremental price curves (and resulting composite price curve split around the PN). The CABBPO and CAOPO charge components settle these and the bid/offer price only.



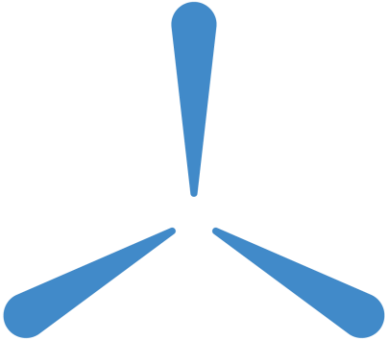
# Industry Queries:

What are the rules on complex COD pricing for NPDR for bids and offers?

They will have to be BCOP compliant, i.e. cost reflective. The details of what this entails is a matter for the RAs.

Is Standing COD Complex or Simple?

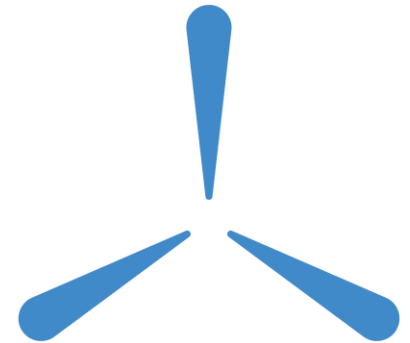
Standing COD is Complex



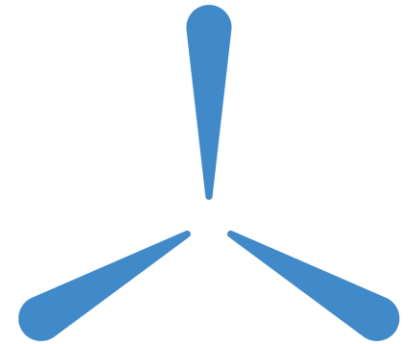
## Industry Queries:

Where in Commercial Offer Data – and especially in which file(s) – is Forecast Availability defined. We assume that where forecast availability changes after gate closure participants should notify these changes to SEM-O through this variable – is that correct? and how are changes to this variable, after gate closure, handled by SEM-O?

In the I-SEM Technical Specification (ITS-Release 9.1 ), in the document “ISEM\_TS Volume C – Balancing Market v12.1.pdf”, you will find the submission timing in **Section 5.3** and the Forecast Availability parameter in **Section 5.5**.



# ESPS Modifications Update



## History of the Mod

- The mod was introduced to the mods committee on 19<sup>th</sup> October.
- Based on feedback from committee members it was decided that further sessions were required to work through the detail of the mod before going to a vote.
- Further sessions were held by the Scheduling and Dispatch team on the 8<sup>th</sup> and 15<sup>th</sup> of November. All members of the mods committee were invited to join these calls and a wider invitation was issued at our November Scheduling and Dispatch Programme workshop.
- Within these sessions the Scheduling and Dispatch Programme team provided further clarifying details on the mod proposal and related operational policies, and discussed queries and suggestions submitted by participants.
- Updates have been made to the mod based on these sessions and the mod has been resubmitted for a vote in this December committee meeting.
- The updated mod was recommended for approval by the mods committee members at the December meeting.



## Updates to Mod Proposal since October Mods Committee Meeting

- Based on discussions with industry, updates have been made to the mod proposal:
  - Proposal to treat Battery Storage Units the similarly to interconnectors when applying loss adjustment factors has been removed, loss factors will be applied as they are for other generators.
  - A new requirement has been added to use Complex Commercial Offer Data in the settlement of Battery Storage Units. This is to allow these units to be compensated appropriately for dispatch away from Physical Notifications which have become infeasible due to TSO actions.
- Based on ongoing discussions with vendors:
  - Proposal to use Outturn Minimum Output as a floor in the calculation of Accepted Bid Offer Quantities (QBOAs) for incs has been postponed.



# System Improvements

We are working with our vendors to remove limitations on market systems which currently restrict batteries' participation in the market.

