# Future Power Markets

## Stakeholder Engagement

### Industry Workshop: 21st January 2025

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

*Achievable – Valuable – "Simple"*

EirGrid semo Single Electricity Market Operator SONI

# 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

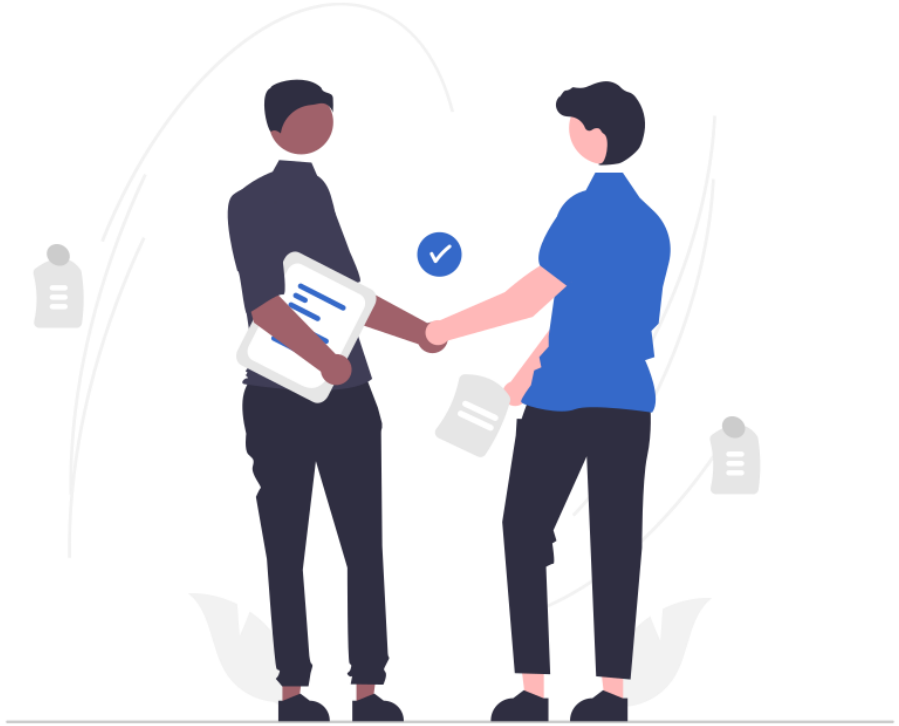
## Setting Expectations

### Meeting 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 FPM.



# FPM: Industry Workshop (21st of January 2025)

## Agenda for today's workshop

| Time | Topic |
|---|---|
| 10:15 - 10:20 | Introduction & Housekeeping |
| 10:20 – 10:35 | FASS Status Update |
| 10:35 – 10:50 | EMP Status Update |
| 10:50 – 11:10 | SMP: Balancing Market Reform - overview of SEM solution for multi-NEMO arrangements. |
| 11:10 – 11:25 | LDES Status Update |
| 11:25 – 11:55 | SDP Status Update |
| 11:55 – 12:30 | SDP update on planned Tranche 1 Market Participant Engagement activity |
| 12:30 – 14:15 | Break |
| 14:15 - 16:15 | FASS: Presentation on the DASSA Objective function and the DASSA Top-Up Mechanism |

# Future Arrangement System Services – Status Update

# FASS: Programme Summary Status

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

Improving
Steady
Worsening

## FASS Summary Status

| | | |
|---|---|---|
| **Overall Status** |  | The Future Arrangements for System Services (FASS) Programme continues at pace; however, programme status remains amber reflecting risk of delays to schedule due to overlapping design activities. |
| **Schedule** |  | Programme schedule is amber reflecting risk of delays due to capacity challenges stemming from overlapping programme activities and extended review periods. |
| **Resourcing** |  | Resourcing status moved from amber to green, following notice of approval of programme funding. TSO programme teams are staffed and engaged to continue work at pace. |
| **Finances** |  | Formal funding approval letter received from the RAs December 2024. |

## Key Messages

**Service Provider Sentiment:**.

- Industry readiness survey informed the High-Level Readiness Scope document, published 29.11 (FASS.20)

**Key Activities for Immediate Action**

- GAP Consultation Paper – approval from RAs ahead of publication.
- DASSA Top-Up Mechanism (FAM Alternative) Consultation Paper draft complete with internal review underway.
- Drafting of Parameters & Scalars Consultation Paper.
- Scoping of non-reserves workstream, session to be held with RAs in early February.
- SEMC Decision on FASS Charge, expected end of February.

**Positive Developments (Since Last Report)**

- Final draft of the DASSA Volume forecasting Methodology recommendation paper shared with RAs 23/12, feedback received 15/01.
- Gap Consultation Paper issued to RAs on 23/12, awaiting approval.
- TSOs presented on outcomes of RA/TSO FAM Alternatives workstream at SSFA project Panel, 16/12. Final draft of FAM Alternatives Consultation Paper is under review with TSOs.
- Grid Code review for reserve products initiated.

**Challenges (Since Last Report)**

- Risk of misalignment between TSOs and RAs on core components of the DASSA design.
- Parameter & Scalars – Delays in third party sourcing may impact project timelines for consultation.

# Status of Design Activities

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 which provides clarity on the timing of future consultations in level 2 of the programme plan.

| Open Design Activities | Status |
|---|---|
| System Services Charge | System Services Charge Recommendations paper finalised and shared with RAs on the 29th of November. SEMC Decision now expected by end of February, a delay of one month against PIR schedule. |
| Volume Forecasting Methodology (Reserves) | Volume Forecasting and Methodology Recommendations paper submitted to RAs 23/12. Feedback from RAs received 15/01. |
| DS3 SS Tariffs to FASS (Transition Period) | The DS3 SS Tariffs to FASS "The Gap" Consultation Paper was issued to the RAs on the 23rd of December and is awaiting RA approval. |
| DASSA Top-Up Mechanism (FAM Alternative) | The DASSA Top-Up Mechanism (FAM Alternatives) Consultation Paper is being finalised and will be issued to the RAs shortly. |
| Parameters & Scalars | External consultants recently onboarded to support TSOs in analysis for Parameters and Scalars in the DASSA workstream which will feed into TSO consultation. |

| Closed Design Activities | Status Update |
|---|---|
| DASSA Design | SEM-24-066 Future Arrangements for System Services - DASSA Market Design Decision Paper was published along with the TSOs' DASSA Design Recommendations Paper on the 18th of September. |
| Product Review & Locational Methodology (Reserves) | SEM-24-074 Future Arrangements for System Services - Product Review and Locational Methodology Decision Paper was published on the 22nd of October. RAs and TSOs engaging on clarifications. |

# Thank You

*Questions can be submitted to*

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

## Next Steps:

- The TSOs will publish the ‘DS3 Tariffs to FASS’ Consultation Paper following RA approval.
- The TSOs will publish the ‘DASSA Top-Up Mechanism’ (FAM Alternative) Consultation Paper when finalised and following RA approval.
- Next code Working Group scheduled for 23rd January to go through the PEV first draft. TSOs intend to have a February Working Group which will cover Agreed Procedures.

# Energy Markets Policy – Status Update

# Agenda

1. Democratic Consent Vote (Northern Ireland)
2. Multi-Region Loose Volume Coupling (MRLVC) and Post Brexit Arrangements
3. Capacity Allocation and Congestion Management (CACM) 2.0
4. Net Zero Markets

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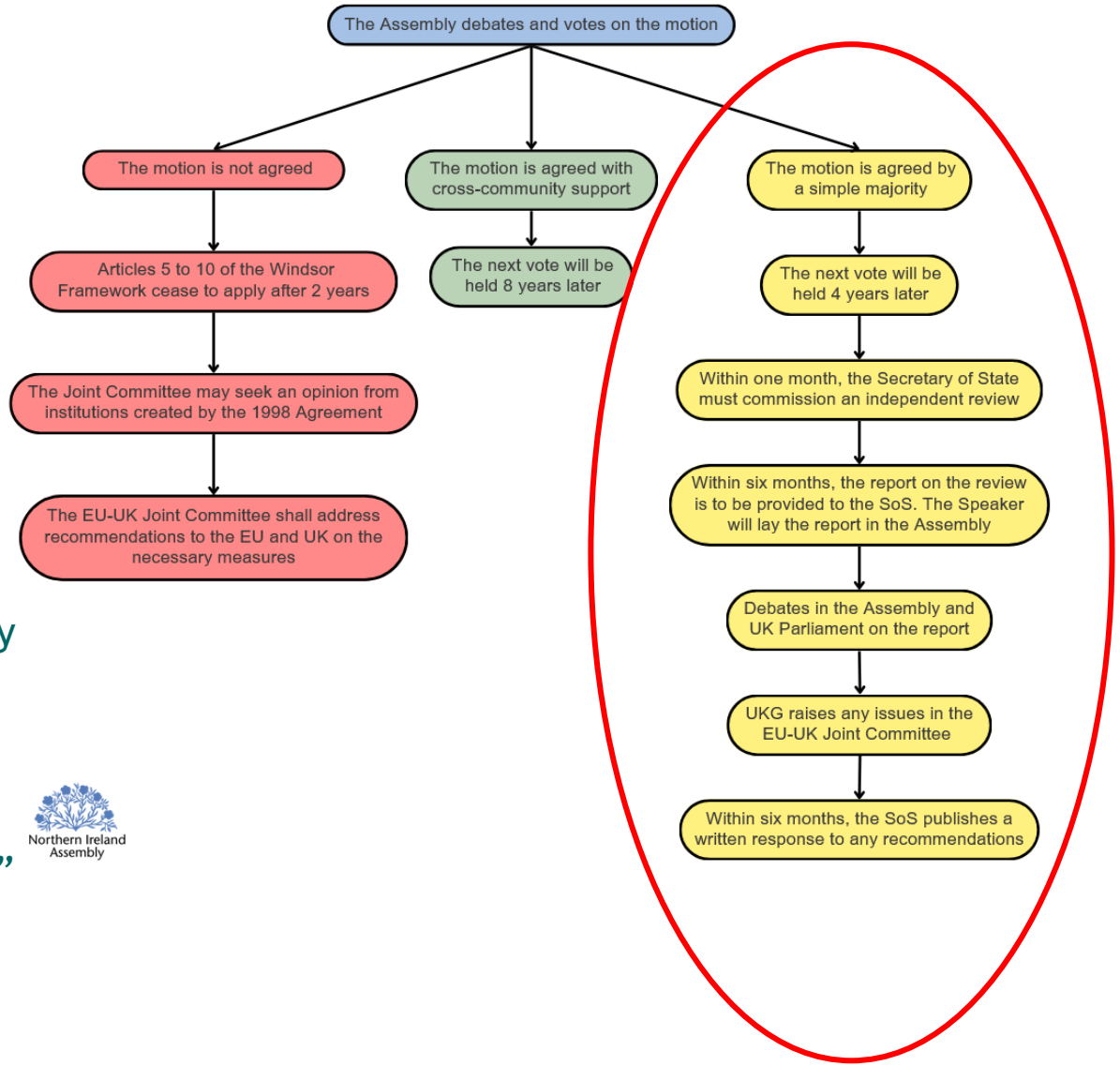
# Democratic Consent Vote (Northern Ireland)

- Democratic consent vote took place in Northern Ireland Assembly in December 2024

- Windsor Framework/Protocol on Ireland/Northern Ireland
  - Continued application of Articles 5-10
  - Article 9: Single Electricity Market

- Motion passed by simple majority
  - Next vote in 2028
  - UK Government to commission an independent review into the Windsor Framework and its implications. Terms of Reference for the independent review was published on 10 January
  - Purpose of the review is *"to provide the Government with a report of its conclusions on the functioning of the Windsor Framework arrangements and its implications on social, economic and political life in Northern Ireland."*




Northern Ireland Assembly

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# MRLVC and Post Brexit Arrangements

- **November 2024**
  - EU-UK Specialised Committee on Energy met and proposed a Roadmap for 2025.

- **December 2024**
  - EU and GB TSOs met to kick off work.

- **Overview of 3 workstream**
  - Operations of MRLVC within EU and GB market, fall backs and operational timings
  - Tender documentation for BZB forecaster
  - Offshore and hybrid compatibility of MRLVC solution.

- **Roadmap 2025**
  - **April:** Meeting with EC, Ofgem, ACER and RAs
  - **June:** Presentation to Specialised Committee
  - **October:** Draft of report for ACER and OFGEM
  - **November:** Report published.

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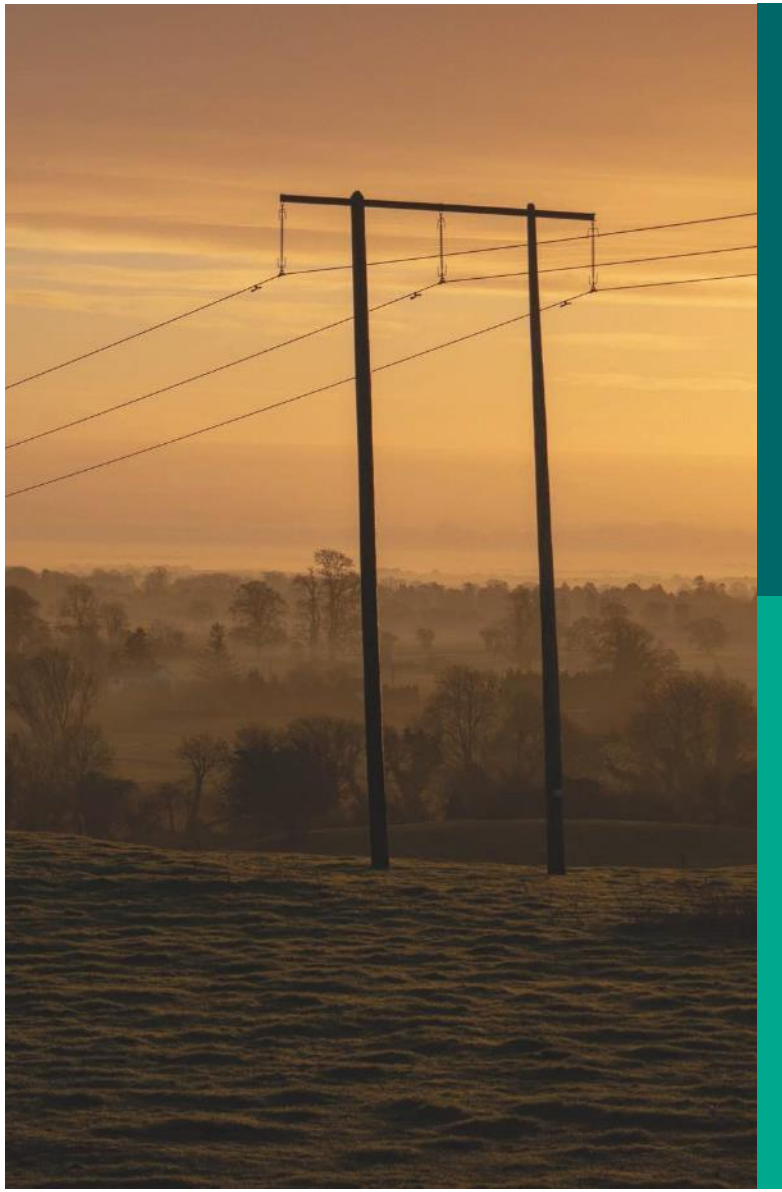
ACER
European Union Agency for the Cooperation of Energy Regulators

# Capacity Allocation and Congestion Management (CACM) 2.0

- The CACM Regulation sets rules for the implementation and operation of EU-wide day-ahead and intraday markets
- In 2021, ACER issues recommendations for CACM 2.0
    - 70% cross zonal capacity up to the intraday
    - Third country flows
    - Market Coupling Governance, including MCO entity/Single legal entity
- Given the energy crisis and the 2023 reform of the Electricity Market Design the process was stalled
- The European Commission is due to publish its proposal in Q1 2025
- ENTSO-E's CACM Coordination Group will prepare a response to the EC's consultation when the proposal is published.
- Competitiveness focus in Europe.



# Net Zero Markets

- Net Zero future markets report underway with AFRY
    - Recommendations for a competitive market transition to Net Zero
- Draft under internal EirGrid review
- Topics covered include Markets and Operational synergies under Net Zero scenarios considering total costs of NZ transition scenarios
- Project expected to be completed in Q2 2025.

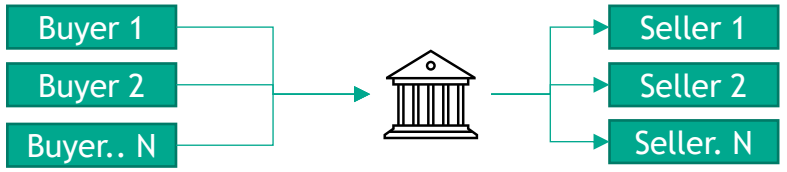
# Strategic Markets Programme: Balancing Market Reform -

*Overview of SEM solution for multi-NEMO arrangements*

# Background: NEMO & Multi-NEMO Arrangements (MNA)

## • NEMO is a legal entity

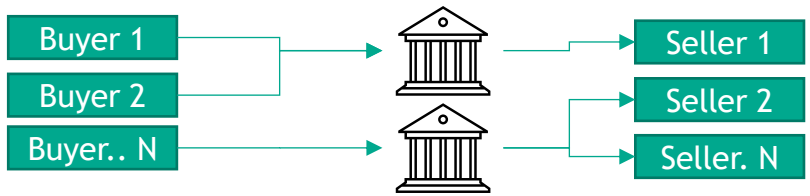
- A Nominated Electricity Market Operator (NEMO) is a designated entity under EU regulations. Each NEMO is responsible for central counter party (CCP) and shipping agent (SA) functions.
- Through direct designation or “passporting”, the number of NEMOs in a bidding zone can be:
  - Only One NEMO in a Bidding Zone
  - More than one NEMO in a Bidding zone (Multiple NEMOs)




Example: One NEMO in a Bidding Zone matching buying and sellers

## Multiple NEMO support is a legal requirement

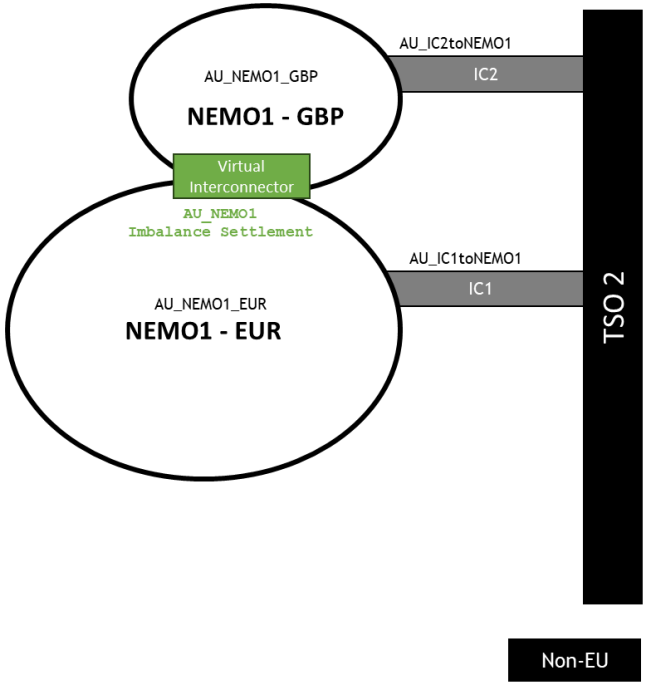
- MNA is part of the legal framework, allowing multiple NEMOs to operate in the same Bidding Zone (BZ) in EU member states that are open to competition.
- In a bidding zone with Multiple NEMOs, each NEMO operates its own market platform and its trading processes. However, it is essential to collaborate with other NEMOs.
- Via the MNA framework, NEMOs (and other parties) in the bidding zone can collaborate, share information and coordinate market activities.




Example: Two NEMO in a Bidding Zone matching buying and sellers in MNA-Framework

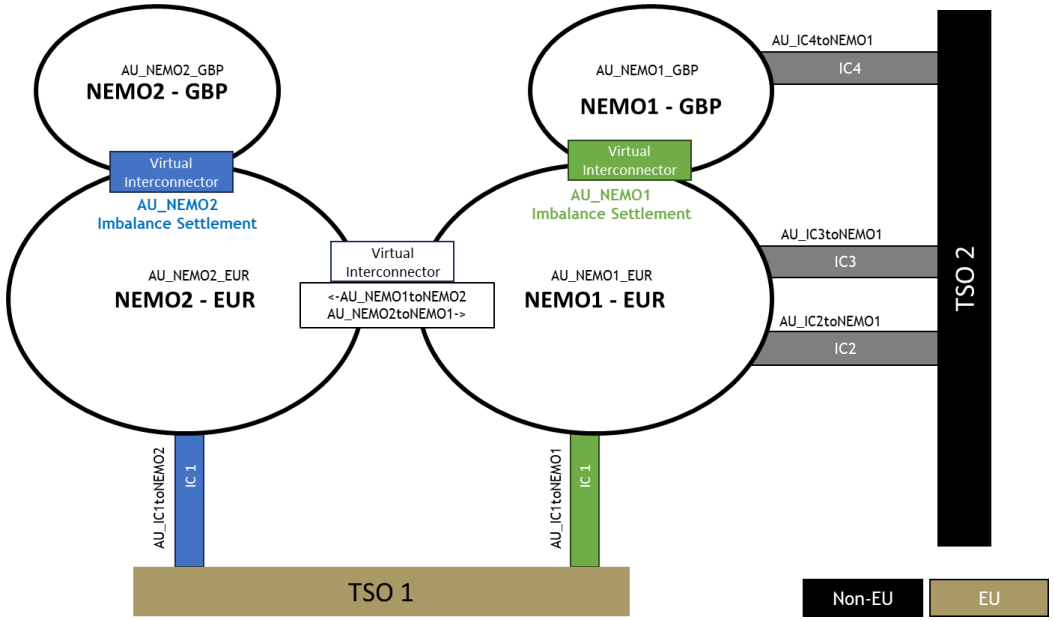
# MNA-Framework: Now vs Target

## Current Model




1. *Only One NEMO active (SEMOpx) so registration of units with only availible NEMO in the SEM region*
2. *No interconnection with Continental Europe (CE) so trade exchange with CE TSOs not possible.*

## Target Model

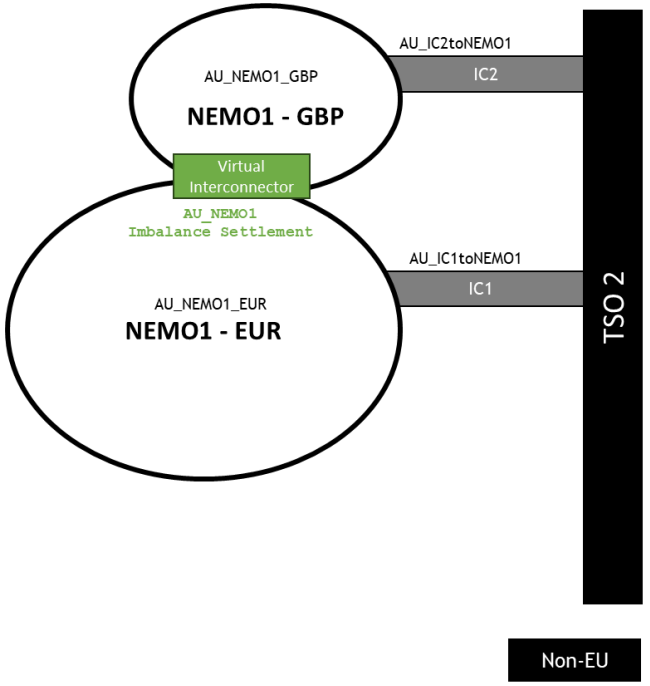



*Above figure represents multi-NEMO model with two NEMO scenario.*

1. *Multiple NEMO could be active in the region so registration of units for as many NEMOs as are able to operate within the SEM at any time.*
2. *Interconnection with CE is possible through the Celtic Interconnector, so trade exchange with CE TSOs are also possible.*

# MNA-Framework: AU Generic Model Now vs Target

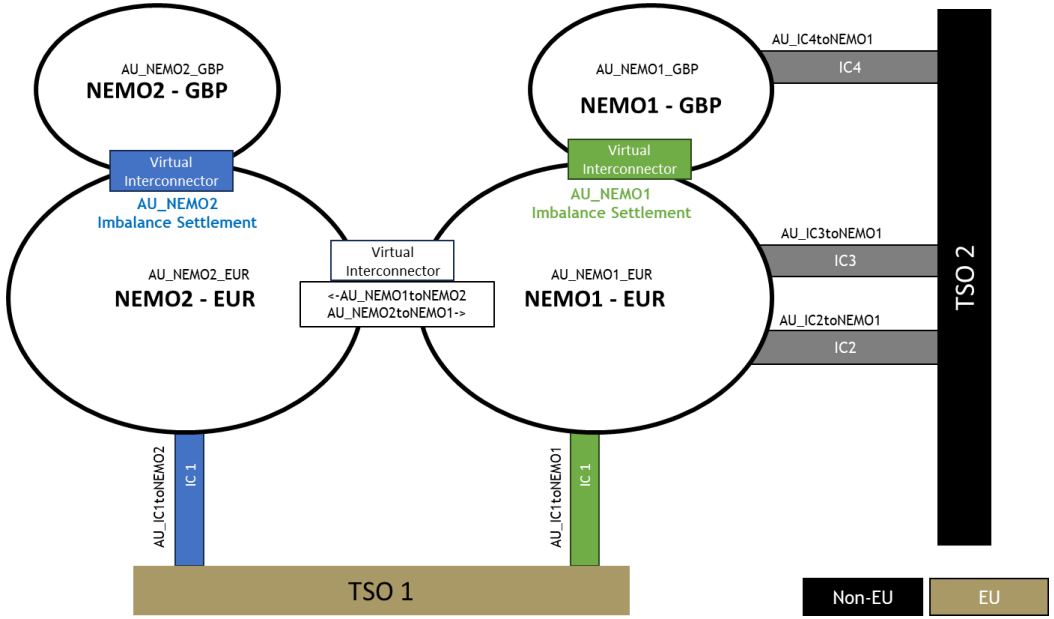
## Current Model




### Number of Assetless Units (AU) needed

1. One AU per interconnector for each NEMO in the bidding zone
2. One AU for Market Area Exchanges.
3. One AU per Settlement for whole Bidding Zone (NI+ROI)

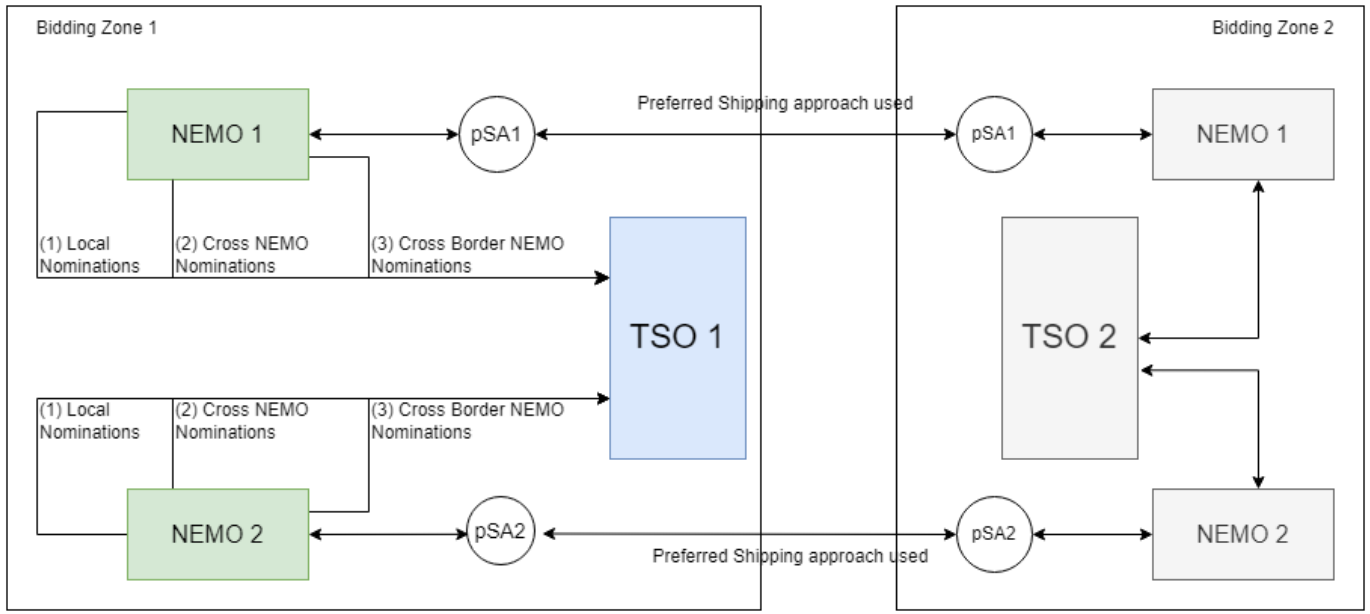
## Target Model




### Number of Assetless Units (AU) needed

1. [Existing] One AU per interconnector for each NEMO in the bidding zone
2. [Existing] One AU for Market Area Exchanges.
3. [Existing] One AU per Settlement for whole Bidding Zone (NI+ROI)
4. [New] One AU per additional NEMO for cross-NEMO transactions

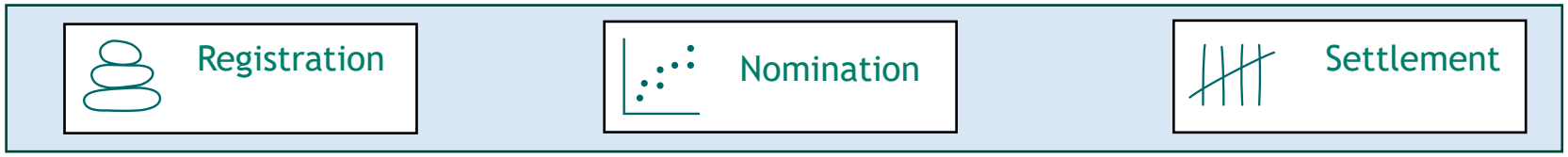
# MNA-Framework: High Level Overview of Preferred Shipping Approach




Key points:

1. By default, on borders between MNA areas, the “preferred shipper” approach is used. Each NEMO assigns a preferred Shipping Agent (pSA) for its NEMO hub within each Bidding zone.
2. The preferred shipper (a function of a NEMO) performs physical and financial settlement according to scheduled exchanges resulting from coupling.
3. Each NEMO manages its own exchanges with other NEMOs in the Bidding Zone and outside Bidding Zone, and with their respective participants.
4. The primary role of SEMO is to make sure all the nominations received from NEMOs are consistent, to conduct settlement processes properly with multiple NEMOs in the region.

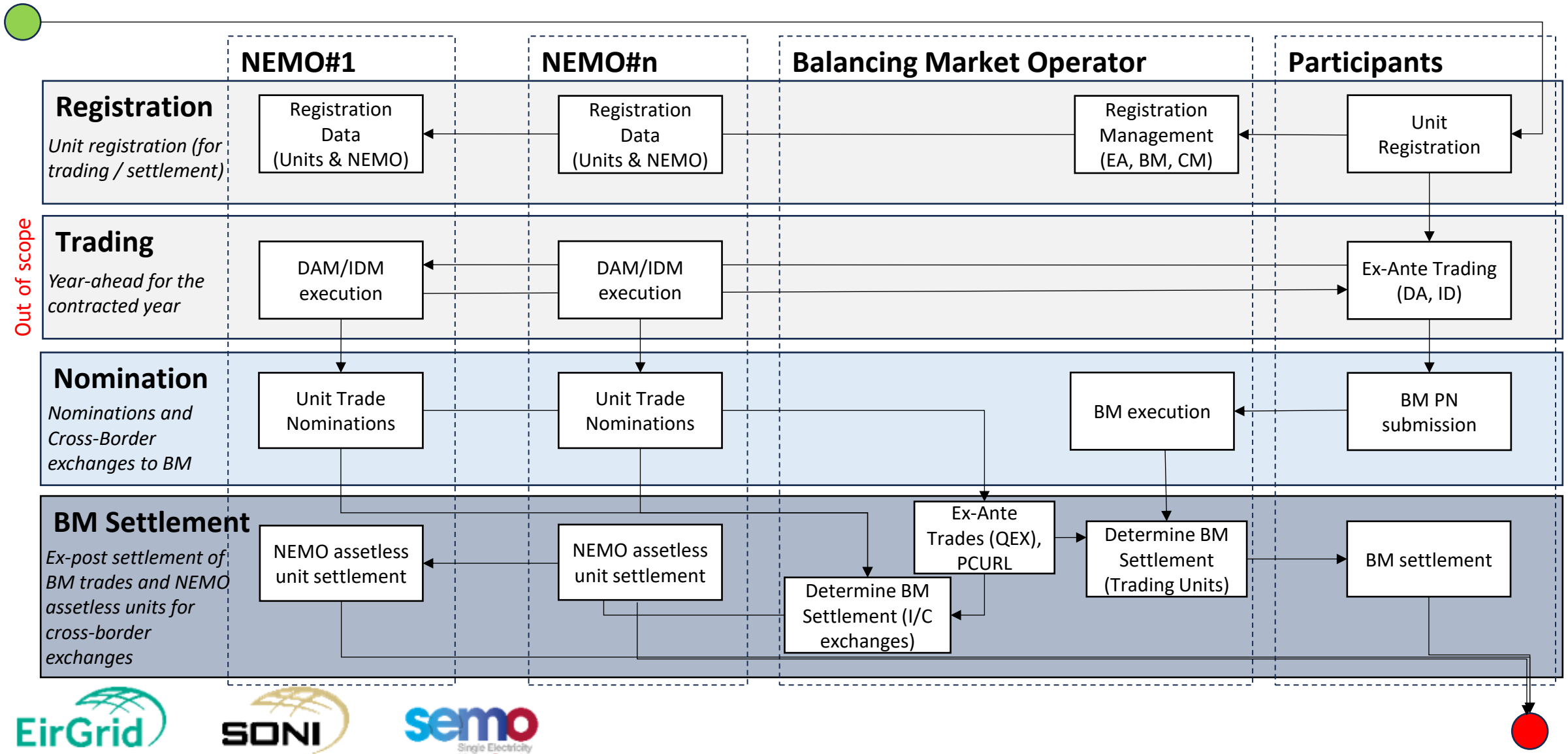
# MNA in SEM Balancing Market: Summary



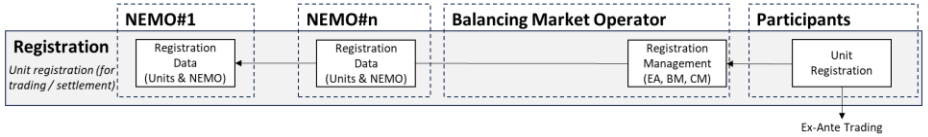

- Below are the key areas of impact to the SEM Balancing Market due to the introduction of MNA:

  - **Registration**: Facilitate the registration of units within the balancing market with multiple NEMOs
  - **Nomination**: Multiple NEMOs must submit the Ex-ante Trade inputs and Nomination inputs to SEMO.
  - **Settlement**: Apply imbalance settlement rules for additional units registered to each participating NEMO.

# MNA - Operation in SEM Balancing Market: High Level Flow

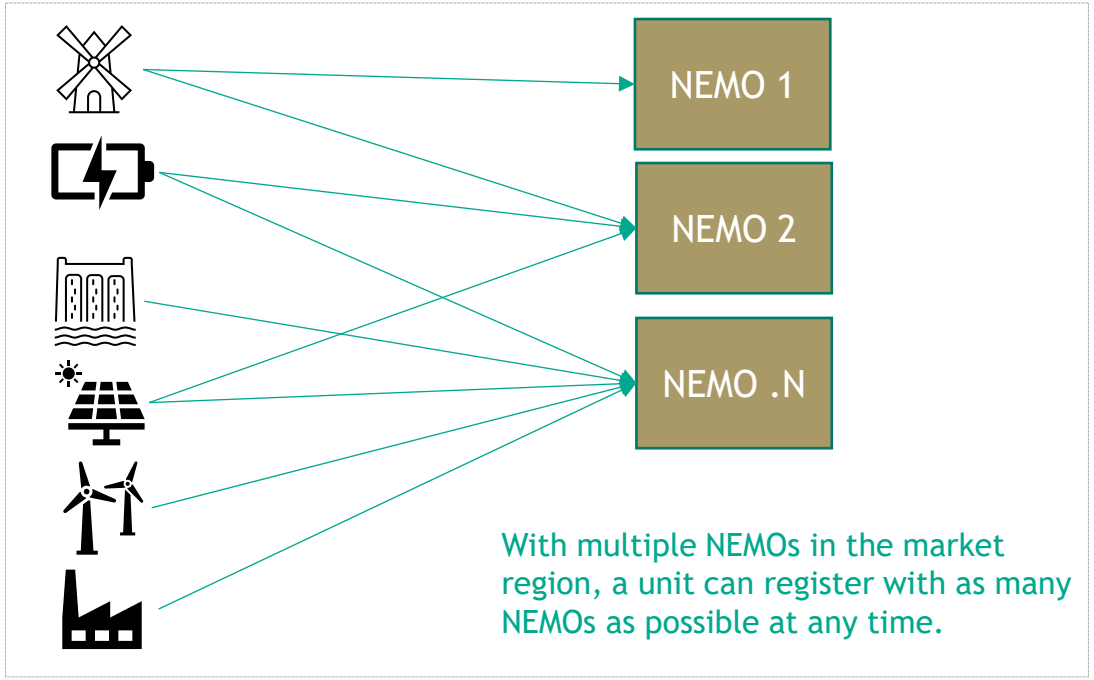


# A. Registration (1/2)

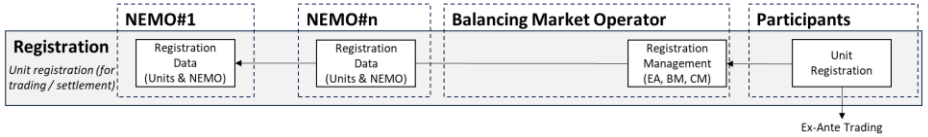



## How many NEMOs are there in a MNA framework?

- SEM Balancing Market should be able to handle registration of Units for as many NEMOs as are able to operate within the SEM at any time



# A. Registration (2/2)

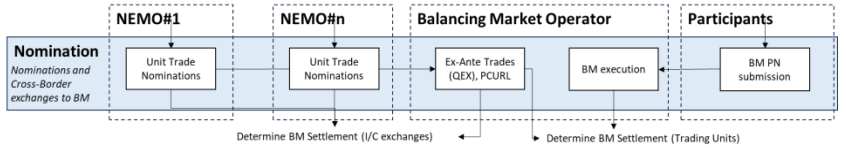



## Registration of Assetless Units

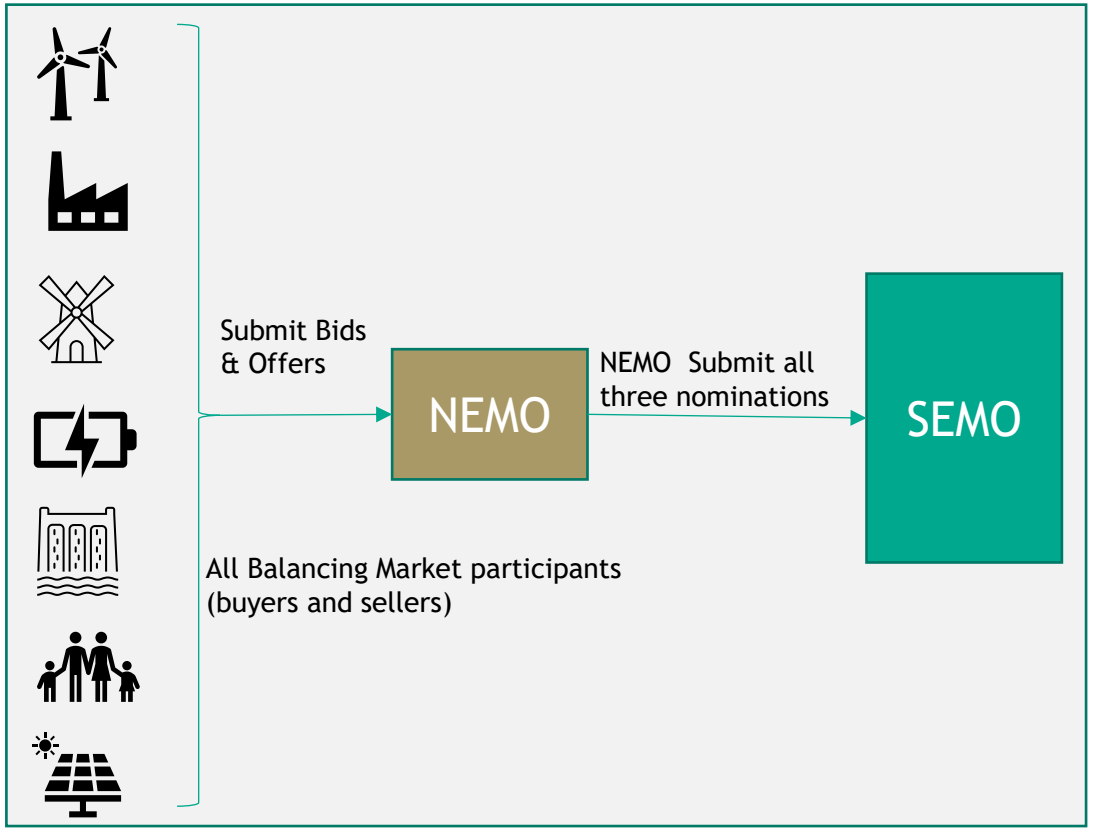
Each NEMO registered in the SEM region shall have following number of Assetless Units (AUs) allocated to it:

1. One AU per Interconnector (based on the TSC article B.8.2.3 and F.2.2.4 relating to SA Assetless Units)
2. One AU for Market Area Exchanges (based on TSC Article B.8.1.2.e and F.5.2.10) which may be per Currency Zone (or Jurisdiction) where a specific NEMO Trading Hub has been implemented.
3. One AU per Settlement for the entire Bidding Zone (based on the TSC article B.8.1.2.d and F.2.2.4 relates to the SA Units)
4. One AU per additional NEMO for cross-NEMO exchanges (i.e., for each NEMO, an AU for cross-NEMO exchanges with each other NEMO)

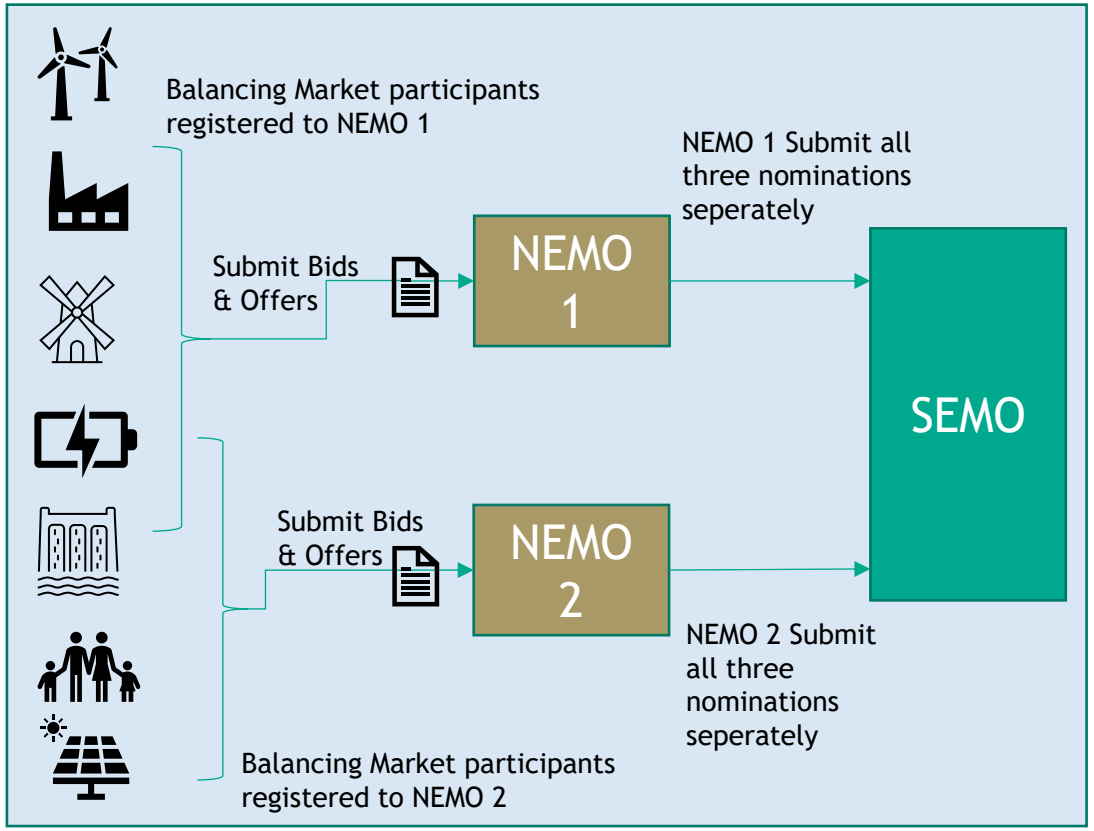
# B. Nominations (1/5)



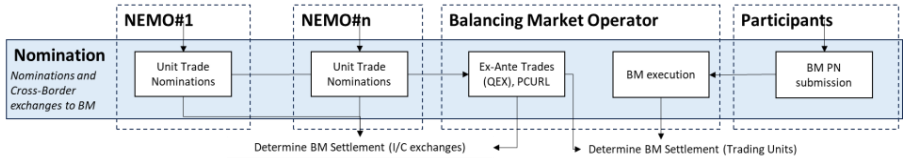

## Current Set-up




## Target MNA Set-up



# B. Nominations (2/5)

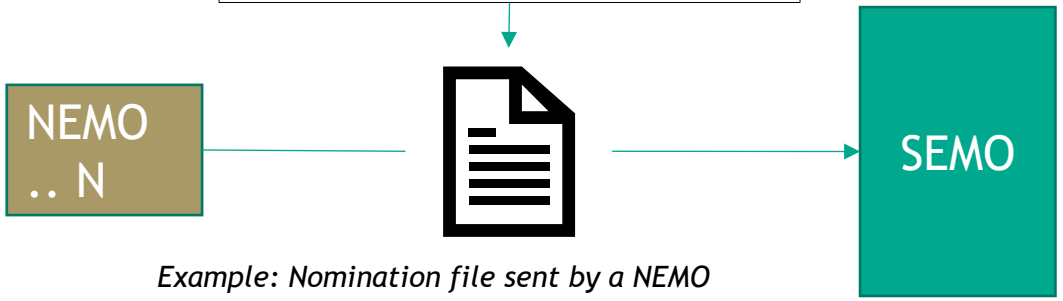



## Each NEMO must submit separate nominations (separate files) to the Market Operator (SEMO)

- Each nomination file shall able to cover all types of exchanges in all market timeframes
- Validation and versioning rules for MNA approach will be same as Single NEMO approach that exists in the current state

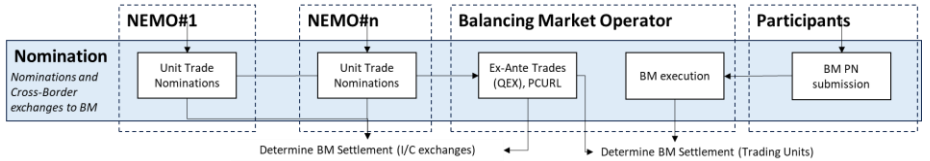
For all types of market timelines:
- Day Ahead Market
- ID Continous and Auction (IDA)

All exchanges
- local trades,
- Cross-NEMO exchanges
- Cross Border exchanges




*Example: Nomination file sent by a NEMO*

# B. Nominations (3/5)



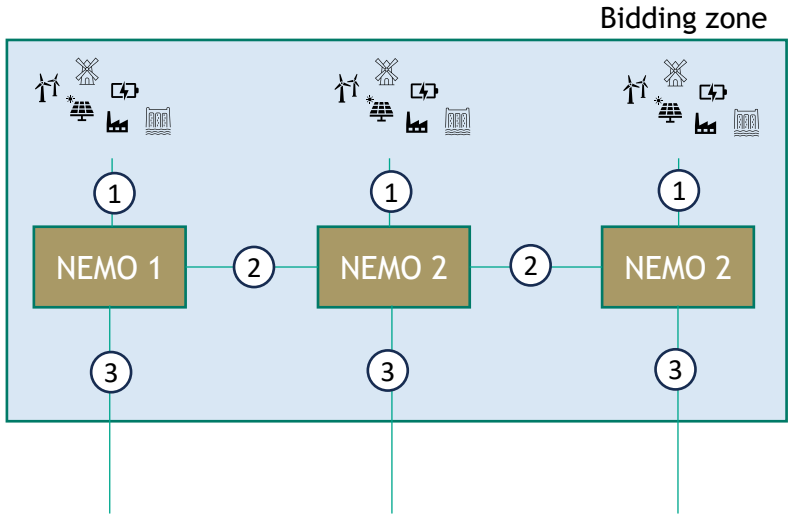

## Types of exchanges in a MNA framework

- In MNA framework, each NEMO has the possibility of three type of nominations:
  1. Local Nominations (from Local participants)
  2. Cross NEMO Transfers (from NEMOs within the same zone)
  3. Cross Border Nominations (from NEMOs outside the zone)

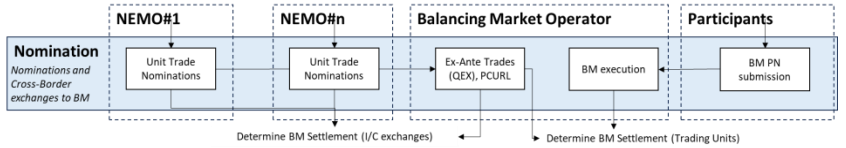
- **Condition to be fulfilled:**
  - A **bidding zone with multiple NEMO needs to be balanced**

    For all NEMO in the bidding zone $\Sigma$ (*Local Nominations +Cross Border Nominations +Cross NEMO Transfer*) =0

    In case the condition is not fulfilled, then the NEMOs are exposed to imbalance settlement for the delta as per the TSC Part B F.5.2.10.

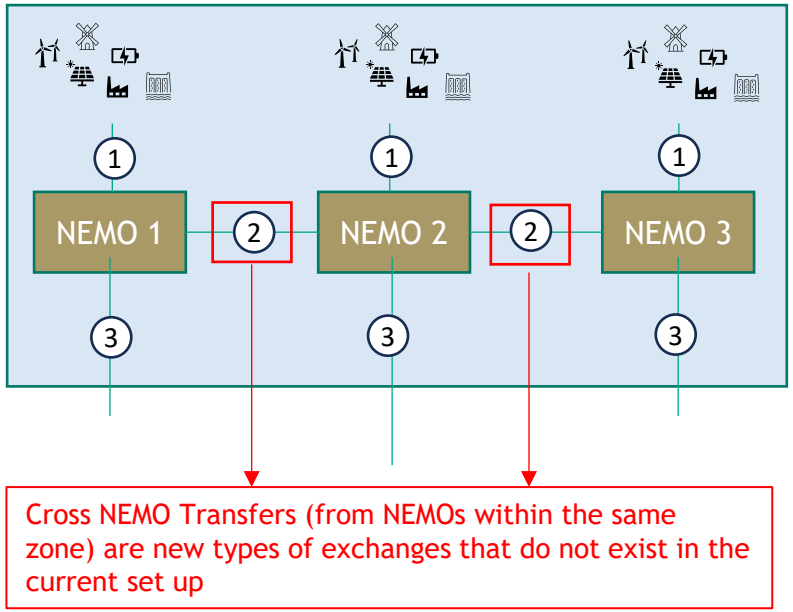


# B. Nominations (4/5)




## How to treat cross-NEMO nominations?

1. Local Nominations
2. Cross NEMO Transfers
3. Cross Border Nominations



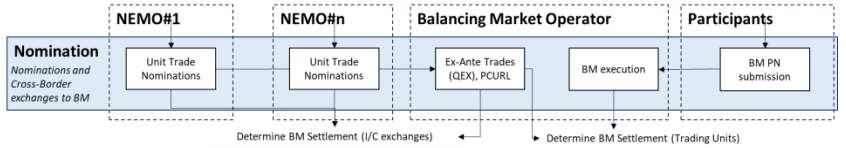

Cross NEMO Transfers (from NEMOs within the same zone) are new types of exchanges that do not exist in the current set up

Cross-NEMO exchanges will be nominated by both NEMOs who are party to this exchange, with the direction of the exchange specified in the nomination. This is known as double-sided nomination and is consistent with the current design of the SEM.

| NEMO 1 Nomination file | NEMO 2 Nomination file | NEMO 3 Nomination file |
|---|---|---|
| Export 10 MW with AU unit of NEMO 2 | Import10 MW with AU unit of NEMO 1 | |
| | Import 100 MW with AU unit of NEMO 3 | Export 100 MW with AU unit of NEMO 2 |
| Import 550 MW with AU unit of NEMO 3 | | Export 550 MW with AU unit of NEMO 1 |

*Example showing how Cross-NEMO inputs are represented in each nomination files.*

# B. Nominations (5/5)

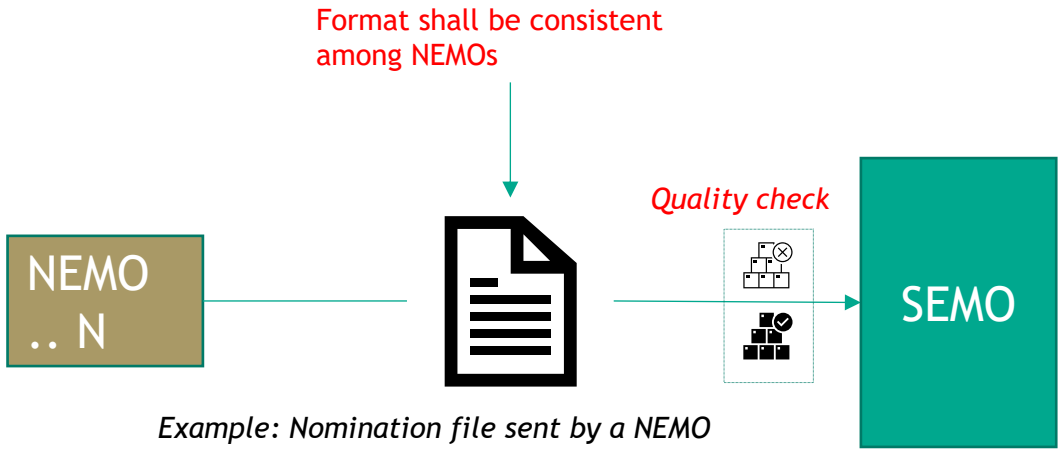



## Format of the Nomination file shall be consistent

- Current Nomination file format shall be sufficent and this shall be extended to all NEMOs

## Nomination files shall undergo Validation check

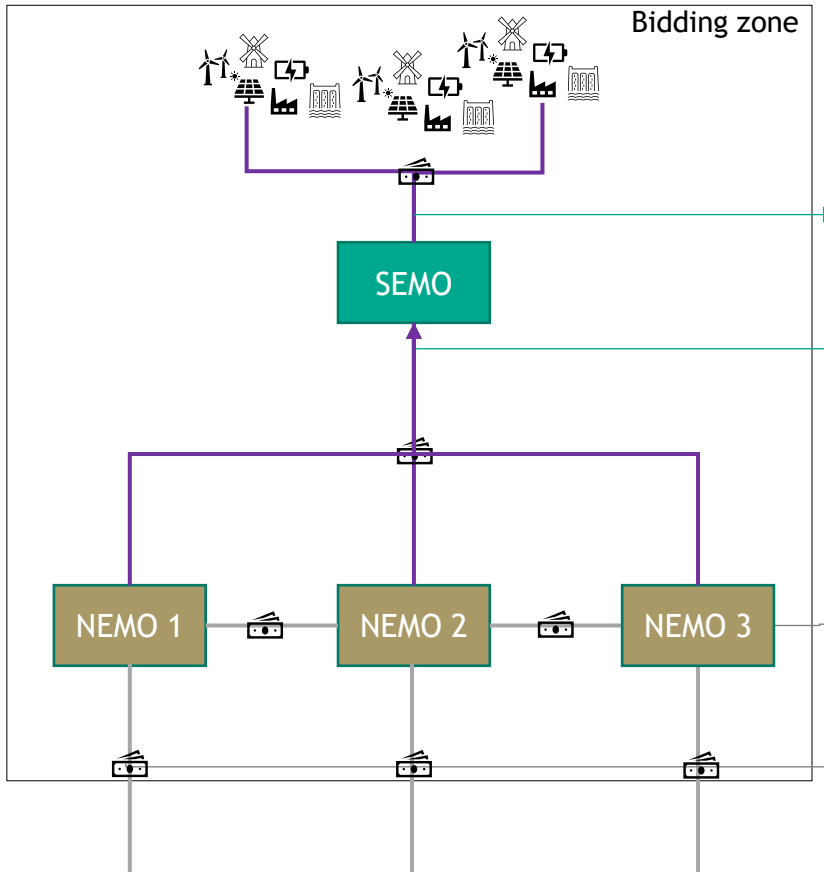
- Current validation rules shall be sufficent and this shall be extented to all NEMOs




*Example: Nomination file sent by a NEMO*

# C. Settlement (1/2)

## Roles and responsibilities in (financial) Settlement in the MNA framework




- SEMO performs imbalance settlement with market partcipants. (Practice remains same as before. No change in scope for EirGrid/SONI)
- SEMO performs imbalance settlement for the Assetless units of NEMOs as per F.5.2.10 (Practice remains same as before and EirGrid/SONI, scope is expanded to new NEMOs)

- NEMOs perform settlement with NEMOs in the bidding zone. (Practice is new but out of scope for EirGrid/SONI)
- NEMOs perform settlement with Cross border NEMOs. (Practice remains same as before and the scope is expanded to all new NEMOs. But out of scope for EirGrid/SONI)
- NEMOs perform settlement with exchange members for cleared trades.(Ex-Ante)*

*Not illustrated in the diagram

# C. Settlement (2/2)

## Settlement equation implementation 2

As per TSC Part B F.5.2.10, the Ex-Ante Quantity (QEXu'γ) for each Assetless Unit, u' =

$$QEX_{u'\gamma} = \left( \sum_{u \text{ and } v \in u'} \left( \sum_{x} (qTDA_{xh} \times Min(DTDA_x, DISP)) + \sum_{x} (qTID_{xh} \times Min(DTID_x, DISP)) \right) + \sum_{u \in u'} \left( \sum_{x} (qEMADA_{xuh} \times Min(DTDA_x, DISP)) + \sum_{x} (qEMAID_{xuh} \times Min(DTICIDMIN, DISP)) \right) \right)$$

$\sum_{u \text{ and } v \in u'}$ is a summation over all Generator Units, u, excluding Interconnector Residual Capacity Units or Interconnector Error Units, and Supplier Units, v, registered in respect of all Participants for whom the Assetless Unit, u', is registered in respect of the SEM NEMO which acts as a Scheduling Agent which submits Contracted Quantities for that Participant

**Condition to be fulfilled** = Under MNA framework, summation of units need to be calculated per NEMO submission not per units "*registered in respect of the SEM NEMO*"

**Gap** = Currently, the equation to calculate the Ex-Ante Quantity for each Unit considers a one-to-one mapping between registered units and a SEM NEMO whereas in the MNA set-up, the requirement is different, and the equation needs to be updated.

**Solution** = Summation of all trades per NEMO submission

# Multiple NEMOs: Day in the life

Multi NEMO

Multiple NEMO Arrangements

## Registration (one-off)

- Registration of Assetless Units required for nomination
- Registration of Assetless Units required for settlement

*Assetless Units must be registered so that cross-NEMO and cross-border exchanges (and associated imbalances) can be appropriately nominated and settled*

## Trading

- Participant trading via their respective NEMO(s)
- NEMO ex-ante trading execution
- NEMO confirmation of cleared trades

*Participants may trade via any NEMO to which they are registered (including multiple NEMOs for the same period) – trading risks for the same volume will rest Participants. NEMOs execute trading processes and produce cleared trades and associated prices*

## Nomination

- NEMO nominations (local trades)
- NEMO nominations (cross border exchanges)
- NEMO nominations (Cross-NEMO)

*NEMOs provide nominations which encompass trades by Participants (local trades), cross-border exchanges (between TSOs) and exchanges between NEMOs*

## Balancing Market Settlement

- Imbalance Settlement based on nominations, dispatch, metering

*Settlement is performed for each respective Participant, taking nominations into account from multiple NEMOs where applicable*

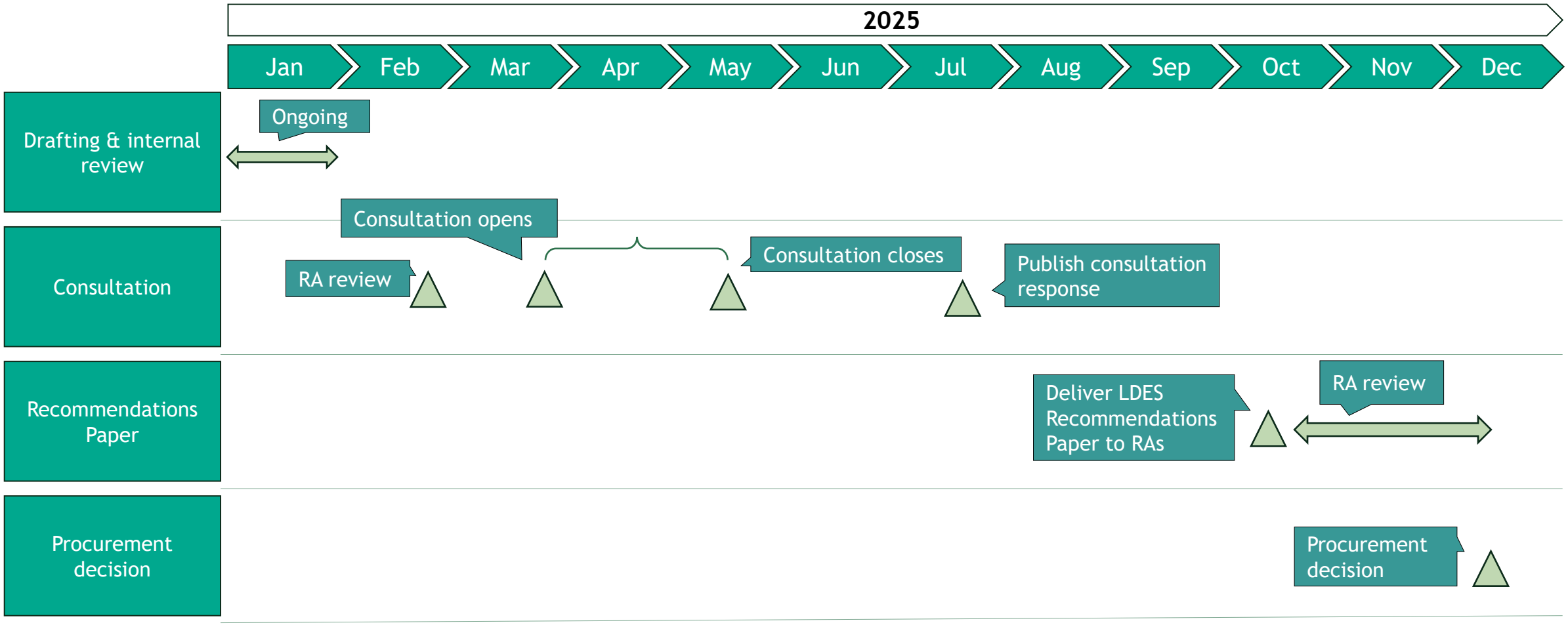
EirGrid Market Operator

# LONG DURATION ENERGY STORAGE (LDES)

# Timeline Formulation

- Release of DECC's Electricity Storage Policy Framework (July '24) which placed actions on CRU & TSO
- Assessed the ask(s) included in this and present options for closing off the actions
- Options are presented to CRU and agreement is sought
- Request for us to follow a similar process to that of the LCIS procurement
- Culminating in 2 consultations over the following timeline

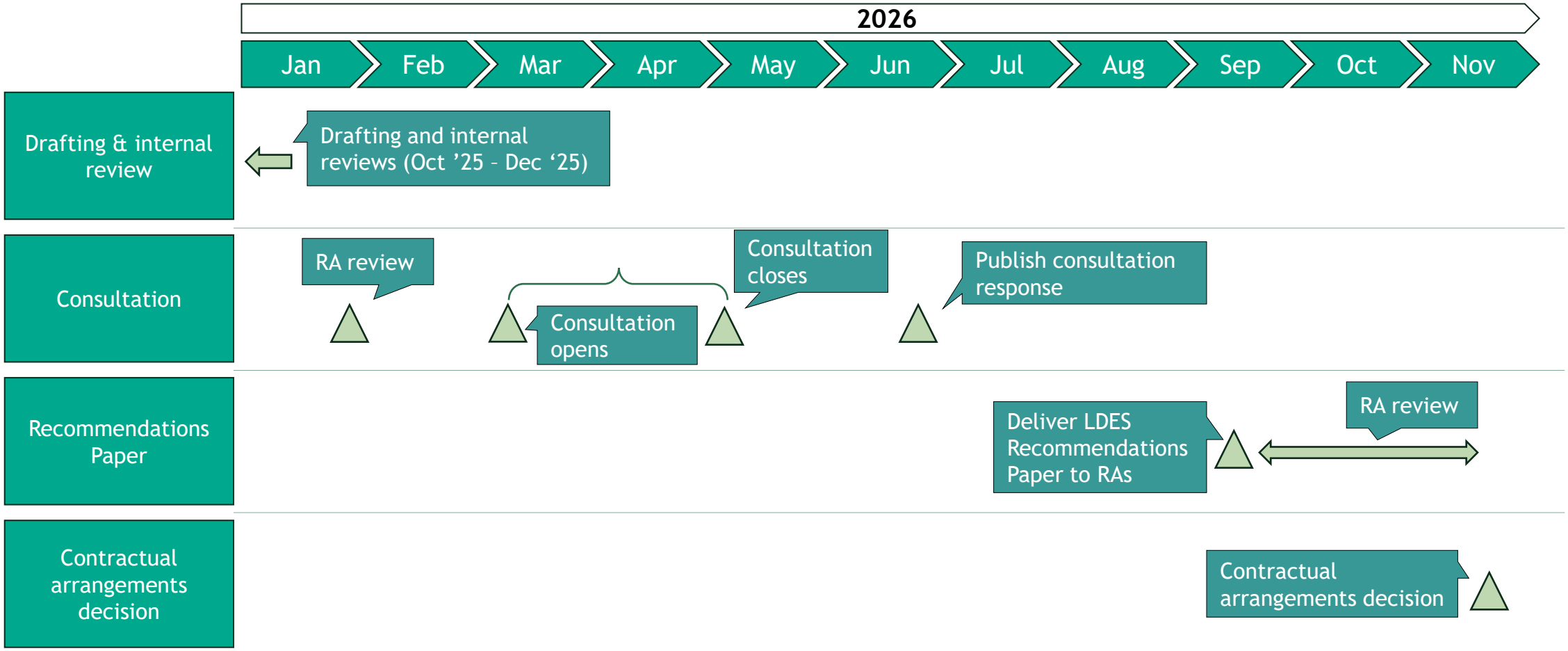
# EirGrid & SONI are working towards an initial 500MW procurement in IE: Procurement model




Note: timeline subject to RA approval

Key: △ Milestone

# EirGrid & SONI are working towards an initial 500MW procurement in IE: Contractual arrangements




Note: Auction platform build Dec 2025 – Nov 2026; Launch LDES procurement Mar 2027; Contract execution Dec 2027.

Key: △ Milestone

# Scheduling and Dispatch Programme

# Scheduling and Dispatch - Status

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

| SDP | | Summary Status |
|---|---|---|
| Overall Status | ↓ | Overall programme status is RED. Continued system vendor test delays have impacted the critical path of Tranche 1 delivery. Target date for Tranche 1 Modifications approval of June 2024 has not been met. Work on Tranche 2 modifications and system design continues in line with plan. The programme is publishing a re-baselined plan for Tranche 1 Delivery *(*subject to SEMC All Ireland Programme Change Approval)* |
| Schedule | ↓ | **Tranche 1:** Continued system vendor test delays have impacted the critical path of Tranche 1 delivery. Target date for Tranche 1 Modifications approval of June 2024 has not been met. Mod_13_23 Treatment of NPDRs (SDP_01 NPDR) and SEM-24-044 Definition of Curtailment, Constraint and Energy Balancing related to SEM-13-011 (SDP_04 WDI) were included on the agenda for SEM-C meeting on 19-Dec. The two items were not approved at the December meeting and will be next on the agenda at the SEM-C meeting scheduled for 27-Feb. NPDR unit designation approach has been prepared with unit analysis underway. Programme aiming to confirm NPDR unit status as soon as possible. Market Participant Engagement plan being updated based on re-baselined delivery timelines.<br>**Tranche 2:** The modification process for the Tranche 2 T&SC modifications is in progress. System design for Tranche 2 continues with the programmes system vendors. |
| RA Update on NPDR Mod | | The modification proposed is part of a complex work package and the SEM Committee have requested additional time to understand the full proposed operation and treatment of Non-Priority Dispatch Renewables. The SEM Committee requested that the modification is brought back for deliberation. The RA team intend to discuss the proposal during February's SEM Committee, with both the RA and TSOs working collaboratively to progress this initiative and ensure that SEM Committee have all details necessary to make an informed decision. |
| 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. |

## Key Messages

**Market Participant Sentiment is** Neutral

- Some participants have sent communications to the programme and RAs regarding duration of Participant Interface Test duration along with considerations for go live planning
- While an increased number of market participants have completed January readiness survey, a notable cohort of market participants have not engaged with recent SDP readiness survey.

**Key Activities For Action Next Month**

- SEM-C to make a determination on NPDR modifications and SEM-24-044 Definition of Curtailment, Constraint and Energy Balancing
- Tranche 1 Vendor system test to progress to re-baselined plan
- Tranche 2 Modifications to be submitted to Mod committee

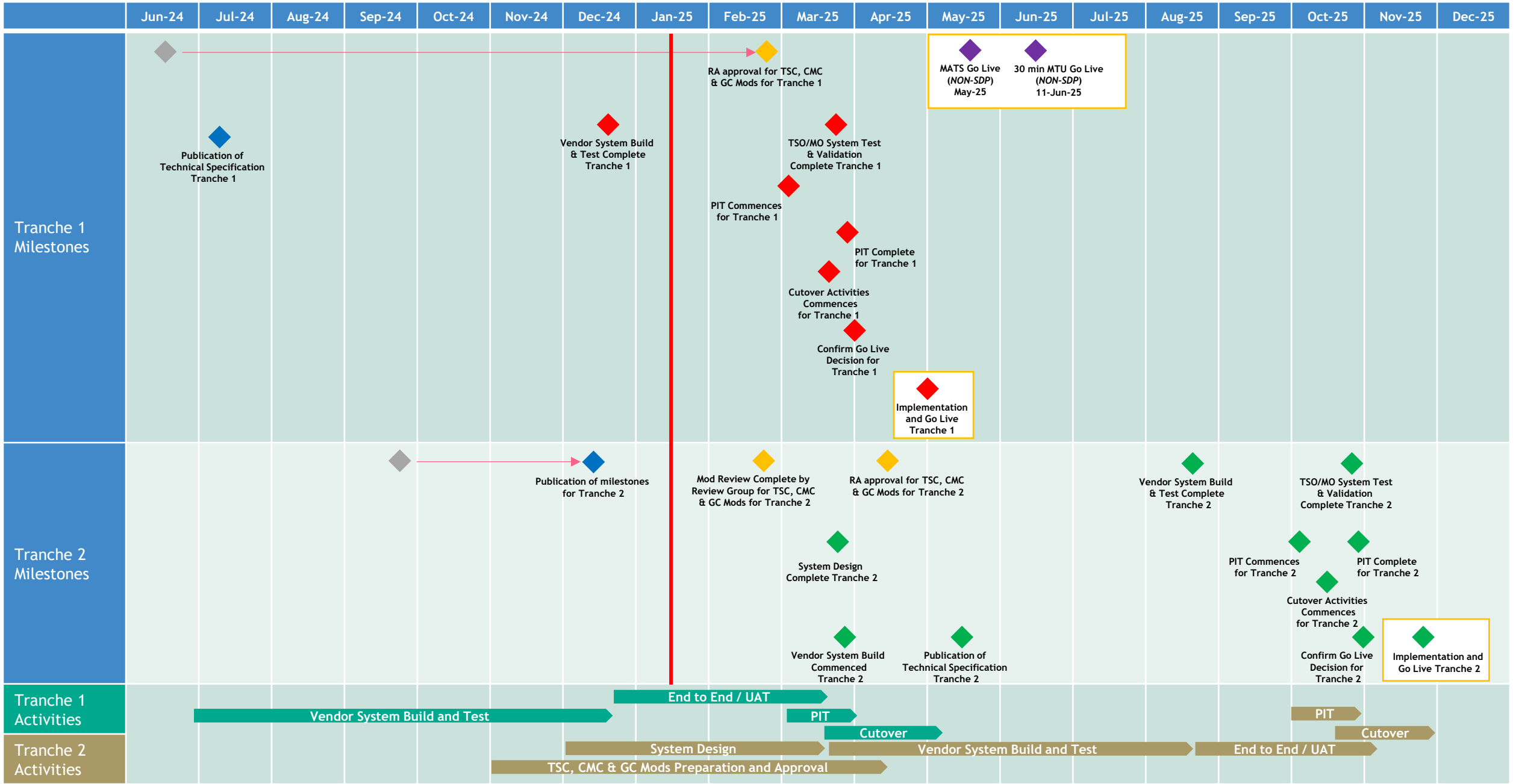
**Positive Developments (Since Last Report)**

- SDP POCs confirmed for 41 market participant organisations via POC confirmation survey

**Challenges (Since Last Report)**

- Target date for NPDR Modifications approval in June 2024 has not been met
- Vendor system test delays resulted in programme timeline revisions

# Scheduling and Dispatch: Initial Milestone Plan



# Scheduling and Dispatch – Re-baseline Rationale

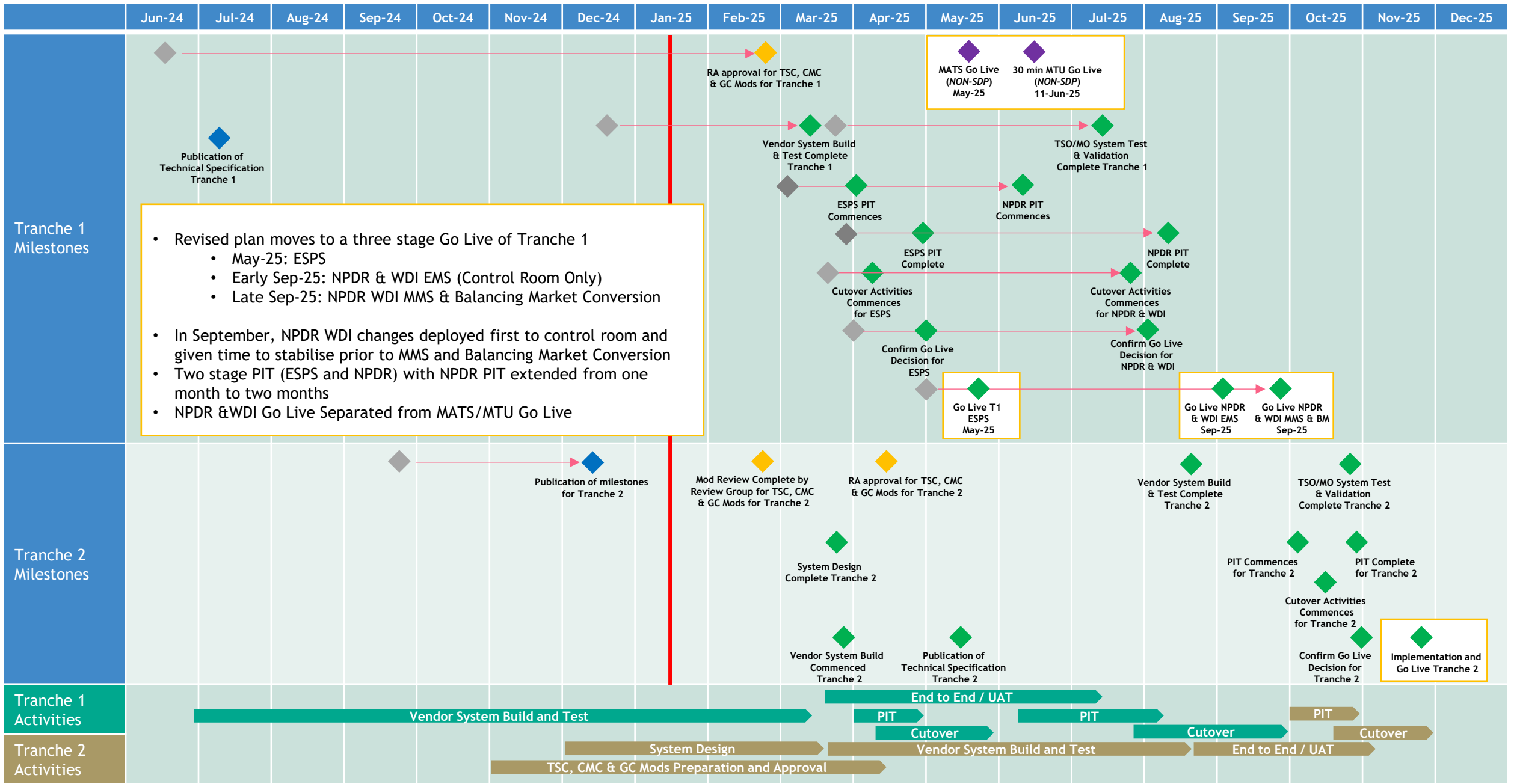
**Vendor delivery delays**

- Programme has been tracking delays in Vendor system delivery as outlined at December Industry Workshop, these delays have impacted the critical path of the programme

**Market Participant Feedback on contention with MATS and requesting more time for Participant Interface Test**

- Correspondence from Market Participants requesting the extension of the planned Participant Interface Test phase from one month duration to two months duration
- Correspondence from Market Participants requesting a gap between the MATS and SDP go-live dates
- Key themes from the Market Participants Readiness Survey responses being (1) Clarity on timelines noting proximity of SDP Tranche 1 and MATS, (2) request for longer Participant Test Phase

# Scheduling and Dispatch: Re-baselined 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 |

# 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 | June 2024 → 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 | Dec 2024 → Mar 2025 | |
| Tranche 1 | TSO/MO System Test and Validation Complete for Scheduling and Dispatch Programme Tranche 1 Initiatives | Mar 2025 → July 2025 | |
| Tranche 1 | *ESPS* Participant Interface Test (PIT) Commences (*Revised Milestone as part of re-baseline*) | Mar 2025 → Apr 2025 | |
| Tranche 1 | *ESPS* Participant Interface Test (PIT) Complete (*Revised Milestone as part of re-baseline*) | Mar 2025 → Apr 2025 | |
| Tranche 1 | *ESPS* Cutover activities Commences (*Revised Milestone as part of re-baseline*) | Mar 2025 → Apr 2025 | |
| Tranche 1 | *ESPS* Confirm Go Live Decision (*Revised Milestone as part of re-baseline*) | April 2025 | |
| Tranche 1 | *ESPS* Go Live (*Revised Milestone as part of re-baseline*) | April 2025 → May 2025 | |
| Tranche 1 | *NPDR* Participant Interface Test (PIT) Commences (*Additional Milestone as part of re-baseline*) | Mar 2025 → June 2025 | Additional Milestones |
| Tranche 1 | *NPDR* Participant Interface Test (PIT) Complete (*Additional Milestone as part of re-baseline*) | Mar 2025 → Aug 2025 | |
| Tranche 1 | *NPDR and WDI* Cutover activities Commences (*Additional Milestone as part of re-baseline*) | Mar 2025 → Aug 2025 | |
| Tranche 1 | *NPDR and WDI* Confirm Go Live Decision (*Additional Milestone as part of re-baseline*) | April 2025 → Sep 2025 | |
| Tranche 1 | *NPDR and WDI* Go Live (*Additional Milestone as part of re-baseline*) | April 2025 → 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 |

# SDP 03/05 - Fast Frequency Response / Reserve Services Scheduling & Dispatch

## Background

- Currently, wind, solar and other types of generation are paid to provide reserves, which are not correctly scheduled in the control centers, leading to increased system costs.
- The EirGrid and SONI TSOs need to implement operational and market tools for scheduling and monitoring reserves from a broader pool of new service providers, such as storage, wind and solar.
- The use of reserves from new types of service providers, such as wind and solar generation, must be facilitated by the EirGrid and SONI TSOs to achieve the 80% RES-E target by 2030. This is crucial for the success of upcoming operational trials.
- The FFR product was introduced into systems during the I-SEM but the functionality delivered does not adequately enable scheduling for all applicable unit types.
- FFR product is designed to provide a MW response at a faster deployment rate than the existing Primary Operating Reserve (POR) service.
- This service is to be deployed within 2 seconds of an event and be sustained for 8 seconds.

## Business Drivers

**The business drivers for these initiatives are:**

- TSOs meeting obligations to facilitate increased levels of renewable generation on the all-island power system.
- TSOs meeting obligations to operate a secure economic power system by utilising new types of service provider for reserve provision.
- Compliance with expected legislative and/or regulatory obligations to facilitate the participation of FFR resources, in aid of achieving renewables targets.
- Ensuring efficient scheduling, monitoring & utilisation of all reserve products that are presently not being fully utilised due to limitations in

| Ex Ante | BM: B&O | Scheduling | Dispatch | Settlement |
|---|---|---|---|---|
| None | None | Minor | Minor | None |

# Scheduling and Dispatch Programme - Market Participant Engagement Update

# SDP – Market Participant Surveys Update

The below is an overview of key metrics associated with the two SDP Market Participant surveys currently open.

## SDP Market Participant Point of Contact Confirmation

**Survey Key Metrics**

- Survey opened on 16th December 2024
- SDP Programme points of contact confirmed for 41 Market Participant organisations.
- On average, 1 POC name was provided for Market Participant organisations who completed the survey.
- Average time to complete POC survey was **1 minute**

**Next Steps**

- SDP POC Survey to remain open until **31st January**
- Points of contact will receive a confirmation email from the SDP Programme confirming they have been noted as their organisation's POC for SDP engagement.
- Confirmed points of contact to receive SDP Programme updates, via email, from February onwards.

**POC Confirmation Survey Link**

- SDP POC survey can be accessed via: https://eu.surveymonkey.com/r/CFWMFYM

## SDP Market Participant Readiness Survey

**Survey Key Metrics**

- Survey opened on 16th December 2024
- Readiness Survey completed by 21 Market Participant organisations
- Average time to complete Readiness survey was 4 minutes
- Key Market Participant feedback identified via Survey:
    1. SDP Programme timelines noting proximity to MATS/MTU go-live
    2. NPDR Unit Confirmation
    3. PIT duration
    4. Training for NPDR Units in advance of PIT.
    5. Requests for T1 technical support documentation, e.g. ITS document.

**Next Steps**

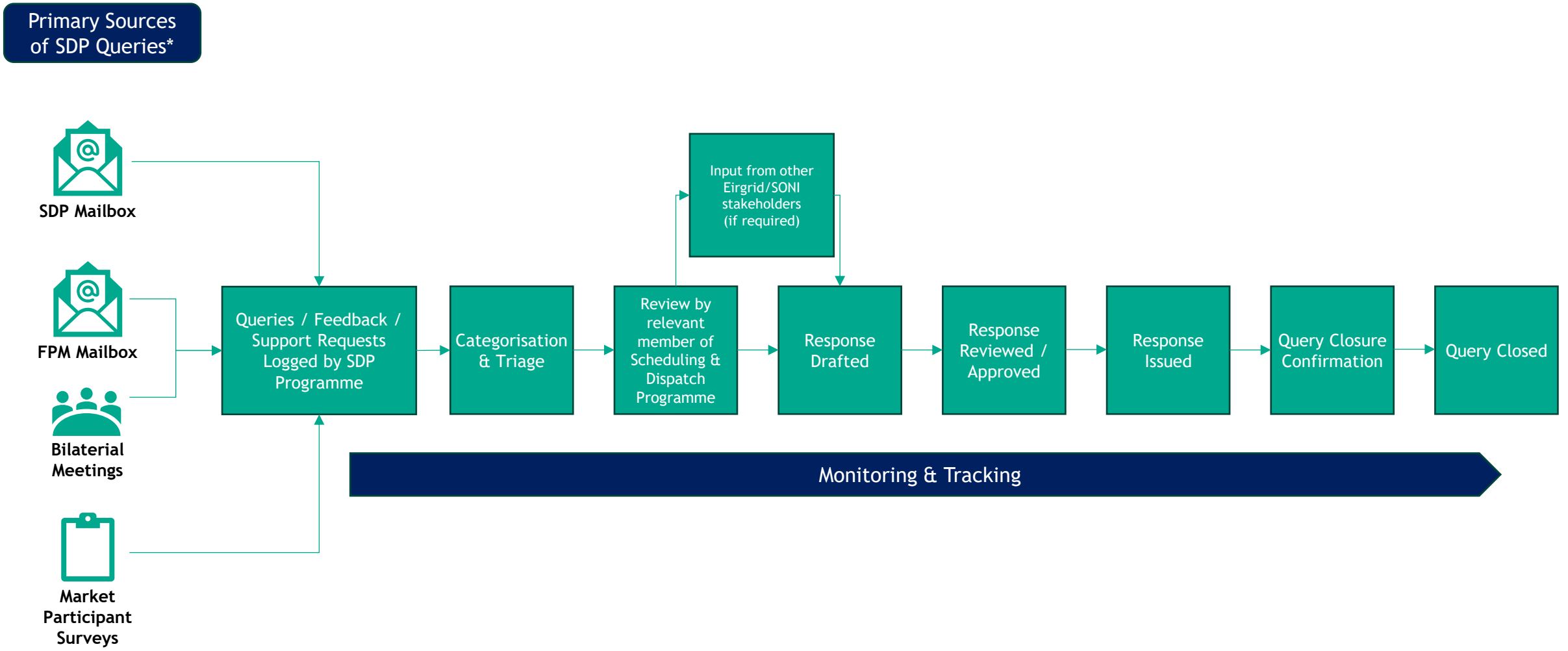
- SDP Readiness Survey to remain open until **31st January**
- All participants who have provided feedback and support requests, via SDP Survey, will be contacted directly by the SDP team in relation to their survey responses.

**SDP Readiness Survey Link**

- SDP Readiness Survey can be accessed via: https://eu.surveymonkey.com/r/CFT237Y

# SDP – Query Management Overview

The below is a high-level overview of the approach to management of market participant queries received by the Scheduling & Dispatch Programme.

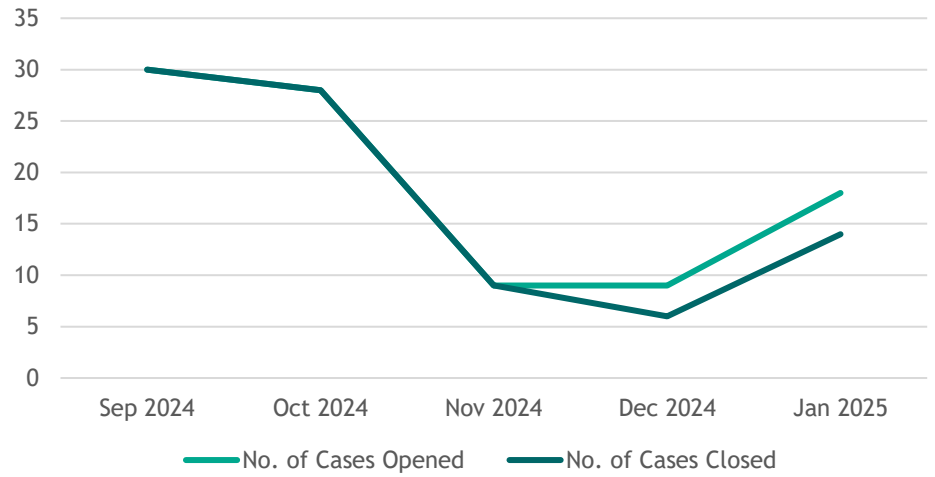



* Queries may also be received by SDP Programme via other Eirgrid/SONI sources, e.g. info@sem-o.com mailbox. However, preferred source of SDP queries are those highlighted above.

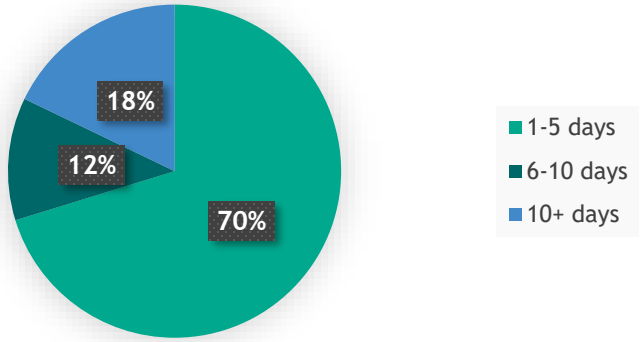
# SDP – Query Management Overview (2/2)

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

## SDP Case Query Volumes




## Average Working Days to Close out Query Cases




### Most Common Query Topics (Sep – Jan)

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

### Current Query Case Volumes

| 5 | 13 days |
|---|---|
| Cases Currently Open | Average Duration Open |

# Stakeholder Engagement: FPM Industry Workshop

## Contacting FPM Programmes

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

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

| Information to Provide |
|---|
| • Your Name<br>• Your email & phone number<br>• Your organisation<br>• Topic of Issue/Query & Programme Name<br>• Description of the issue or query<br>• Any additional information to aid in understanding the issue or query<br>• (*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

- Additional Tranche 2 Details
- Non-Priority Dispatch Renewables Designation
- Participant Interface Test
- Training

FASS

- DS3 Tariffs to FASS consultation – workshop on paper
- Real Time Security Arrangements (FAM Alternative) consultation – workshop on paper

SMP

- Overview of the plan
- Overview of impacts of EU Reintegration on SEM Market Participants
- CORE Capacity Calculation

EMP

- CACM 2.0
- FCA 2.0
- CRM27 + (guided by SEMC)

| Indicative Date | Location |
|---|---|
| 19 February 2025 | Virtual |
| 19 March 2025 | TBC (In person / virtual) |

# Future Arrangements for System Services

## Overview of DASSA Objective function and the proposed DASSA Top-Up Mechanism

# FPM: Industry Workshop (21st of January 2025)

## Agenda for FASS Presentation

| Time | Topic | Presenter(s) |
|---|---|---|
| 14:15 – 14:20 | Introduction | Niamh Delaney |
| 14:20 – 15:25 | Presentation on the DASSA Objective function *including 25 minutes for Q&A* | Sam Bouma & Kasra Haji Bashi |
| 15:25 – 16:15 | Presentation on the DASSA Top-Up Mechanism *including 20 minutes for Q&A* | Joe Deegan |

21/01/2025

# Industry Workshop

## DASSA Market Clearing Optimisation – The Objective Function

# Agenda

01 DASSA Market Clearing Optimisation & Divisibility of the Bids

02 Jurisdictional Requirements

03 Quality products and Value functions

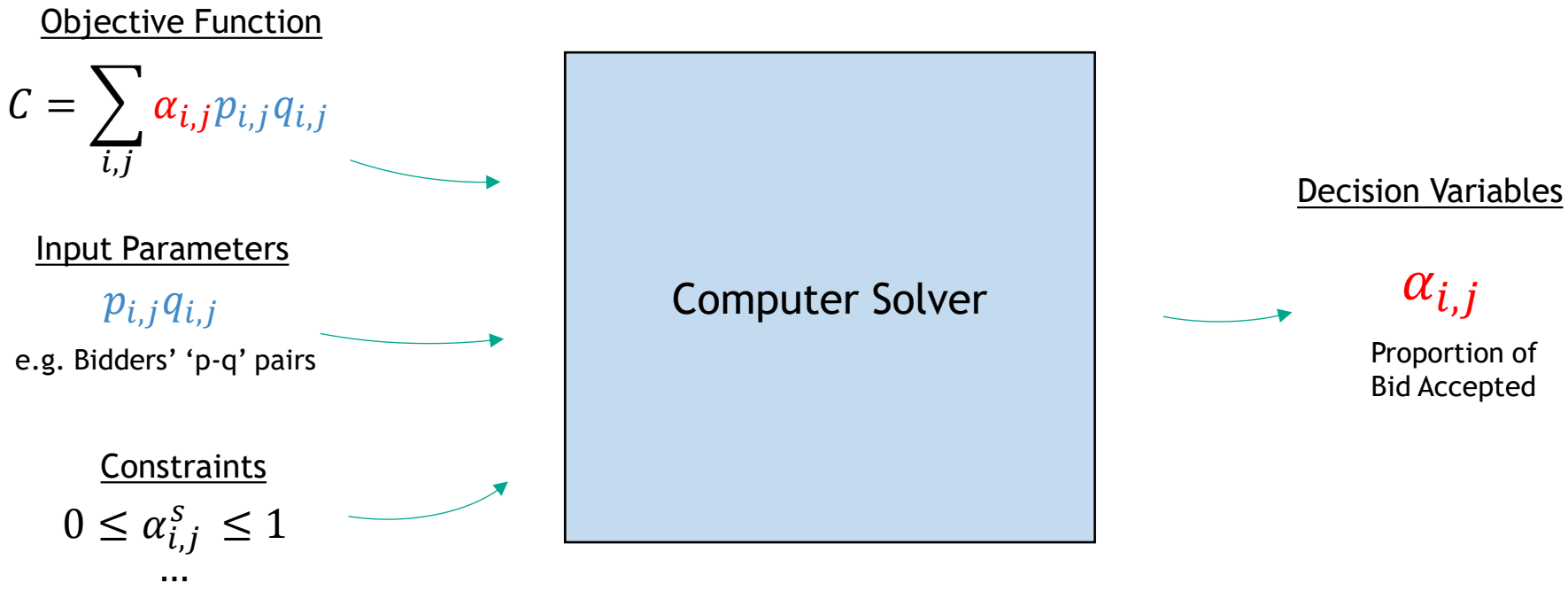
04 How does optimisation work in the presence of value functions for bundles?

05 Questions

# Section 1 - DASSA Market Clearing Optimisation & Divisibility of the Bids

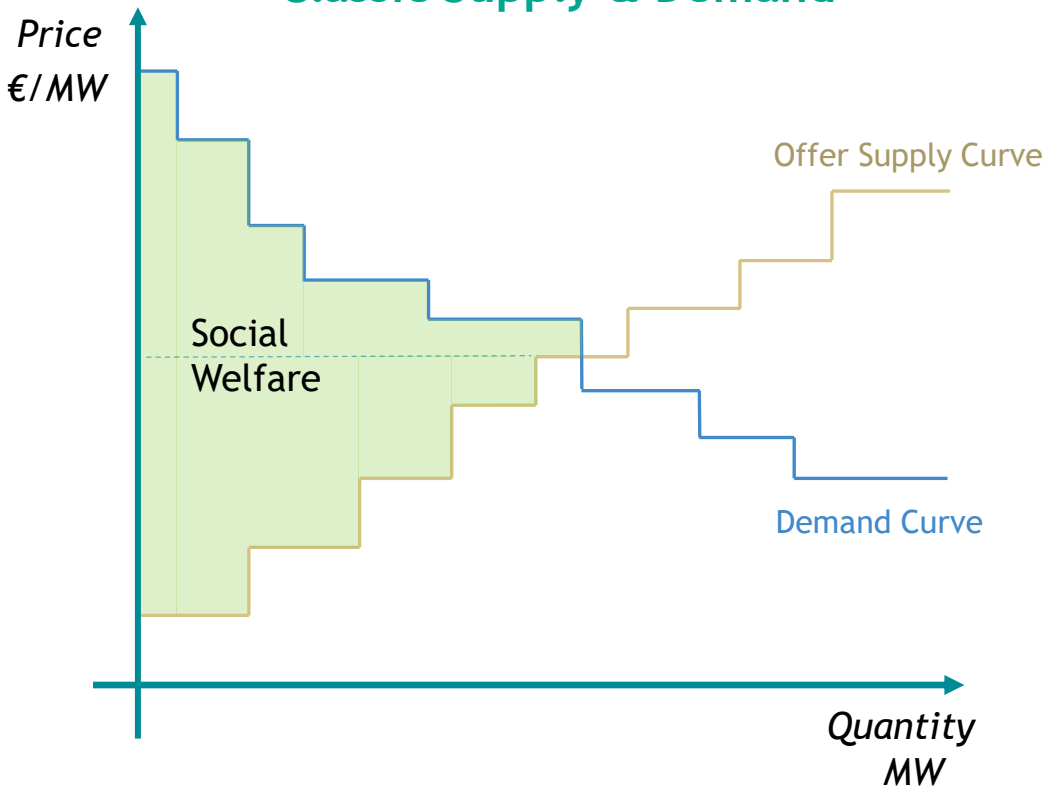
# What is an Objective Function?

- The ‘Objective Function’ is a target that we want to Maximise or Minimise
- We give this to a Computer Solver, along with our ‘Inputs’ and ‘Constraints’
- Then the Computer Solver gives us the solution for our ‘Decision Variables’ in return
- For DASSA, we will be minimising ‘Producer Costs’



# Why do we Minimise Producer Costs?

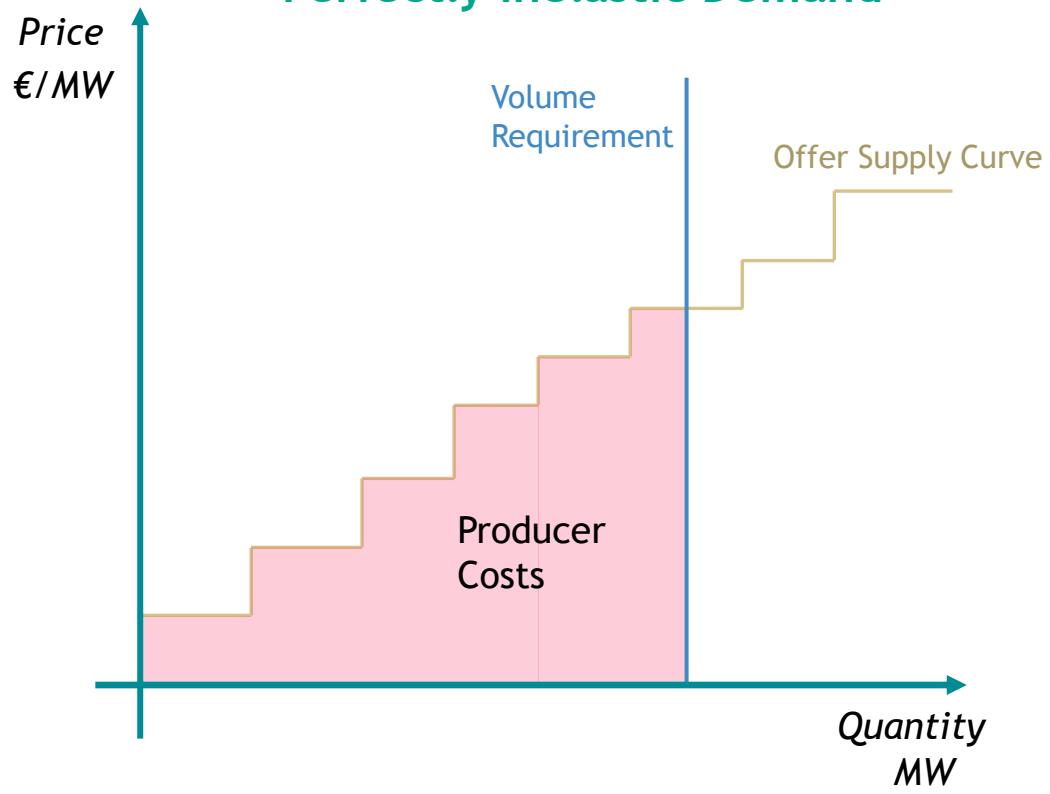
## Classic Supply & Demand




⇒ Maximise Social Welfare

For our case, we will…

## Perfectly Inelastic Demand




⇒ *Minimise* Producer Costs

# Example of a Simple Objective Function

Minimising the Objective Function (Producer Costs)

...by finding the **decision variables**...

... given the **input parameters**

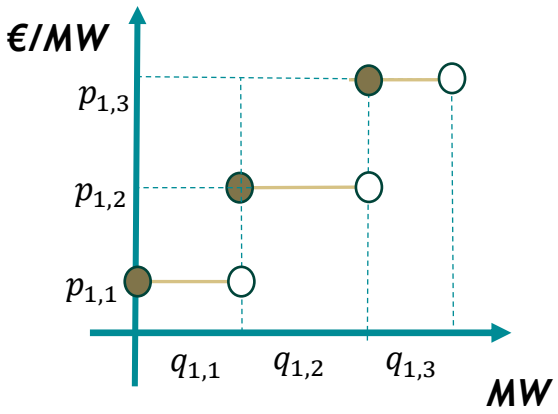
$$C = \sum_{i,j} \alpha_{i,j} p_{i,j} q_{i,j}$$

Quantity of $j^{th}$ increment of the $i^{th}$ Bidder

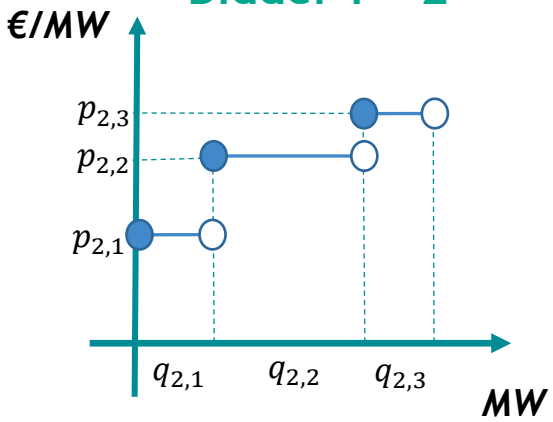
Proportion of Bid to be Accepted

Price of $j^{th}$ increment of the $i^{th}$ Bidder

## Bidder i = 1

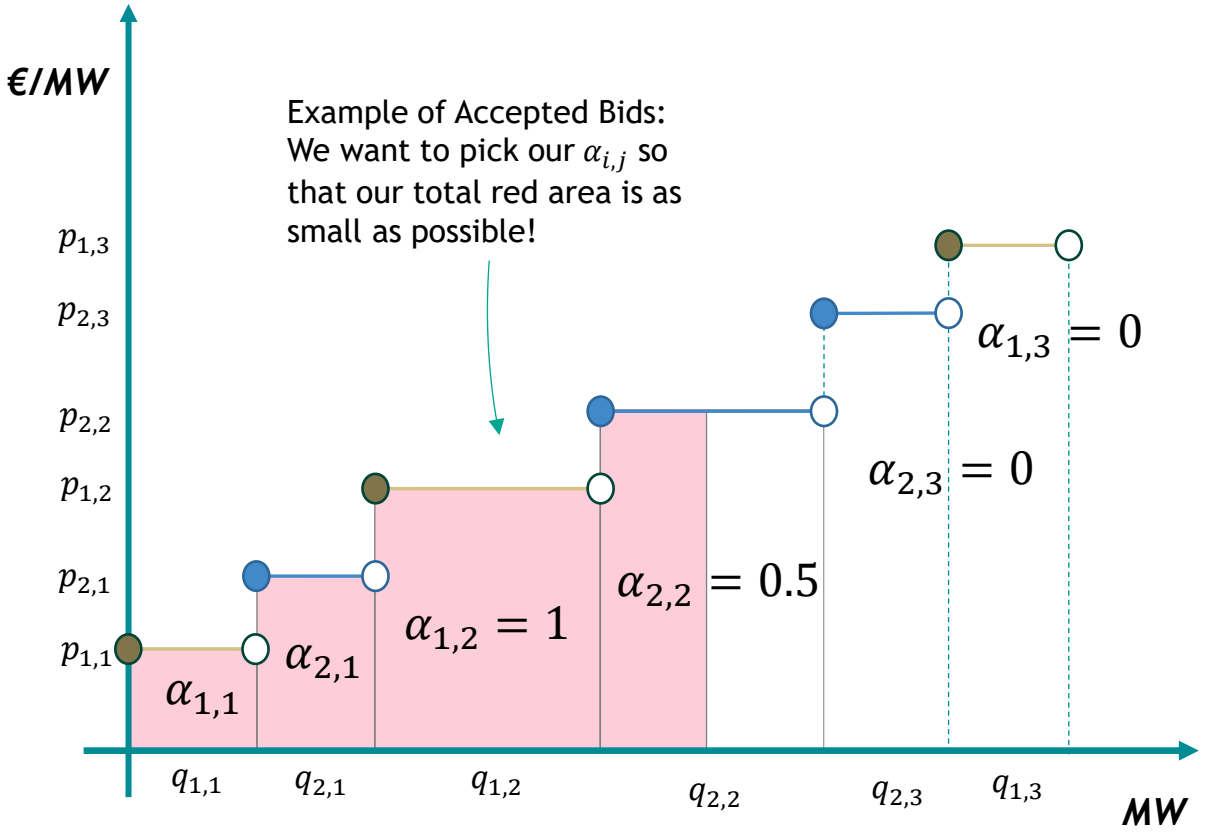



## Bidder i = 2




## Aggregate Supply Curve

Example of Accepted Bids:
We want to pick our $\alpha_{i,j}$ so that our total red area is as small as possible!



# Example of a Simple Objective Function

$$C = \sum_{i,j} \alpha_{i,j} p_{i,j} q_{i,j}$$

| 'P-Q' Pairs (Cumulative) | | | |
|---|---|---|---|
| Unit 1 | (€1,10) | (€3,30) | (€6,41) |
| Unit 2 | (€2,12) | (€4,30) | (€5,43) |

$$= \alpha_{1,1}\, p_{1,1}q_{1,1} + \alpha_{1,2}p_{1,2}q_{1,2} + \alpha_{1,3}p_{1,3}q_{1,3}$$
$$+ \alpha_{2,1}p_{2,1}q_{2,1} + \alpha_{2,2}p_{2,2}q_{2,2} + \alpha_{2,3}p_{2,3}q_{2,3}$$

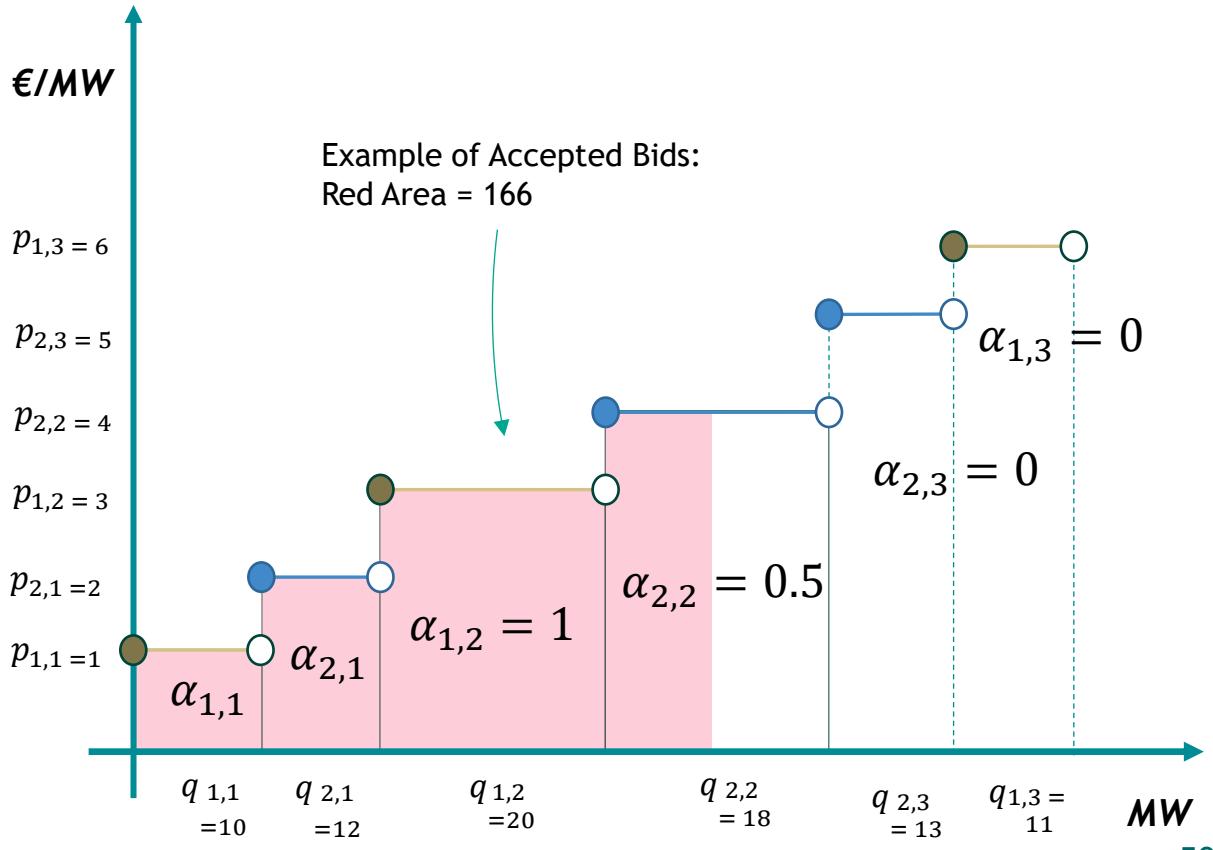
$$= (1).p_{1,1}q_{1,1} + (1).p_{1,2}q_{1,2} + (0).p_{1,3}q_{1,3}$$
$$+ (1).p_{2,1}q_{2,1} + (0.5).p_{2,2}q_{2,2} + (0).p_{2,3}q_{2,3}$$

$$= (1).(1)(10) + (1).(3)(20) + (0).(6)(11)$$
$$+ (1).(2)(12) + (0.5).(4)(18) + (0).(5)(13)$$

$$= 166$$

Total Producer Cost of Accepted Bids

## Aggregate Supply Curve



# Example of a Simple Objective Function

Minimising the Objective Function (Producer Costs)

...by finding the **decision variables**...

... given the **input parameters**

$$C = \sum_{i,j} \alpha_{i,j} p_{i,j} q_{i,j}$$

Quantity of jth increment of the ith Bidder

Proportion of Bid to be Accepted

Price of jth increment of the ith Bidder

Subject to Constraints! (e.g.)

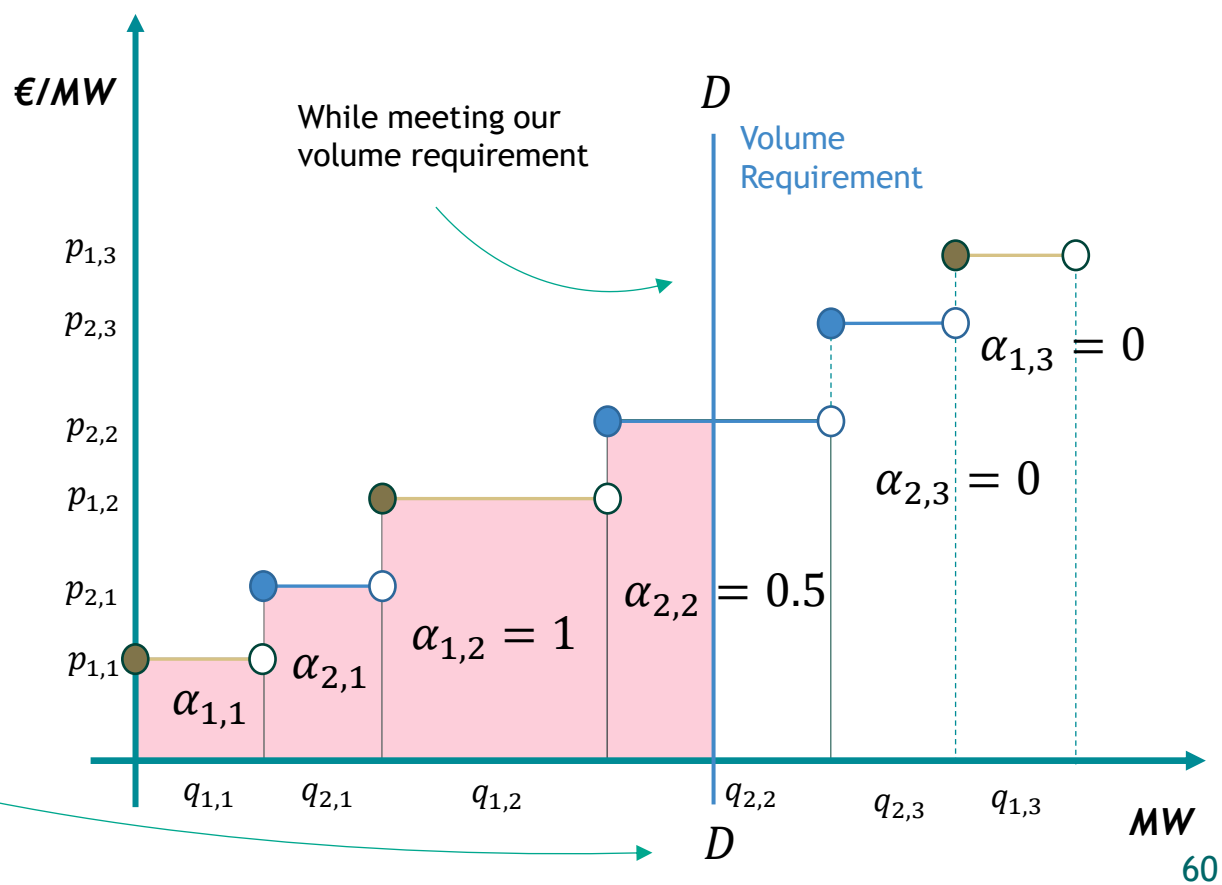
1) $0 \leq \alpha_{i,j} \leq 1$

2) $\alpha_{i,j} \in \{0,1\}$ where $i \in F_j$

3) $\alpha_{i,j} \geq \alpha_{i,j+1}$

4) $\sum_{i,j} \alpha_{i,j} q_{i,j} \geq D$

## Aggregate Supply Curve



# Section 2 – Jurisdictional Requirements

# Market Clearing optimisation problem
## objective function

→ Choosing the $\alpha_{i,j}^{s}$ such that:

$$Min\left\{\sum_{r}\left(\sum_{i\in r,j,s}\alpha_{i,j}^{s}p_{i,j}^{s}q_{i,j}^{s}\right)\right\}$$

The total cost of accepted quantities is minimised given the bid offer prices & quantities (in each region ' $r$ ')

| Parameter \index \Variable | Description |
|---|---|
| q | Bid quantity [parameter] |
| p | Bid price [parameter] |
| i | Bid identifier [index] |
| i ∈ r | Bids for Units in a defined region 'r' [index] |
| j | Bid increment [index] |
| r | Regional index (which may be region, jurisdiction or the entire system) [index] |
| F | Fill or Kill identifier for a Bid identifier [index] |
| s | the index of services [index] |
| α | Proportion (between 0 and 1) of Bid quantity accepted in the optimisation [variable] |

# Market Clearing optimisation problem
## suite of constraints

| Constraint | Description |
|---|---|
| $0 \leq \alpha^{s}_{i,j} \leq 1$ | Proportion of the offer quantity segment $q^{s}_{i,j}$ for service s that is accepted, is between 0 and 1 ($\alpha_{i,j}$) |
| $\alpha^{s}_{i,j} \in \{0,1\}$ where $i \in F_j$ | Proportion of bid $i$'s $j$th increment accepted must be 0 or 1, if non-divisibility applies |
| $\alpha^{s}_{i,j} \geq \alpha^{s}_{i,j+1}$ | Quantities $q^{s}_{i,j}$ for service *s* are accepted in increasing order (e.g. all of first quantity is utilised before accepting second quantity) – Known as Sequential filling guarantee. |
| $\sum_{i \in r,j} \alpha^{s}{}_{i,j} q^{s}{}_{i,j} \geq D^{s}_{r}$ | Hard quantity requirement for services not within a bundle or quality, for service s in region r |

# Section 3 - Quality products and Value functions

# Quality Products - Example

| Service | Auction Constraints on the Min Requirement | Auction Constraints Total Requirement |
|---|---|---|
| FFR Category 1 | Min FFR1 | Total FFR |
| FFR Category 2 | Min FFR2 | |
| FFR Category 3 | Min FFR3 | |
| POR [Static , Dynamic] | Min POR – Dynamic | Total POR |
| SOR [Static , Dynamic] | Min SOR – Dynamic | Total SOR |
| TOR1 [Static , Dynamic] | Min TOR1 – Dynamic | Total TOR1 |
| TOR2 [Static , Dynamic] | Min TOR2 – Dynamic | Total TOR2 |
| RR | NA | NA |

| POR | Min Dynamic Requirement :100 MW | Total Requirement: 300 MW |
|---|---|---|

At least 100 MW of POR-Dynamic will be procured

The remaining 200 MW can be procured from either of Dynamic or Static categories

This is where value functions are important

# Market Clearing optimisation problem

## The Objective Function

$$Min \left\{ \sum_{r} \left( \sum_{i \in r, j, s} \alpha_{i,j}^{s} p_{i,j}^{s} q_{i,j}^{s} - \left( \sum_{Q,S \in Q,h} m_h \sum_{i \in V_h^Q, i \in r, j} \alpha_{i,j}^{s} \, q_{i,j}^{s} \right) \right) \right\}$$

→ Choosing the $\alpha_{i,j}^{s}$ such that:

Minimising the total cost of accepted quantities given the bid offer prices & quantities minus the conditional sum of valuation terms related to quality requirements

| Parameter \index \Variable | Description |
|---|---|
| q | Bid quantity [parameter] |
| p | Bid price [parameter] |
| m | Valuation multiplier [parameter] |
| i | Bid identifier [index] |
| $i \in r$ | Bids for Units in a defined region 'r' [index] |
| $i \in V_h^Q$ | Bid for Unit that has quality Q for quality range h [index] |
| j | Bid increment [index] |
| r | Regional index (which may be region, jurisdiction or the entire system) [index] |
| F | Fill or Kill identifier for a Bid identifier [index] |
| s | the index of services [index] |
| α | Proportion (between 0 and 1) of Bid quantity accepted in the optimisation [variable] |

# Simple Description of Value Functions

$$Min \left\{ \sum_{r} \left( \sum_{i \in r, j, s} \alpha_{i,j}^{s} p_{i,j}^{s} q_{i,j}^{s} - \left( \sum_{Q, S \in Q, h} m_{h}^{s} \sum_{i \epsilon V_{h}^{Q}, i \in r, j} \alpha_{i,j}^{s} q_{i,j}^{s} \right) \right) \right\}$$

Valuation functions are important to implement the TSOs preference for higher quality variations

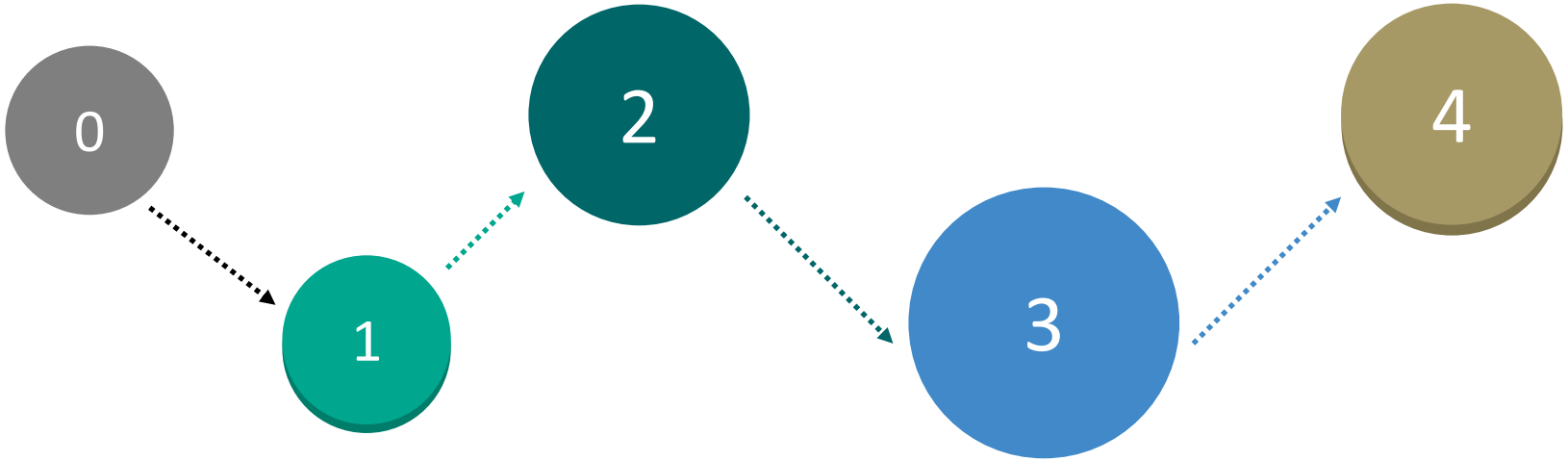
- Dynamic POR, the value function $m_h$ has been set at € 2 in the auction information pack
- This means, Q={POR}, h={Dynamic}
- Bidder 12 (a provider in ROI) has offered 10 MW at the price of € 10 with one single P-Q pair
- This means, i=12, j=1
- The effective offered price in the objective function for this bidder will be 10-2= € 8

# Market Clearing optimisation problem
## Suite of constraints

| Constraint | Description |
|---|---|
| $0 \leq \alpha^{s}_{i,j} \leq 1$ | Proportion of the offer quantity segment $q^{s}_{i,j}$ for service s that is accepted, is between 0 and 1 ($\alpha_{i,j}$) |
| $\alpha^{s}_{i,j} \in \{0,1\}$ where $i \in F_j$ | Proportion of bid i's jth increment accepted must be 0 or 1 (1 if non-divisibility applies) |
| $\alpha^{s}_{i,j} \geq \alpha^{s}_{i,j+1}$ | Quantities $q^{s}_{i,j}$ for service s are accepted in increasing order (e.g., all of first quantity is utilised before accepting second quantity) - Known as Sequential filling guarantee. |
| $\sum_{i \in r \,\&\, i \in V^{Q}_{h}, j, s \in Q,} \alpha^{s}{}_{i,j} q^{s}{}_{i,j} \geq D^{s}_{h,r}$ | