Future Power Markets

Stakeholder Engagement

Industry Workshop: 14th May 2025

This presentation provides an update on the Future Power Markets Programmes.

Future Power Markets - Industry Outreach

Why Are We Here?

Inform

We are here to provide information about the ongoing programmes of work in the Future Power Markets space and the impact on the market participant community. We will provide a view of the programmes' drivers, functional details, structure, timelines, and stakeholder engagement.

Discuss

We will discuss the changes and how this impacts you and your portfolio. We will discuss the functional, technical, and formal arrangement changes, stakeholder engagement, and programme management updates. 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 FPM programmes, the functional, technical, and regulatory 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.

FPM - Industry Workshop

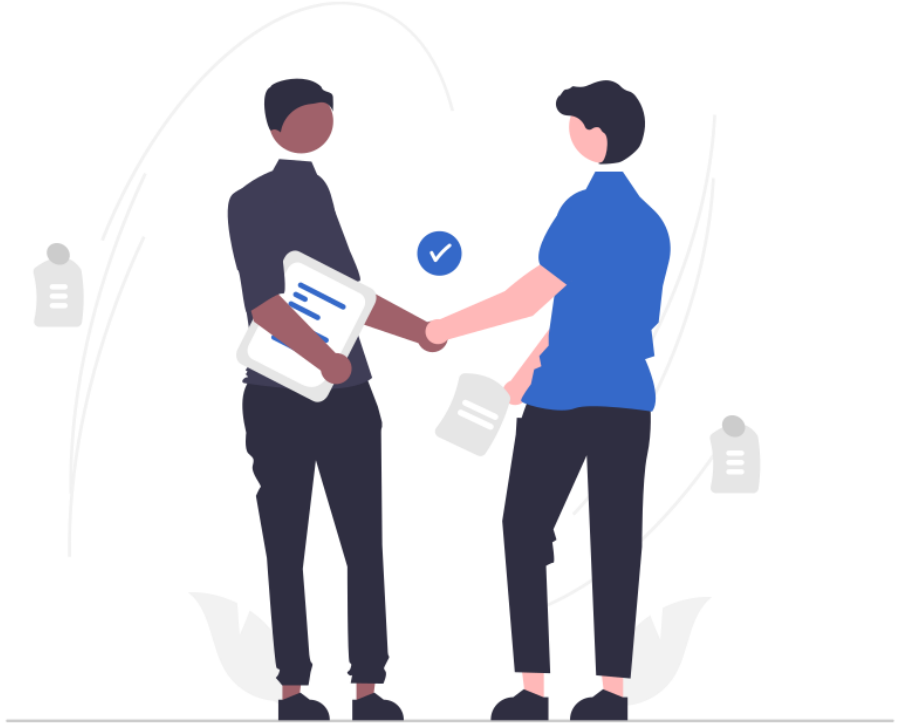
Setting Expectations

Meeting Guidelines

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 Future Power Markets programmes.



FPM: Industry Workshop (14th May 2025)

Agenda for today's workshop

Time	Segment/Programme	Topic Detail
09:30 – 09:35	Introduction & Housekeeping	
09:35 – 09:55	Scheduling & Dispatch Programme (SDP)	• General Programme Status Update
09:55 – 10:30	Future Arrangements for System Services (FASS)	• General Programme Status Update • Status of consultation papers • Key themes from the RAD consultation • One pager on scope of P&S and plan
10:30 – 10:40	Strategic Markets Programme (SMP)	• General Programme Status Update
10:40 – 10:55	Energy Market Policy (EMP)	• MRLVC - Multi-Region Loose Volume Coupling
10:55 – 11:10	Long Duration Energy Storage (LDES)	• Expected publication date • Regulatory Authority feedback • Mid-Consultation workshop
11:10 – 11:50	SMP / Balancing Market Reform	• Deep Dive on MARI Integration
11:50 – 12:00	AOB / Q&A / Next steps & close	• Next FPM: June 18th

Scheduling & Dispatch Programme (SDP)
General Programme Status Update

Scheduling and Dispatch – Programme Summary Status

As planned, no issues | Minor - moderate concern | Significant issue / concern
Improving | Steady | Worsening

SDP		Summary Status
Overall Status	→	SDP-02 (ESPS) go-live set for 17-Jun-25. Participant interface testing (PIT) for battery unit operators is underway with 1:1 participant meetings taking place. Cutover planning for SDP-02 is well progressed with details to be shared with in scope participants. ESPS Grid Code mods under assessment by RAs. RAs and SEMC assessment of Mod_13_23 Treatment of NPDRs is continuing.
Schedule Tranche 1	→	**SDP-02 Energy Storage Power Stations System** Tranche 1 SDP-02 Energy Storage Power Stations System Test go live moved from May-25 to 17-Jun-25 (Market Message issued 01-May-25), rationale for delay was to allow time for additional testing. Participant interface testing (PIT) for battery unit operators in progress with 1:1 participant meetings taking place. Cutover planning for SDP-02 is well progressed with details to be shared with in scope participants. ESPS Grid Code mods MPID318 / SPID-03-2024 are under assessment with CRU and UR respectively. **SDP-01/04 Non-Priority Dispatch Renewables / Wind Dispatch Improvements** RAs and SEMC are assessing Mod_13_23 Treatment of NPDRs and SEM-24-044 Definition of Curtailment, Constraint and Energy Balancing related to SEM-13-011. SDP Programme analysis on the units that will be designated as Non-Priority Dispatch Renewables (NPDR) is complete with Eirgrid/SONI governance reviews in progress in advance of RA review and subsequent industry engagement.
Schedule Tranche 2	→	An updated version 3 of the TS&C modification Mod_01_25 related to SDP-06 Synchronous Condensers was approved at Mods meeting 128 on 09-Apr-25. System design for Tranche 2 is continuing with the programmes system vendors, system build has commenced.
Resourcing	→	TSO/MO programme teams are fully staffed
Finances	→	SEMC All-Island Programme sub-committee approved the full funding request for the S&D (phases 3-5) programme on 22nd March 2024.
Participant Readiness		SDP-02 readiness survey issued to participants operating battery units. Participant interface testing (PIT) for battery unit operators is underway with 1:1 participant meetings taking place to support participant readiness preparation for go-live.

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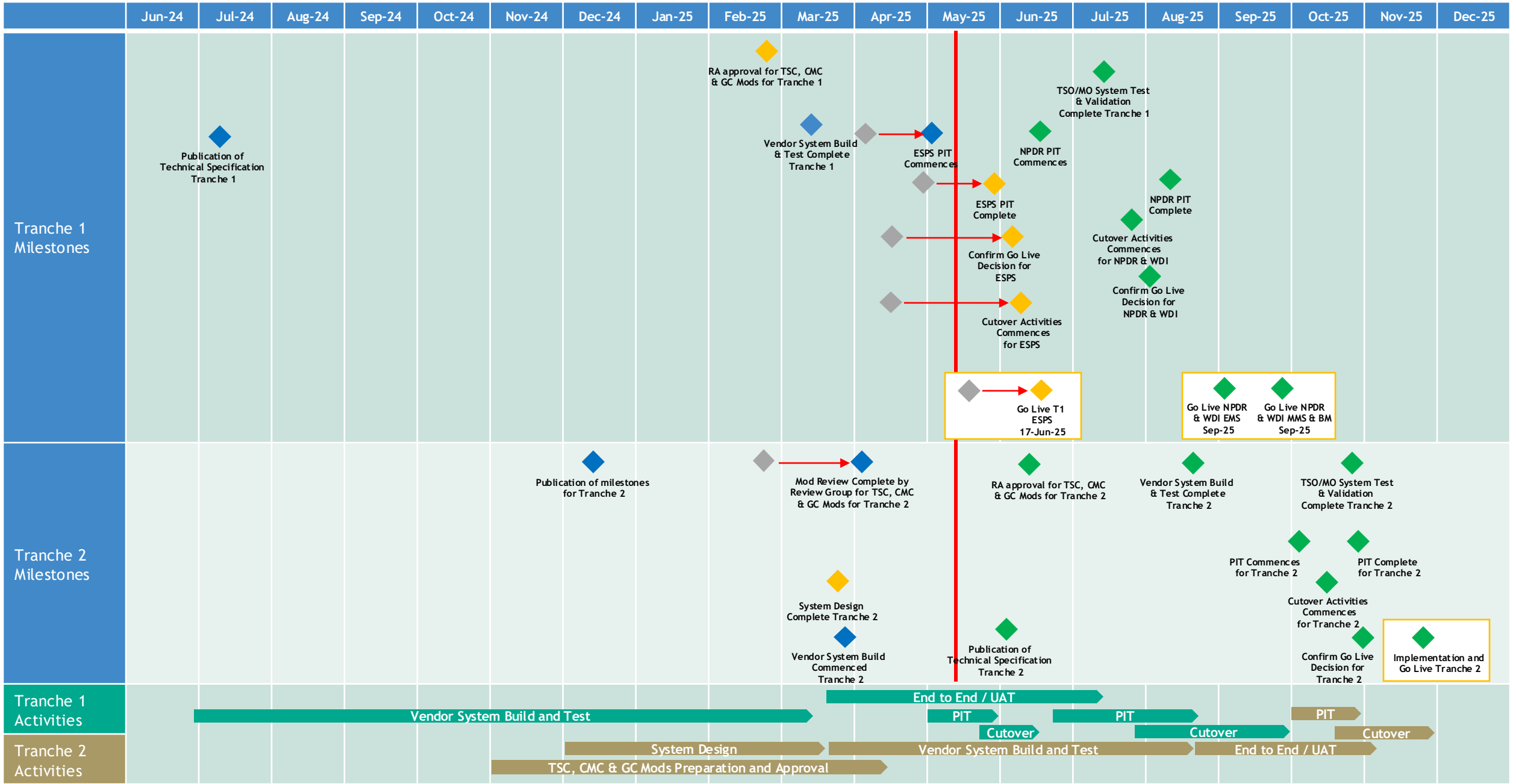
Scheduling and Dispatch: Milestone Plan



Scheduling and Dispatch - Tranche 1 & 2 Phase 2 Milestones

Tranche	Milestone	Dates
Tranche 1	Requirements Definition Complete for Scheduling and Dispatch Programme Tranche 1 Initiatives	September 2023
Tranche 1	System Design Complete for Scheduling and Dispatch Programme Tranche 1 Initiatives	March 2024
Tranche 1	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)	March 2024
Tranche 2	Requirements Definition Complete for Scheduling and Dispatch Programme Tranche 2 Initiatives	July 2024
Tranche 2	Publication of milestones for Scheduling and Dispatch Programme Tranche 2 Initiatives	September 2024 (Completed December 2024)
Tranche 2	System Design Complete for Scheduling and Dispatch Programme Tranche 2 Initiatives	Jan – Mar 2025
Tranche 2	TSC, CMS & GC Mods Review Complete for Scheduling and Dispatch Programme Tranche 2 Initiatives by the relevant review group (Mods Committee, Grid Code Review Panel, Capacity Market Workshops respectively)	Jan – Mar 2025 (Completed April 2025)

Scheduling and Dispatch - Tranche 1 Phase 3 Milestones

Tranche	Milestone	Dates
Tranche 1	Regulatory Authority approval for Trading and Settlement Code (TSC), Capacity Market Code (CMC) & Grid Code Mods (GC) for Scheduling and Dispatch Programme Tranche 1 Initiatives	Feb 2025
Tranche 1	Publication of Technical Specification for Scheduling and Dispatch Programme Tranche 1 Initiatives	July 2024
Tranche 1	Vendor System Build and Test Complete for Scheduling and Dispatch Programme Tranche 1 Initiatives	Mar 2025
Tranche 1	*ESPS* Participant Interface Test (PIT) Commences	Apr 2025 → 01 May 2025
Tranche 1	*ESPS* Participant Interface Test (PIT) Complete	Apr 2025 → 29 May 2025
Tranche 1	*ESPS* Confirm Go Live Decision	Apr 2025 → 06 June 2025
Tranche 1	*ESPS* Cutover activities Commences	Apr 2025 → 09 June 2025
Tranche 1	*ESPS* Go Live	May 2025 → 17 June 2025
Tranche 1	*NPDR* Participant Interface Test (PIT) Commences	June 2025
Tranche 1	TSO/MO System Test and Validation Complete for Scheduling and Dispatch Programme Tranche 1 Initiatives	July 2025
Tranche 1	*NPDR* Participant Interface Test (PIT) Complete	Aug 2025
Tranche 1	*NPDR and WDI* Cutover activities Commences	Aug 2025
Tranche 1	*NPDR and WDI* Confirm Go Live Decision	Sep 2025
Tranche 1	*NPDR and WDI* Go Live	Sep 2025

Scheduling and Dispatch – Tranche 2 Phase 3 Milestones

Tranche	Milestone	Dates
Tranche 2	System Build Commenced for Scheduling and Dispatch Programme Tranche 2 Initiatives	Jan – Mar 2025
Tranche 2	Regulatory Authority approval for Trading and Settlement Code (TSC), Capacity Market Code (CMC) & Grid Code Mods (GC) for Scheduling and Dispatch Programme Tranche 2 Initiatives	Apr - June 2025
Tranche 2	Publication of Technical Specification for Scheduling and Dispatch Programme Tranche 2 Initiatives	Apr - June 2025
Tranche 2	Vendor System Build and Test Complete for Scheduling and Dispatch Programme Tranche 2 Initiatives	Jul – Sep 2025
Tranche 2	TSO/MO System Test and Validation Complete for Scheduling and Dispatch Programme Tranche 2 Initiatives	Oct – Dec 2025
Tranche 2	Participant Interface Test (PIT) Commences for Scheduling and Dispatch Programme Tranche 2 Initiatives	Oct – Dec 2025
Tranche 2	Participant Interface Test (PIT) Complete for Scheduling and Dispatch Programme Tranche 2 Initiatives	Oct – Dec 2025
Tranche 2	Cutover activities Commences for Scheduling and Dispatch Programme Tranche 2 Initiatives	Oct – Dec 2025
Tranche 2	Confirm Go Live Decision for Scheduling and Dispatch Programme Tranche 2 Initiatives	Oct – Dec 2025

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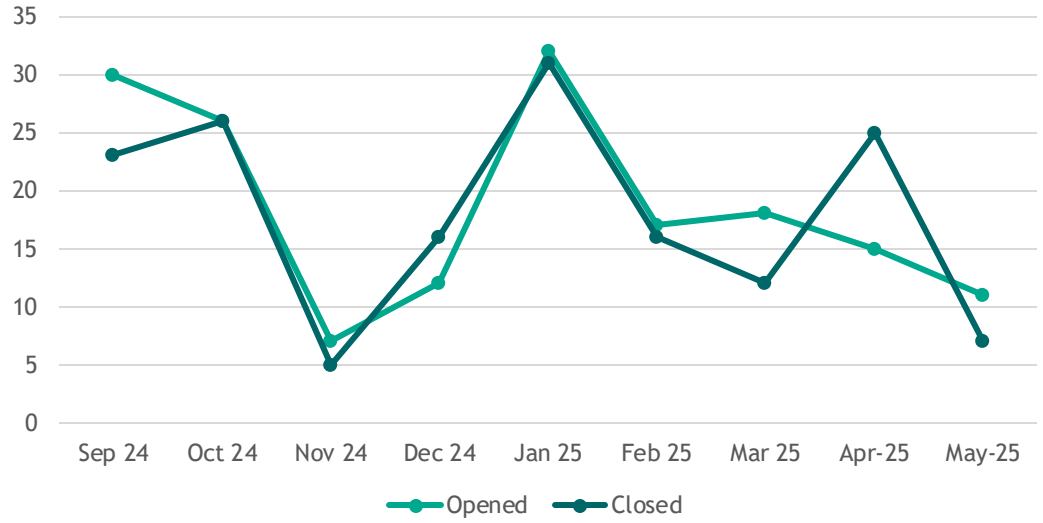
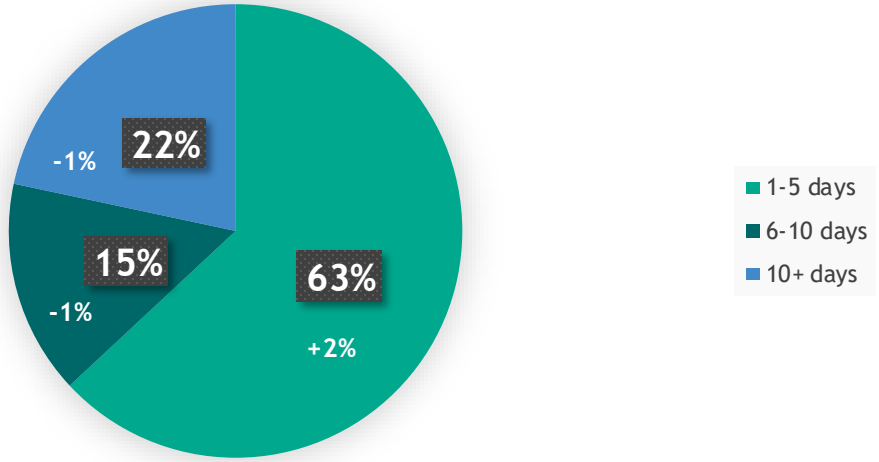
SDP – Query Management Overview

The below is an overview of key metrics associated with the queries received by the Scheduling & Dispatch Programme between September 2024 and May 2025.

Opened vs Closed Cases



Overall Average No. Working Days to Close out Cases



Most Common Query Topics (Sep – Mar)

1. NPDR / ESPS Technical Queries
2. NPDR Unit Confirmation
3. MPI Data Submission Queries
4. Support Material Requests
5. Environment Access Requests

Current Query Case Volumes

6	3.5 days
Cases Currently Open	Average Duration Open

Future Arrangements for System Services (FASS)

FASS: Programme Summary Status

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

As of 09.05

FASS

Summary Status

Overall Status	⇧	Overall programme status moved to red in January 25 reflecting delays to vendor contracting (now closed), and publication of consultation papers and SEMC decisions impacting critical path. Status to be reflected upwards upon publication of PIR V3.0.
Schedule	⇧	Programme schedule is red reflecting delays to baseline schedule. Direction provided by the RAs on programme schedule and a replanning exercise has now commenced to deliver PIR V3.0. Status to be reflected upwards upon publication of PIR V3.0.
Resourcing	⇩	Programme resourcing remains green, however resourcing challenges are emerging due to the delays in publication of some consultation papers which is requiring the TSOs to reallocate resourcing to meet changing priorities and schedule.
Finances	⇨	Formal funding approval letter received from the RAs December 2024.

Workstream Updates

Detailed Market Design	Delays to core DASSA design components; Overlapping consultation periods required to avoid further impact to programme critical path. Updated schedule drafted, and now pending RA sign-off prior to publication as part of PIR V3.0.
Detailed Operations Design	Non-reserve services' product design, locational methodology and volume forecasting methodology ongoing. RA engagement in progress with alignment needed ASAP to progress implementation activities.
IT Systems Design	DASSA vendor engagements mobilising—Initial DASSA design workshop held, while workshops ongoing with downstream vendors to support operational system changes.
Regulation & Licencing	RA-TSO engagement on licencing is on hold, pending RAs' legal input on licence mods. Grid Code review for reserve services in progress.
SS Code Development	SS Code Working Group Session held 28th of April to further review aspects of the System Services Charge. Dependency on timely SEMC decisions to maintain momentum.

Status of Business Design Papers

As part of the FASS Programme there are a number of consultations and publications in progress. Phased Implementation Roadmap (PIR) V2.0 was published on the 11th of October following agreement with the RAs. PIR V3.0 will present next iteration of consultation timelines, targeted publication end of May.

Open Design Activities	Status	Update
DS3 SS Tariffs to FASS (Transition Period)	Consultation Closed	Consultation closed 25/03 with 21 responses received. Recommendations Paper now drafted and internal reviews ongoing. Target to issue recommendation paper to RAs in May.
Residual Availability Determination (FAM Alternative)	Consultation Closed	Consultation closed 02/05 and drafting of Recommendations Paper underway. Further discussion later in this presentation.
Parameters & Scalars	Work in progress (TSOs)	Consultation Paper drafting at an advanced stage. Ongoing engagement with RAs on proposals. Target to publish consultation in May.
Non – Reserve Services	Work in progress (TSOs)	Early drafting of Consultation Paper commenced, with engagement with RAs ongoing. Schedule for publication to be reviewed as part of PIR 3.0.

Closed Design Activities	Status	Update
Volume Forecasting Methodology (Reserves)	Closed. SEMC Decision published	SEM-25-011 DASSA Volume Forecasting Methodology (Reserves) Decision Paper was published along with the TSOs' VFM (Reserves) Recommendations Paper on 24th of March. TSOs to publish further information on consequential losses as agreed 17th April.

Summary of DASSA Top-Up Mechanism Consultation Responses

DASSA Top-Up Mechanism – Consultation Responses

We have received 16 responses to the DASSA Top-Up Mechanism Consultation Paper (one marked confidential).

Initial Summary

- Several respondents agreed on the necessity of a method to procure services via a top-up mechanism. However a number of respondents commented that the RAD does not sufficiently address their requirements.
- Queried as to whether SEMC will approve the RAD
- Concern that there is an undervaluation of System Services and a drive towards cost minimisation.
- ➢ TSOs note that the RAD was **developed via a RA-TSO Joint Options Assessment**, with multiple sessions throughout Oct '24 – Dec '24.

Consideration Raised (% of Respondents)

Request for Detail (60%)

Greater detail requested on facets of the RAD, including TSOs justification, industry involvement, core features & operational considerations.

RAD Gate Closure (50%)

Further explanation on the RAD gate closure times and interaction with the BM, including the TSOs' justification.

SEMC Approval (30%)

Respondents queried whether the RAD proposal would receive SEMC approval

FASS Complexity (20%)

Greater detail on elements of the FASS Framework (DASSA, Fixed Contracts, LPF), how they reflect the HLD and how they interact with the RAD.

RAD Price Cap (75%)

Opposition to capping the RAD clearing price at the DASSA clearing price. Opinion that it may disincentivise participation and should be removed to offer participants scarcity/market-based value signals closer to real-time.

Market Power (20%)

Greater explanation of the prevailing market power mitigations at the core of the RAD design.

RAD Volume (45%)

Concerns that the volumes required in the RAD will be minimal thus removing opportunities from assets with varying availability or those without cleared DASSA orders.

Compensation (20%)

Further consideration of the usage of system services during frequency events is needed, e.g., if the TSOs use frequency response from assets that are not compensated under a DASSA contract or a top-up mechanism.

Residual Availability Determination (RAD)

Characteristics of the RAD

- Participation / bidding in proposed RAD does not require withholding capacity from other markets.
- Ex-ante RAD bidding gate closure proposed to be 14:30, 1 hour before and separate to DASSA.
- Actual RAD volume will be based on the above equation, not the volume of the ex-ante RAD bid.
- Minimal risk associated with bidding day ahead as there will be no commitment obligations for the RAD – so, not equivalent to the DASSA.
- TSOs consider that the cost for maintaining residual availability, with no commitment obligation and having exhausted all other market opportunities, would be minimal.
- Financial incentive to remain available in real-time, beyond final DASSA order volumes.
- The RAD ex-post clearing function will run as normal in tight conditions but not will run in oversupply.

P&S scope and Plan for Engagement

Parameters & Scalars:
Scope and Engagement Plan

The Parameters & Scalars Consultation Paper covers a broad range of topics with the purpose to finalise the design of the DASSA arrangements for go-live.

Scope of the paper will cover:	
• Volumes • Pricing • Bidding • Secondary Trading	• Volume Insufficiency • Commitment Obligations & Incentives • Service Quality • Bundles • Auction Fallback

Engagement Plan

- **May** – Publication of Parameters & Scalars Consultation Paper
- **June** – Industry workshop on Parameters & Scalars *(TBC)*

Thank You

Questions can be submitted to

FASS@Eirgrid.com or
FASSProgramme@soni.ltd.uk

Next Steps:

- Publication of PIR V3.0 expected by end of May
- Parameters & Scalars consultation to be published in May

STRATEGIC MARKETS PROGRAMME JUNE UPDATE

Background to SMP

The Strategic Markets Programme (SMP) has been established by EirGrid to ensure that the necessary systems and processes are in place to enable SEM to participate fully in this single European electricity market.

Strategic Markets Programme (SMP) was developed around 3 pillars; EU Integration; SEM-GB Trading Arrangements and Balancing Market Reform(BMR)

Overall Summary and Status

- Delivery of SMP scope planned over multiple releases – with Release 1 focussing on EU Integration and some Balancing Market Reform items to align with Celtic Interconnector Go-Live at the end of 2026.
- Programme is continuing to progress through detailed requirements gathering, process design and vendor engagement required for Release 1 scope.
- High Level delivery planning for Release 2 scope items is progressing (e.g., remaining Balancing Market Reform initiatives and Post Brexit arrangements)

Key Highlights

- Engagement with EU market operators and regulators ongoing;
- Detailed requirements gathering activities complete for SDAC/SIDC, FTR (initially monthly auctions), Multi-NEMO Arrangements and CORE CCR;
- Vendor engagement commenced on key system changes required
- Change Impact Assessment of processes on end-to-end basis under development to map impact on TSOs and MOs

Upcoming Mileston

- Release 1 systems requirement Detailed Requirements Signoff
- FTRs/SDAC/SIDC/Core CCR are being delivered under Release 1.
- Release 2 planning to be completed
- Internal organisation Impact assessment complete
- Commence Go-live and Cutover planning
- Commence increased industry engagement

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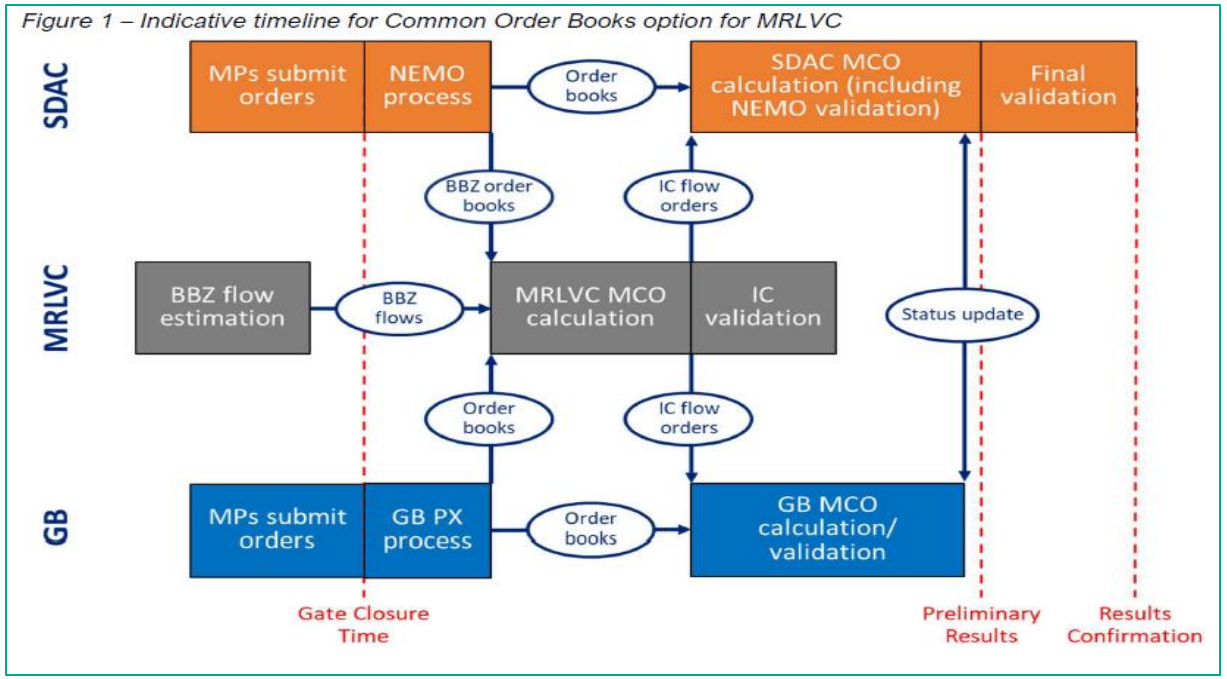
Multi-Regional Loose Volume Coupling Update

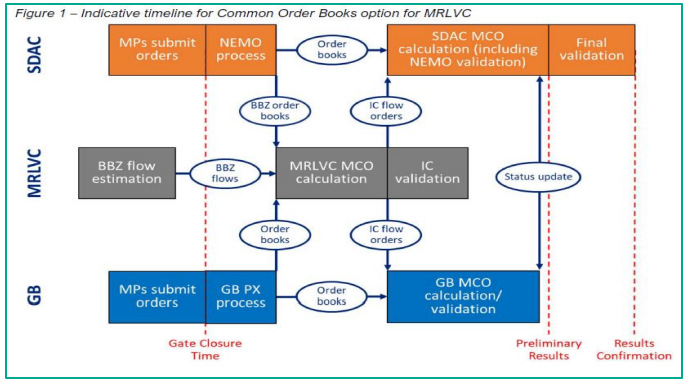
Energy Market Policy (EMP)

Reminder: What is MRLVC?

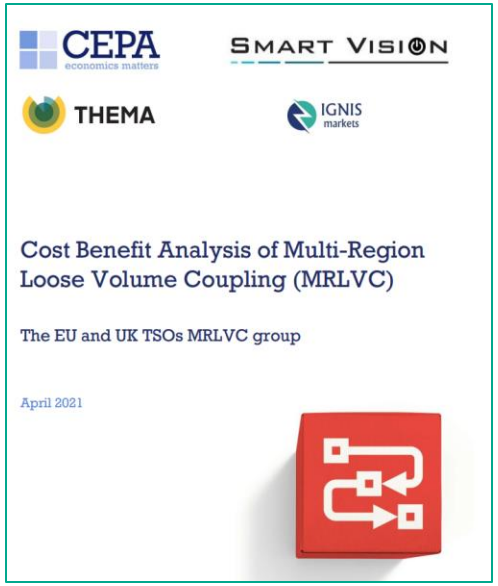
- Multi Regional Loose Volume Coupling is the proposed approach included in the Trading and Cooperation Agreement (Brexit) between EU and UK
- MRLVC involves the **computation of interconnection flows** based on an input of GB/EU **Order Books**, **Interconnector Capacity and Technical characteristics** and **Border Bidding Zone (BBZ) flows.**
- The **resulting dataset** is sent to the EU and GB Day Ahead operations as a **price-taking order.**



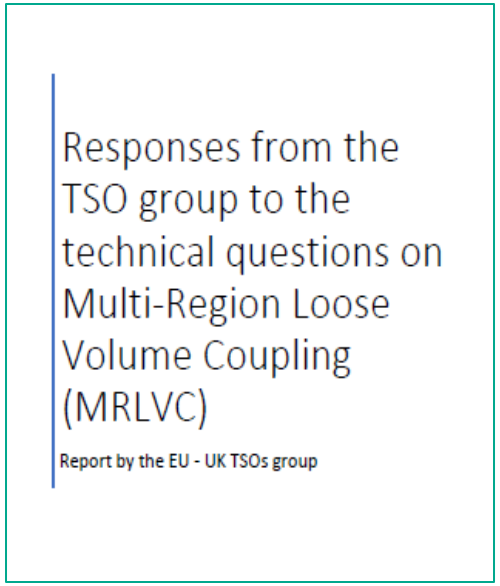
Reminder: What has happened?



2021

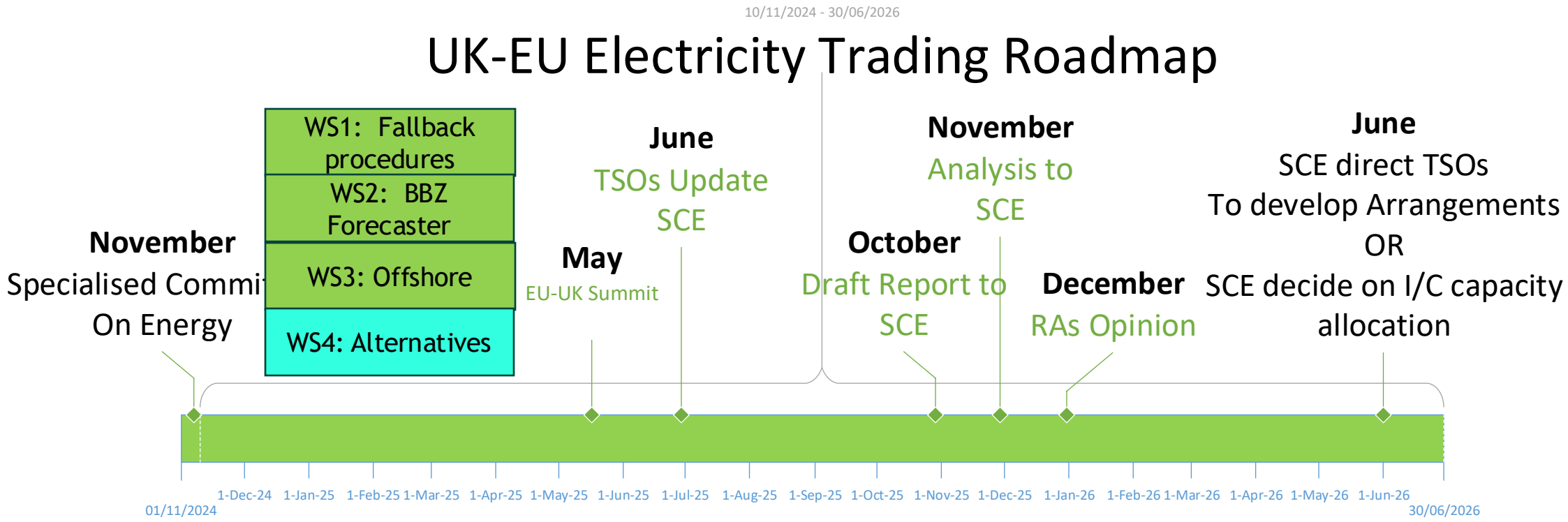


2023



2024

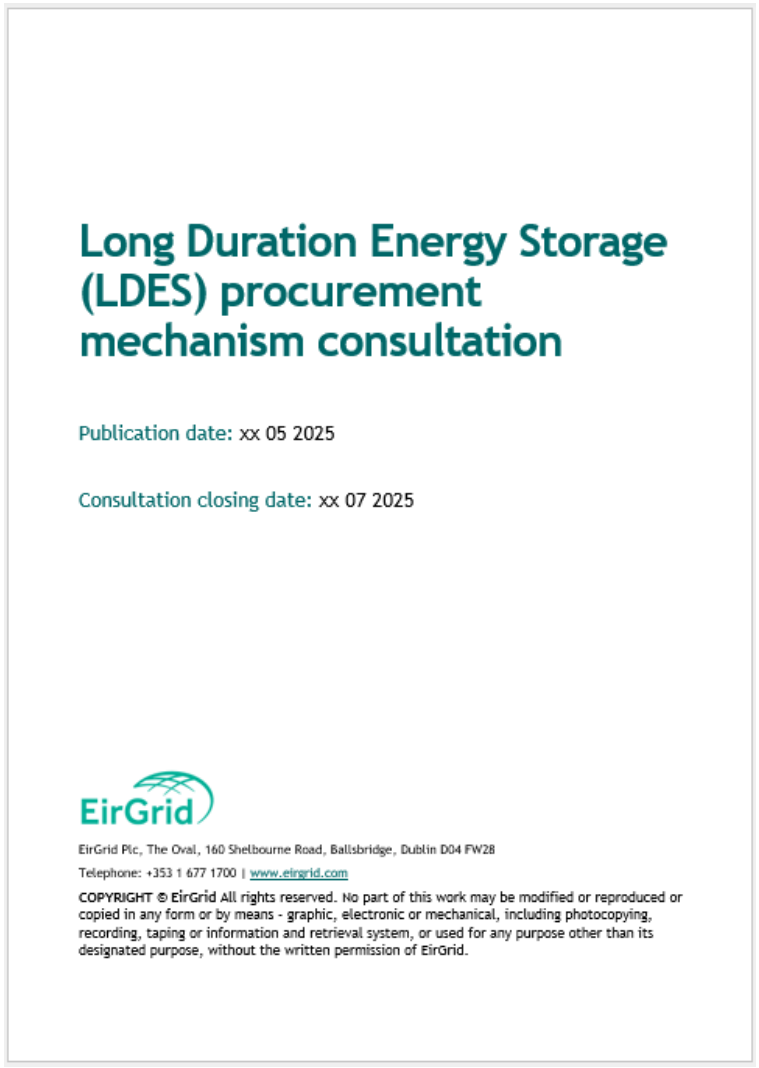
What happens next?



Long Duration Energy Storage (LDES)

EirGrid

LDES consultation draft preview



Long Duration Energy Storage (LDES) procurement mechanism consultation

Publication date: xx 05 2025

Consultation closing date: xx 07 2025

EirGrid

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Table of Contents

- Commission approved consultation paper
- CRU to include note alongside it
- Expected publication date: 23 May
- Mid-consultation workshop: mid-June (date pending)

Procurement scope

- c. 500 MW
- ‘Electricity storage’ as defined by the Directive (EU) 2019/944*
- ≥4 hour duration
- Front-of-meter
- Transmission system level

} aligned with DECC’s Electricity Storage Policy Framework (ESPF)

- Jurisdictional
- Proposed market-based procurement mechanism ('Category A')

*: Directive (EU) 2019/944 of the European Parliament and of the council – 5 June 2019 – on common rules for the internal market for electricity and amending Directive 2012/ 27/ EU

Thank You

Questions can be submitted to

LDES@Eirgrid.com

Next Steps:

- Publication of LDES Procurement Mechanism expected 23 May
- In-person workshop around mid-June

14/05/2025

Strategic Markets Programme

Balancing Market Reform: MARI

Industry Workshop

Agenda

I. **Recap of Previous Industry Presentation**
II. Development of MARI Merit Order List
III. Example Scenarios

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Recap of Previous Industry Presentation
(11 Sep 2024)

- Manually Activated Reserves Initiative (MARI) is the European balancing energy platform used for Manual Frequency Restoration Reserves (mFRR).
- Participating in the MARI platform is a requirement of the Energy Balancing Guideline (EBGL) with the Celtic interconnector go-live.
- Currently, EirGrid and SONI are observers on the MARI platform and will be seeking full membership to join the platform as active participants.
- We will not be joining TERRE, as it is gradually being decommissioned, due to the change in the intraday cross-zonal gate closure time (IDGCT) from 60’ to 30’, as announced here.

Agenda

I. Recap of Previous Industry Presentation

II. Development of MARI Merit Order List

III. Example Scenarios

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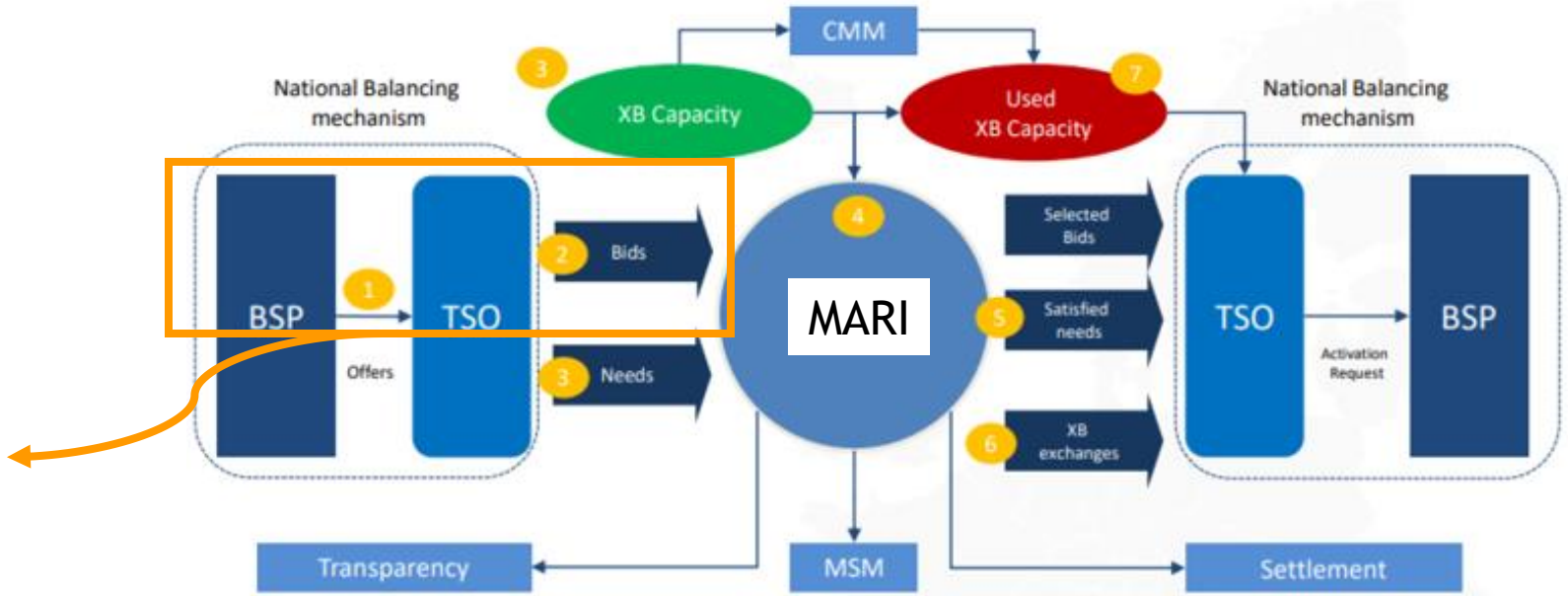
High-Level Functional Flow : EU Balancing & SEM

Objective:

The MARI platform operation can be divided into seven steps. For each step, the stakeholders are identified and whether modification with respect to the current SEM process is needed.

Our focus today is the creation of the merit order list based on Balancing Market COD/TOD that need to be shared with the MARI platform.



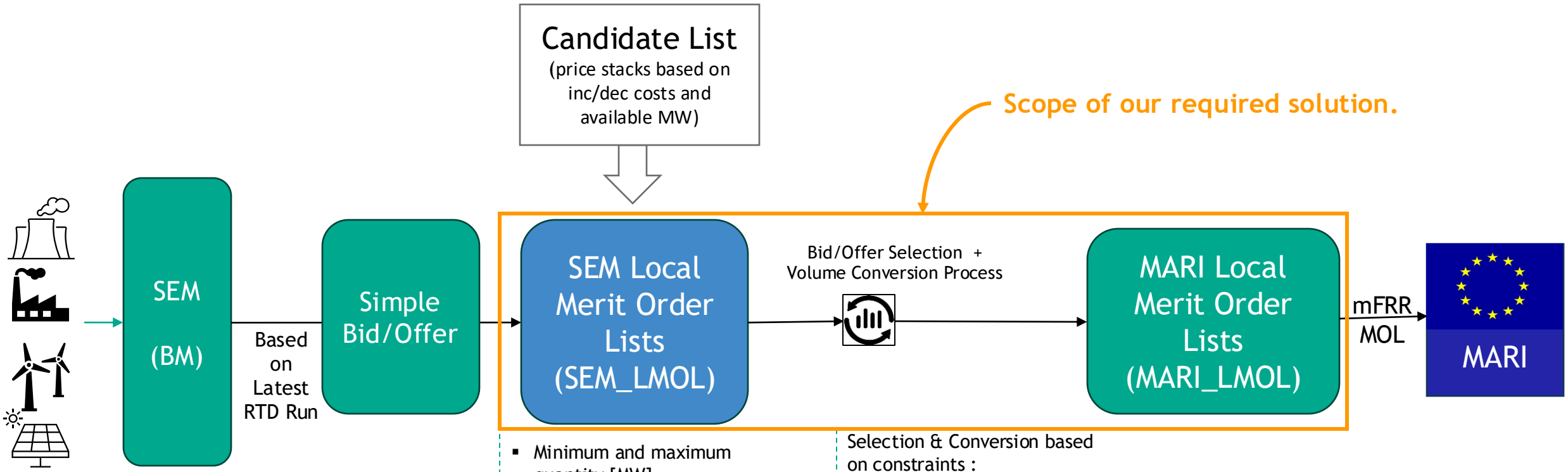
Preparation of SEM MARI Inputs

MARI Clearing

Integration of MARI Outputs

	Steps	Parties Responsible	SEM process Modification Required?
1	TSO receives COD from BSPs in local market balance area	TSO, Participant	No
2	Forward of coherent mFRR balancing products to mFRR platform	TSO, MARI	Yes
3	TSOs communicate their balancing demands and the available XB transmission capacities (ATC)	TSO, CMM(MARI)	Yes
4	Optimization of the clearing of balancing demands against MOL	MARI	-
5	Communication of the results, satisfied demands, and prices	MARI, TSO	Yes
6	Calculation of the commercial flow between market balancing areas and settlement of the expenditure and revenues between TSOs	MARI, JAO, TSO	Yes
7	The resulting XB schedules and remaining ATC are sent to the TSOs	MARI, TSO	Yes

MARI Merit Order List: Proposal to Create SEM_LMOL



- Participant's Submitted Bids/Offers
  - Commercial Offer Data
  - Technical Offer Data
- Latest PN or Dispatch Instruction

- Minimum and maximum quantity [MW]
- Direction (Upward/Downward)
- Price in [€/MWh]
- Location (Scheduling area)
- Validity period (MTU period)

Selection & Conversion based on constraints :

- Full Activation Time ≤ 12.5 minutes
- Min. Delivery Duration ≥ 5 minutes at full activation capacity
- Ramp-rate (Unit /Interconnector)
- Full divisibility
- Specific Exclusivity

For inc MW the range is displayed from low to high MW
For dec MW, the range is displayed from high to low MW

Why Is the Conversion From SEM COD to MARI_LMOL Necessary?

1. Not all participants will be technically available for MARI due to fast activation times (≤ 12.5 minute activation).

2. MARI requires a minimum of a 5-minute delivery period and not all bids/offers from the SEM will align with this.

3. The participant's bid/offer volume may not be fully deliverable in a short timespan, due to ramp rate limitations.

Other Constraints:

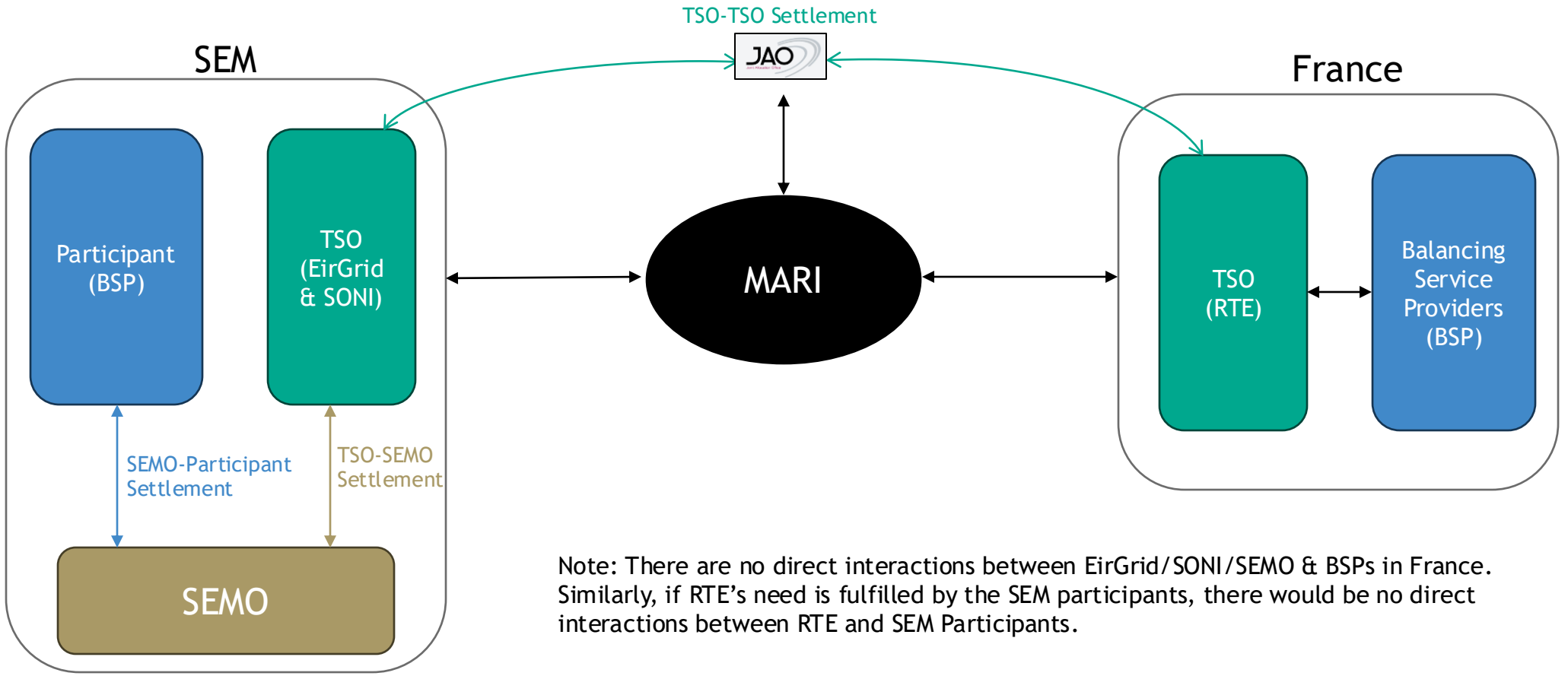
- All bids/offers must be fully divisible for MARI.
- Not all units should logistically be included (e.g. energy-limited units, follow-PN, etc.).

Note: There is no change to the price from submitted COD, only a change in volume during the conversion.

Main Principles of the MARI Merit Order List Methodology

1. This is a TSO-TSO process.

Participants have no direct interaction with the MARI platform.

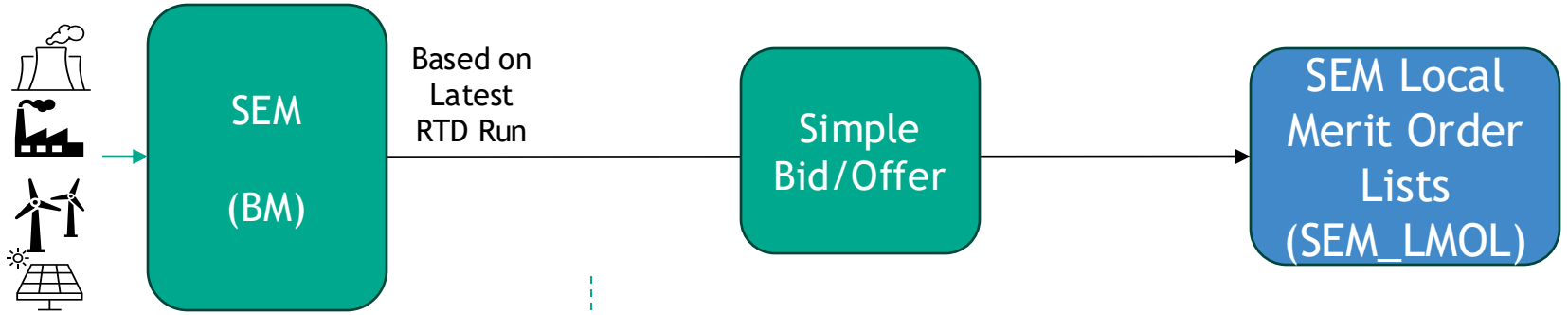


Note: There are no direct interactions between EirGrid/SONI/SEMO & BSPs in France. Similarly, if RTE's need is fulfilled by the SEM participants, there would be no direct interactions between RTE and SEM Participants.

Main Principles of the MARI Merit Order List Methodology

2. Only existing bids/offers are used.

- Only bids/offers that a participant has already submitted to the SEM will be sent to MARI.
- There are no new bids/offers specifically for MARI.



- Participant's Submissions
  - Commercial offer data
  - Technical offer data
- Latest PN or Dispatch Instruction

- Minimum and maximum quantity [MW]
- Direction (Upward/Downward)
- Price in €/MWh
- Location (Scheduling area)
- Validity period (MTU period)

3. MARI results mandate a change in IC flow.

MARI results mandate the TSO to deliver changes to the cross-border exchange of electricity, i.e. change in the IC flow. The specific bids/offers required to achieve this will be determined as per existing SEM balancing rules.

Main Principles of the MARI Merit Order List Methodology

4. Bids/Offers cannot be activated if already locally utilised.

If a bid/offer is selected by MARI, but that has subsequently been activated by the TSO in the SEM, it can no longer be activated to meet the MARI results. In that case, the TSO would activate the next available most economic bid/offer to deliver cross border balancing energy for MARI.

5. MARI trades (price and volume) are included in imbalance pricing calculations.

Unlike IRCU trades on SEM-GB which are excluded, MARI trades will be included when determining the imbalance price. The reasons for this:

- MARI is a competitive market with prices based on participant submission.
- It is defined in the network codes that MARI trades can set the price.

Out-of-merit imbalance prices expected to be flagged by the NIV tagging functionality. Details will be investigated during the detailed design phase.

SO-SO Services Overlapping With MARI

Several SO-SO services (services for security issues) are expected to be included on Celtic:

- **MEAS (Mutual Emergency Assistance Service)** – emergency change of the physical program activated through MCRP-C or EPC
- **Countertrading** – emergency change of the physical program activated through MCRP-C only
- **FAP (Fast Activation Process)** - emergency change of the physical program activated through EPC only
- **RM (Ramp Management)** – modification of the ramping rate/ramping period activated through MCRP-C only

If SO-SO services are activated in a MARI MTU, the Mid-Celtic Reference Programme (MCRP) takes priority and the Cross-Border Capacity Limit (CBCL) for MARI is updated to zero (up until T+5) so that the TSO decouples from the MARI platform during overlap.

Note: Celtic reference programme will be updated every time any of the following changes are made: market, XBID, SO trades.

MARI Merit Order List Methodology

Step 1: Use SEM_LMOL

a) SEM_LMOL will be a single Candidate List for all online and offline units (fast-start units only). The list will respect system constraints.

Step 2: Apply MARI platform qualification criteria

a) Check all candidates in SEM_LMOL for eligibility to be converted for MARI_LMOL. Qualification criteria shown in following slides.

Minimum Characteristics of mFRR Bids as per MARI requirement

Qualification Criteria for Eligible Bids for Conversion

Proposed SEM_LMOL for MARI (Step 1)

SEM_LMOL will be a candidate list consisting online and offline units in the balancing market and may have the following parameters :

No.	Data parameters needed in the SEM_LMOL	Description
1	Max Available	Maximum available capacity determined by the technical and operational limits of the unit, considering factors such as maintenance schedules, fuel availability, and any other constraints that might affect its output.
2	Direction	Upward bid for power injection to the system, downward bid for power withdrawal from the system.
3	EDIL Id	Unit ID in Electronic Dispatch Instruction Logger (EDIL) (if applicable).
4	Current DI	MW point to which the unit is dispatched. In case a unit has multiple bids in the merit order, then all the bids have same DI point, which is equal to Min Dispatchable Quantity.
5	Dispatchable Quantity	Change of power output (in MW) which is offered by the unit, and which is reached by the end of the full activation time.
6	Actual Output	Latest EMS (Energy Management System) actual output.
7	PN	PN from first RTD (Real-Time Dispatch) interval.
8	Price €/MWh	Bidding Price from each unit.
9	Full Activation Time [min] (FAT)	Full Activation Time [min] refers to total time taken to deliver the requested MW power of the balancing energy product after the activation request by the TSO.
10	Full Delivery Period [min]	Period of time during which the unit delivers the full requested change of power level.
11	Divisibility	Fully divisible: any quantity of the bids can be selected.
12	Unit Ramp Rate [MW/min]	Rate at which the power output of a generating unit can increase or decrease over time.
13	Location	Scheduling area to which the unit belongs.
14	Resource Type	Either Generator or Demand Side Unit.
15	Resource Name	Name of the unit.
16	Validity Period	The relevant MTU period.

Qualification Criteria (Step 2)

As per the MARI requirements, mFRR is traded as a standard product which must be capable of being fully activated within 12.5 minutes, with a minimum duration of 5 minutes at full activation capacity.

Qualification Criteria for bids/offers to be eligible for MARI Merit Order List

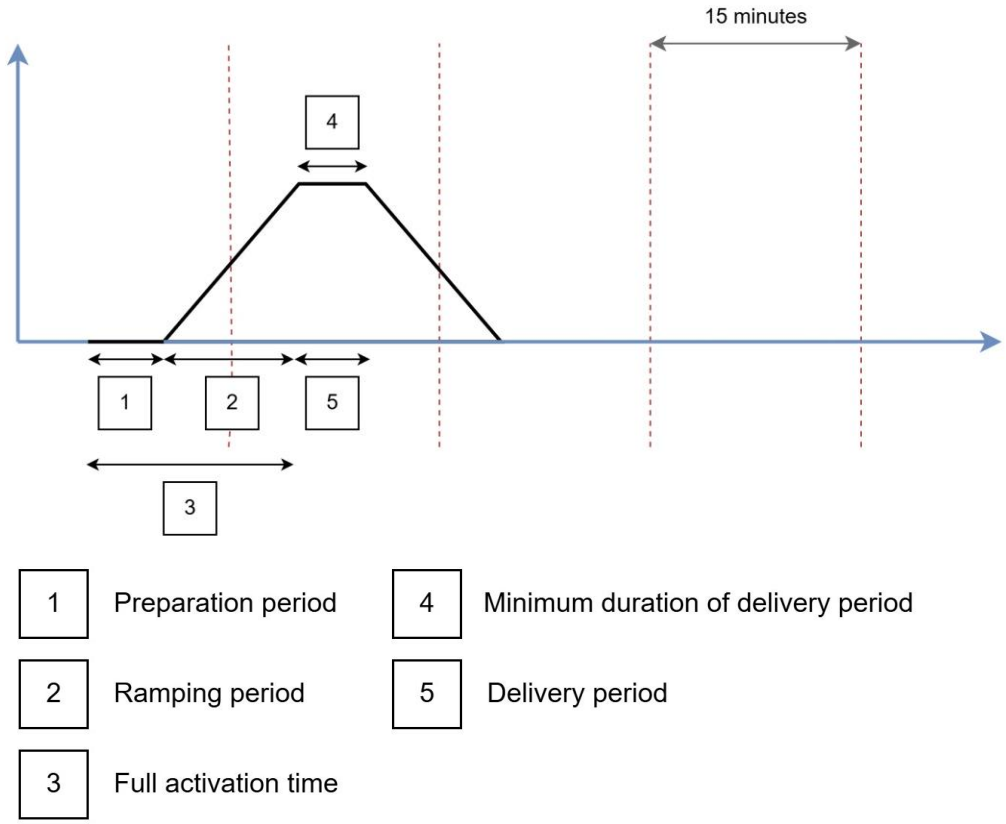
1. **Full Activation Time ≤ 12.5 minutes**
   - *If FAT is more than 12.5 mins then the bid/offer is not eligible*
   - *FAT = Preparation time + Ramping Period*
   - *Due to this criteria, some slow starting units are not eligible.*

2. **Min. Delivery Duration Time n ≥ 5 minutes at full activation capacity**
   - *If the bid/offer has less than 5 mins of minimum duration of delivery period, then it is not eligible. This filters out some variable generation units.*

3. **Divisibility – Only fully divisible bids/offers are selected**

4. **Suitable ramp-rate (Unit/Interconnector)**
   - *Ramp up or down according to the activation direction within 12.5 minutes. Therefore, only fast-acting units are selected.*

5. **Specific Exclusivity**
   - *Exclude energy-limited units (hydros), units using follow-PN approach, reserve requirement units and units subject to system constraints.*
   - *NPDRs would be included.*



(Source MARI Activation Optimization Function Public Description)

MARI Merit Order List Methodology

Step 3: Sort list & convert Max Available to Realisable Volume

a) List candidates from lowest to highest price.

b) Use the limiting ramp rate (either the unit ramp rate or the interconnector ramp rate) to calculate the Realisable Volume (MW).

- Conversion formula: Minimum of *[(MARI's Full Activation Time – Realisable Preparation Period) x Realisable Ramp Rate], [Max Available of Bid]*

- *Where, the Realisable Ramp Rate = Min(Unit Ramp Rate, IC Ramp Rate)*
- *And Realisable Preparation Period = Max(Unit Preparation Period, IC Preparation Period)*
- And where MARI's Full Activation Time (FAT) for a mFRR standard product = 12.5 minutes.
- **Note**: Formula to be confirmed during Detailed Design and will be subject to public consultation.

MARI Merit Order List Methodology

Step 4: Control Room Engineers review the candidate list

a) If necessary, Control Room Engineers remove bids/offers to ensure system security.

i. EB GL Article 29(14) : "Each TSO may declare the balancing energy bids submitted to the activation optimisation function unavailable for the activation by other TSOs because they are restricted due to internal congestion or due to operational security constraints within the connecting TSO scheduling area."

b) If bids/offers are excluded, the reason for the exclusion will be logged.

i. All unavailable bids will be published for transparency. EB GL Article 12(3) : "The information shall include: (i) type of product; (ii) validity period; (iii) offered volumes; (iv) offered prices;(v) information on whether the bid was declared as unavailable;"

Step 5: Submit eligible bids with Realisable Volumes to MARI platform

a) The bid/offer price remains the same as the submitted bid/offer, only the submitted volume is adjusted to accommodate for limiting ramp rates.

MARI Merit Order List Methodology Table of Contents (Proposed)

Merit Order List - Timing of Creation

Proposal

- Generate SEM_LMOL and MARI_LMOL at T-25 so that the Control Room Engineer has the most up-to-date RTD schedule (T-20 output) to make manual adjustments before submission to MARI.
- The RTD updates every 5 minutes (for 10 minutes in the future), which gives the Control Room Engineer 8 minutes from the T-20 RTD output to make any manual changes before submission of the MARI_LMOL by T-12.
- Given that the TSO has a fallback for any issues, by fully decoupling as late at T+5 by updating CBCL to zero, this timing should be sufficient.

Assumption

- Initially, the Control Room Engineer may need to manually approve each submission.
- In future, this could shift to an auto-approval setup where the MARI_LMOL is submitted as generated unless the Control Room Engineer takes any actions.

Agenda

I. Recap of Previous Industry Presentation
II. Development of MARI Merit Order List
III. Example Scenarios

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Scenarios – Impact of MARI

Case 1: Export - MARI causes increased SEM balancing cost

1 – MARI input submission and clearance

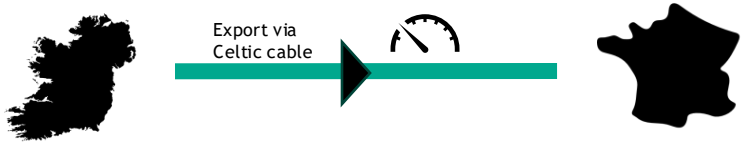
200 MW capacity upward offers submitted to MARI **(~70 Euro/MWh).**

Note – these offers are not already in merit in the SEM, therefore SEM price would be lower (~65 Euro/MWh).

After clearance, all 200 MW is cleared by MARI for activation.

2 – Interconnector adjustments after MARI clearance and order fulfillment

200 MW interconnector capacity is adjusted.



MARI selected offers at ~70 Euro/MWh.

3 - Activation of more expensive resources to meet MARI requirements will push the SEM balancing costs up

- **The difference between ~70 Euro/MWh and ~65 Euro/MWh SEM price is included into the SEM balancing costs.**
- **Increased balancing costs (relative) = 5 Euro/MWh *200 MWh = 1000 Euros**

Key points to note:

- When exporting cheaper energy from SEM to FR, this causes a producer surplus in the SEM and a consumer surplus in FR, resulting in increased economic surplus.
- When importing cheaper energy from FR (compared to local resources) to SEM, this results in a consumer surplus in the SEM and an increased producer surplus in FR (see next slide).

Due to pan-EU trading, an additional collective welfare is created, where the economic surplus is measured across multiple regions as opposed to only local markets.

Note that this scenario assumes a starting position of 0 on the IC.

Scenarios – Impact of MARI

Case 2: Import - MARI causes decreased SEM balancing cost

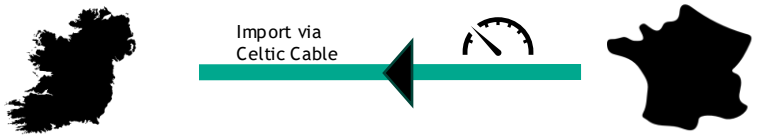
1 – MARI input submission and clearance

- 200 MW capacity downward bids submitted to MARI (~70 Euro/MWh) among other SEM bids (Ex Ante price = 70 Euros/MWh)
- TSO (e.g. RTE) in Europe has an oversupply issue of 200 MW so they submit upward offers (~65 Euro/MWh).

After Clearance, all 200 MW is cleared by MARI for downward activation and system is balanced by importing 200 MW of cheaper energy from France to resolve the oversupply issues.

2 – Interconnector adjustments after MARI clearance and order fulfillment

200 MW interconnector capacity is adjusted



Simultaneously receive 200 MW from RTE (~65 Euro/MWh) at lower price than local SEM offers.

3 - Activation of less expensive resources from MARI will push the SEM balancing cost down

- **More expensive power plants from Ireland are switched off and cheaper power flows from Europe.**
- **The difference between ~70 Euro/MWh and ~65 Euro/MWh is included into the SEM balancing costs.**
- **Decreased balancing costs (relative) = 5 Euro/MWh*200 MWh = 1000 Euros**

Note that this scenario assumes a starting position of 0 on the IC.

Scenarios – Impact of MARI

Case 3: Import – MARI bids more expensive than SEM bids

1 – 200 MW cheaper (15 Euros/MWh) power plants not available due to constraints, resulting in the need to import via MARI

2 – MARI bid submission by T-15 and clearance thereafter

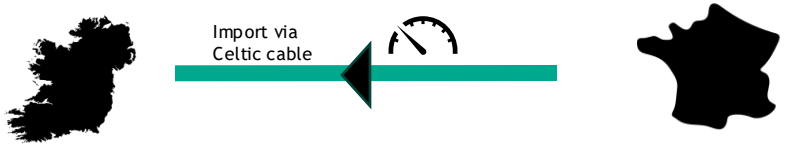
200 MW capacity TSO need.

MARI

After clearance, MARI selected more expensive (~50 Euros/MWh) power plants for import to meet the balancing energy needs.

3 – Interconnector adjustments after MARI clearance and order fulfillment

200 MW interconnector capacity is adjusted



Tagging/flagging functionality in the imbalance pricing is used to filter out those bids of the more expensive power delivered from MARI.

3 - Activation of more expensive resources from MARI instead of cheaper local assets to resolve grid constraints

- **Partcipation in MARI platform will allow efficent management of the grid constraints.**
- **NIV tagging functionality expected to exclude higher price from the imbalance pricing calculation.**

Scenarios – Impact of MARI

Case 4: Change in interconnector capacity

1 – MARI input submission and clearance

200 MW capacity upward offers submitted to MARI **(~70 Euro/MWh).**

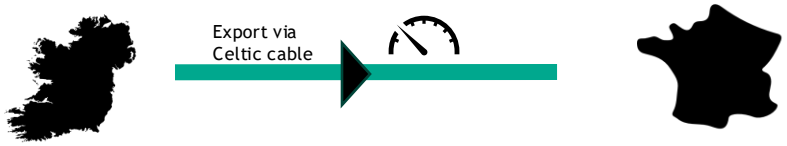
TSO

MARI

After clearance, all 200 MW is cleared by MARI for activation

2 – Interconnector adjustments after MARI clearance and order fulfillment

200 MW Interconnector capacity is adjusted



3 – Interconnecter capacity changed

- **Interconnector capacity changes after gate closure**

4A – Point 3 situation occurred before T+5

- **TSO can reduce the interconnector capacity as low as zero before T+5 (option exclusive to MARI).**

4B – Point 3 situation occurred after T+5

- **Apply "Causer pays" principle and incorporate the costs in imbalance payments.**
  - "Causer Pays" principle is already used in GB. Based on who is responsible for the issue (on which side of the IC converter station the issue arose or due to the line itself), the parties pay for the fault after imbalance settlement.
  - Only financial obligations via TSO-TSO settlements.
  - Note – this principle applies to all IC volumes (i.e. including Forward markets, Ex-ante markets, etc. – any change to CZC after the DAFD)

Thank you

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Stakeholder Engagement: FPM Industry Workshop

Contacting FPM Programmes

To raise an issue or query for the Future Markets Programmes:

Contact	
	**SDP Queries** SchedulingandDispatch@Eirgrid.com SchedulingandDispatch@soni.ltd.uk **LDES Queries** LDES@Eirgrid.com LDESProgramme@soni.ltd.uk **FASS Queries** FASS@Eirgrid.com FASSProgramme@soni.ltd.uk **SMP Queries** SMP.PMO@Eirgrid.com **FPM Policy** FuturePowerMarkets@Eirgrid.com futurepowermarketsNI@soni.ltd.uk

Information to Provide
• Your Name • Your email & phone number • Your organisation • Topic of Issue/Query & Programme Name • Description of the issue or query • Any additional information to aid in understanding the issue or query • (*No requirement to email the same query to both EirGrid and SONI email addresses for a relevant programme*)

Future Power Markets: Future Workshop Schedule

Future Discussion Topics

SDP

- General Status Update

FASS

- Update on PIR V3.0
- Parameters & Scalars Consultation Industry Workshop *(TBC)*

SMP

- BMR – Enduring arrangements for NPDR generation
- CORE Capacity Calculations
- Future Trading Day with Celtic go-live

EMP

- General Status Update

LDES

- LDES Procurement Mechanism Consultation Industry Workshop (mid-June, *date & venue TBC*)

Indicative Date	Location
18th June	Remote