The primary changes which will allow the control centre and market participants to gain greater value from these units in the balancing market are:

- The ability to register and identify these units correctly as Battery Storage Units.
- The ability for participants to submit negative Physical Notifications, representing an intention to import.
- The ability to schedule these units to follow Physical Notifications.
- The ability for these units to receive negative Dispatch Instructions.

As a result of these changes, updates to the rules for Battery Storage Units in the Trading and Settlement Code are required.



# System Improvements

- Due to system limitations, the scheduling of Battery Storage Units cannot be optimised by market systems.
- In response to this and feedback from participants the approach detailed here has been developed as an **interim solution**.
- An **enduring solution** will follow as part of an upcoming programme of work within the TSOs and SEMO.
- Industry engagement will begin on that programme of work in early 2024.

# Dispatch of Battery Storage Units

## Proposed Operational Policy:

- If a battery unit has non-zero PNs, the control centre engineer will dispatch the unit to those PNs so far as is reasonably practicable while respecting system security.
- On rare occasions, e.g. frequency events or system alerts the control centre may need to dispatch these units away from PNs.

## Trickle Charge:

- Will be available up to the 1MW tolerance included in the Uninstructed Imbalance Charge.



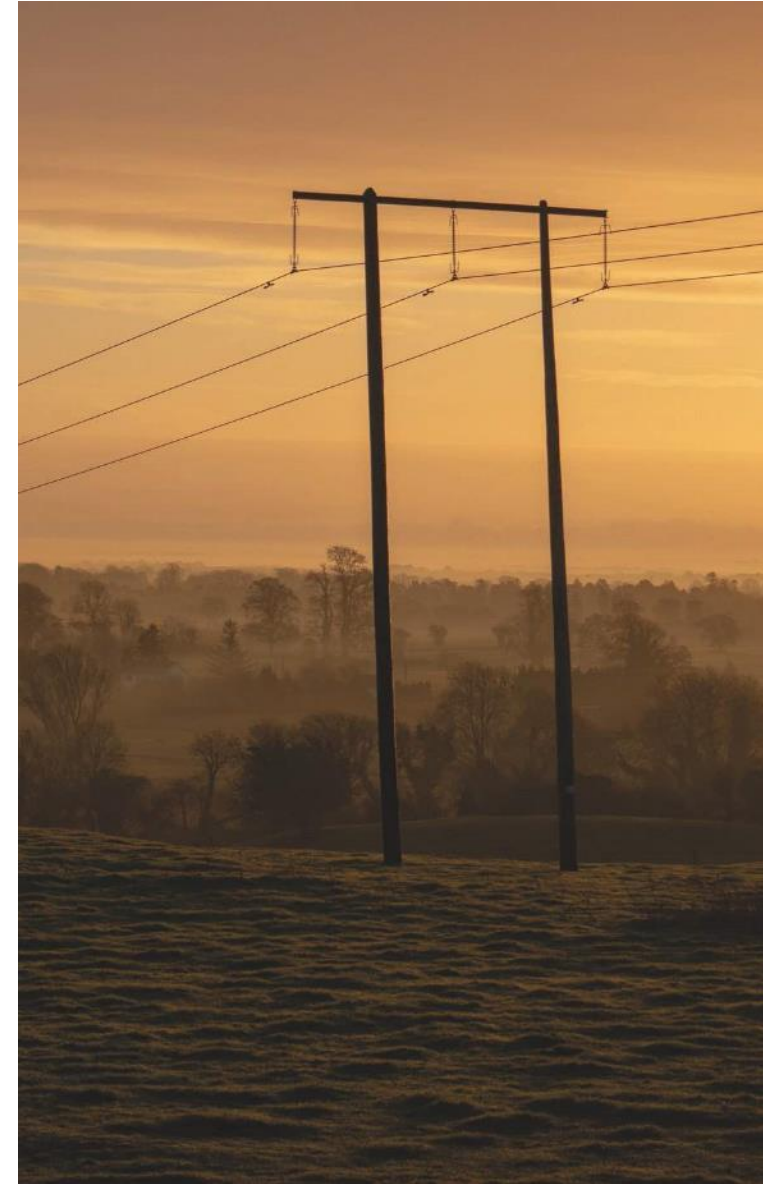
# Settlement of Dispatch Away from PNs

- The TSO will **not** require these units to declare unavailable in EDIL when discharged or charged by the TSO away from PNs, i.e. EDIL availability will not be affected by state of charge.
- Settlement will be based on **EDIL availability**, meaning that dispatch to zero from PNs that have become infeasible due to previous TSO actions will be settled at better of COD price and the imbalance price.
- Settlement for **all actions** on these units will be based on **Complex prices** so that when the TSO must dispatch a unit to zero from PNs that have become infeasible due to previous TSO actions, they are not forced to accept Simple prices.
- **Simple prices** can be submitted, will be used to form the merit order lists, and can set the imbalance price.
  - Participants can use these Simple prices as a signal to the market.
  - If the unit's simple price is the price of the marginal energy action, it will be included in price formation as per the current rules.



# 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.



# 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 ( $qD_{uO\gamma}(t)$ ) at all times within an Imbalance Settlement Period,  $\gamma$ , 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 ( $qD_{uO\gamma}(t)$ ) at any time within an Imbalance Settlement Period,  $\gamma$ , 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 ( $CIMB_{u\gamma}$ ) for each Pumped Storage Unit or Battery Storage Unit,  $u$ , in each Imbalance Settlement Period,  $\gamma$ , 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:

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

- 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,  $\gamma$ , 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,  $\gamma$ , 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.
- The existing tolerances within the Uninstructed Imbalance calculation (minimum of 1MW) may be used by Battery Storage Units to trickle charge.

## Minimum Output in the Calculation of Accepted Bid Offer Quantities (QBOAs) for Incs

- 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 is seen as an imbalance rather than an Accepted Bid, we had proposed that Outturn Minimum Output be included in the algebra for calculating Accepted Bid Offer Quantities (QBOAs) for incs.

- F.6.2.3 
$$qDA_{uoh}(t) = \text{Max}(qD_{uoh}(t), qDA_{u(o-1)h}(t))$$
$$qDA_{u(o-1)h}(t) = \text{Max}(qD_{u(o-1)h}(t), qMINOUT_{uh}(t))$$
$$qD_{u(o=0)h}(t) = qFPN_{uh}(t)$$
$$qBOUR_{u(i=0)h}(t) = 0$$
$$qBOLR_{u(i=0)h}(t) = 0$$

- For consistency, this proposal also applied to the calculation of Trade Opposite TSO Accepted Bid Offer Quantities for Incs (not currently switched on in the market) and Accepted Offers Below Physical Notification and Accepted Bids Above Physical Notification Quantities.
- **Based on conversation with vendors this proposal has not been included in this mod so as not to hold up delivery of other necessary changes.**
- Therefore, under this mod QBOAs will be calculated as they are for other generators today, without the Outturn Minimum Output acting as a floor value.
- This proposal may be re-introduced in a later mod.

## 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 Factors

- We had proposed applying loss adjustment factors to Battery Storage Units in a similar manner to Interconnector Units.
- We have reviewed the proposed changes based on comments from participants.
- We now agree that loss factors should be applied to battery units as they are for other generator units rather than interconnectors.
- We have removed this change from the mod proposal. Loss factors will be applied to Battery Storage Units using the formula below.

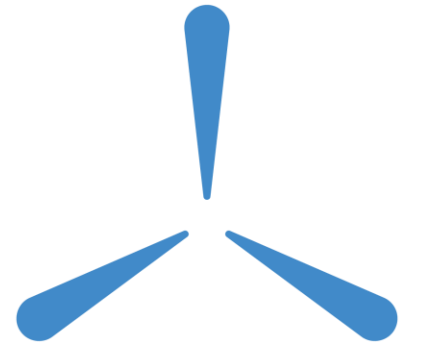
$$XXXLF_{\gamma} = XXX_{\gamma} \times FCLAF_{\gamma}$$



# 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.

# NPDR Modifications Introduction



# NPDR Modifications Discussion

- 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).

# 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.*

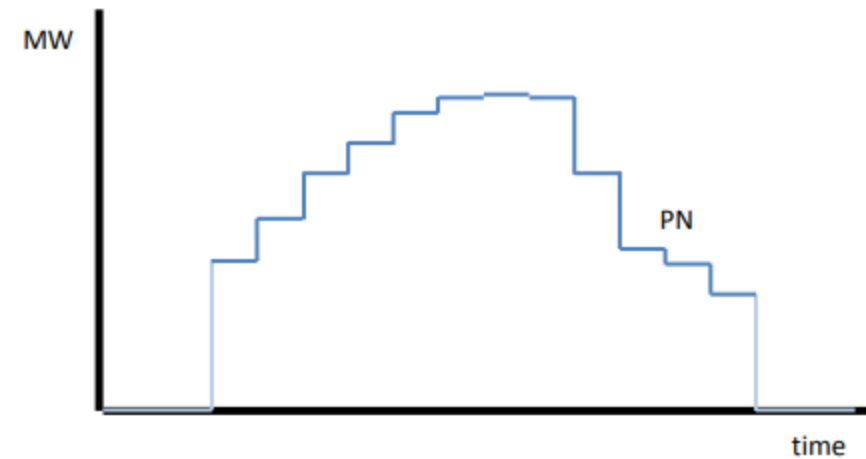
*SEM-20-028: A participant's PN submission represents the participant's best estimate of its intended level of generation and expected trade volumes. At gate closure, these are linked to ex-ante trades, i.e. FPNs which reflect traded volumes.*



# 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,  $\gamma$ , 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,  $\gamma$ ;
- (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,  $\gamma$ , 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.

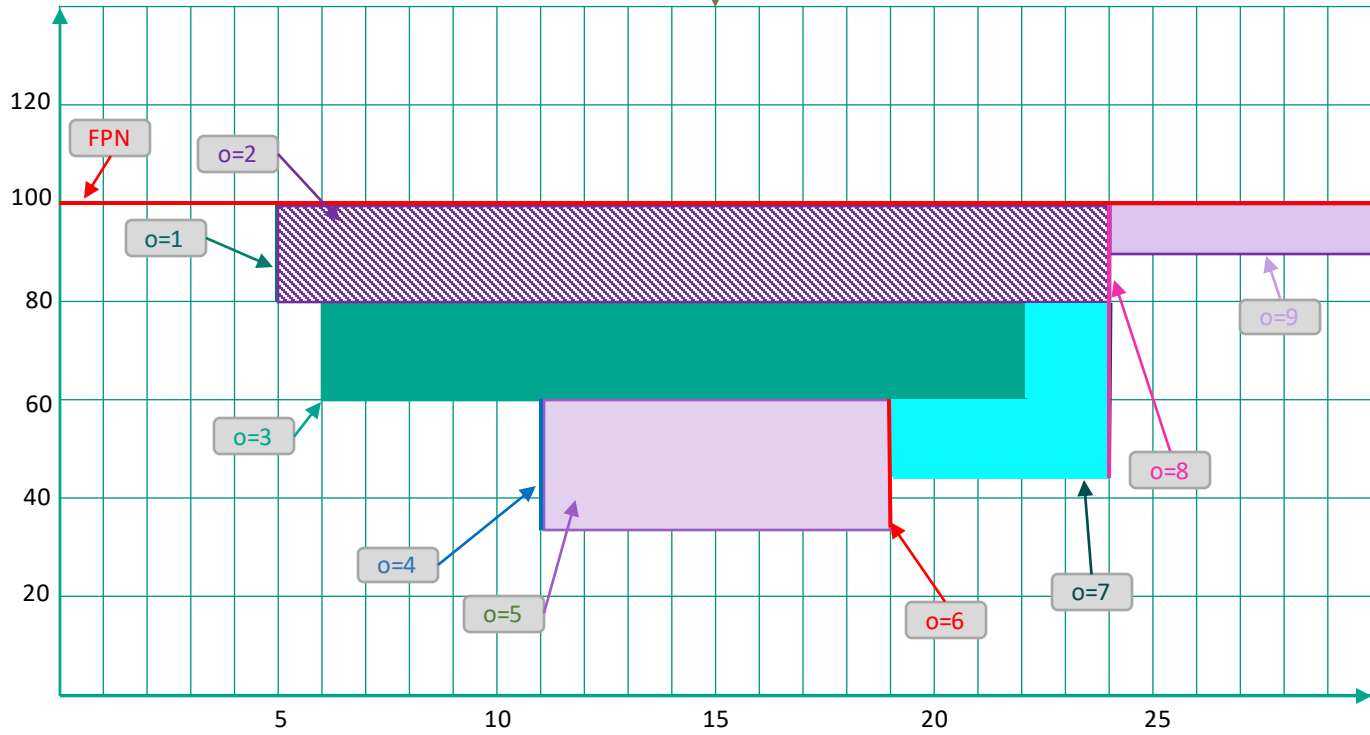


# EX10: Multiple MWOs, MWOs closing towards FPN

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



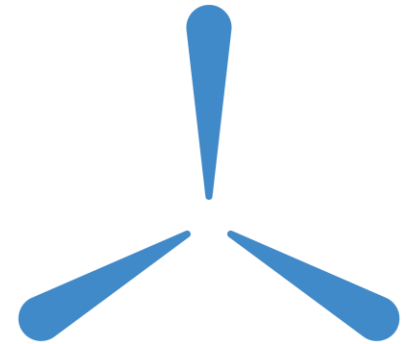
Order	Profile							Notes
FPN	100							re: FPN (30)
o=1	100 @ 1-5	80 @ 5	100 @ 5-30					Profile to MWOF#1 target, return to previous profile
o=2	100 @ 1-5	80 @ 5-24	100 @ 24-30					Create PMWO#1 profile (follow previous profile until MWOF target is met, then extend)
o=3	100 @ 1-5	80 @ 5-6	60 @ 6-22	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	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.



# SDP Tranche 2 Update



# SDP Tranche 2 Update

- Validation of High-Level Requirements (will be) completed in December 2023
- Detailed Design and Vendor Design in Q1-Q2 2024
- Ongoing workshops with industry Q1-Q2 2024 (as conducted with ESPS, NPDR)
- Ongoing bilateral discussions with market participants continues





# 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:

<b>Contact</b> 	<b>SDP Queries</b> <a href="mailto:SchedulingandDispatch@Eirgrid.com">SchedulingandDispatch@Eirgrid.com</a>
	<b>Operating Hours</b> 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"><li>• Your Name</li><li>• Your email &amp; phone number</li><li>• Your organisation</li><li>• Topic of Issue/Query</li><li>• Description of the issue or query</li><li>• Any additional information to aid in understanding the issue or query</li></ul>

# Scheduling & Dispatch: Industry Workshop (December 2023)

## Future Workshop Schedule

Date	Day of Week	Time	Location
10 January 2024	Wednesday	1:00 p.m. - 4:00 p.m.	Dublin + 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

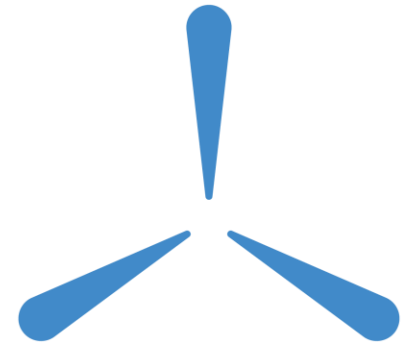


### Future Discussion Topics

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







# SDP Readiness

# Market Participant Readiness



# SDP Readiness: A Quick Refresher from November 2023 Industry Workshop









 <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 for individual MPs, the MP segments, and the MP community as a whole and reported via scorecards, IWs, bilateral meetings and other media. Individual MP scorecards will only be shared with that MP.</p>
 <p>Why Does it Matter?</p>	<p>It is important that the TSOs and the MO are aware of the level of Readiness within their business units/teams and the MP community 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.

# Scheduling & Dispatch: Market Participant Readiness - Survey #1

 <p>Who is getting this Survey?</p>	All Market Participants
 <p>How Will it be disseminated?</p>	Via Survey Monkey <i>[or similar]</i> sent to emails we have on file. But to be sure you get your survey, please email us a request for the Survey.
 <p>When will you get this?</p>	Expected to be sent out early next week (by 12 December 2023)
 <p>When do we need this back?</p>	No later than COB on Friday 05 January 2024
 <p>What will we do with the responses?</p>	Readiness Surveys help provide confidence that the Market Participants are aware of and are preparing for the SDP go-live. It also ensures that the concerns and needs of Market Participants are heard, understood, and incorporated as feedback into the SDP.
 <p>What's in it?</p>	The first Readiness Survey will focus on four main areas: <ul style="list-style-type: none"><li>• Awareness</li><li>• Training</li><li>• Timing</li><li>• Testing</li></ul>





## Section 1: Awareness

1. Are you aware of how the proposed SDP changes will affect your operations?
2. Do you know where to find the latest information on SDP?
3. Do you have suggestions as to how EirGrid could improve the content and delivery of SDP information?



## Section 2: Training

1. Do you think there is benefit in conducting training focused on SDP Changes?
2. If this training is offered, would you participate?
3. What training delivery format do you consider the most useful?
  - a. Virtual Training
  - b. Classroom
  - c. PowerPoint Slides
  - d. Other?





## Section 3: Timing

1. I-SEM Technical Specifications - how much in advance of Go-live do you need detailed interface and other technical details?
2. Based on the SDP information currently available, can you describe a project timeline for your own SDP Readiness?



## Section 4: Testing

1. Do you anticipate conducting participant testing for SDP changes?
2. What types of participant testing do you believe are important for the SDP changes?
3. How far in advance of SDP Go-live should the SDP participant test environment be in available?

# SDP Readiness: Working Together to Achieve SDP Readiness



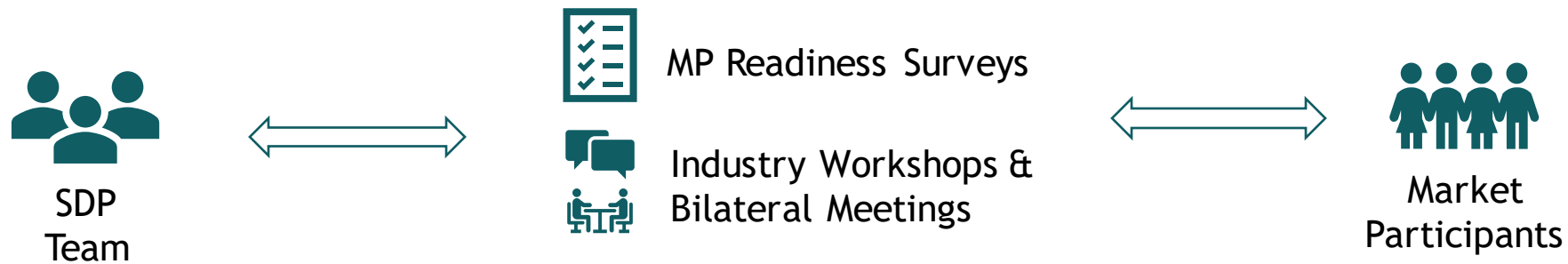
Please Help Us, Help You

By completing the first Readiness Survey

Tell us how we are doing

And what you need to Be Ready

For 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.



# 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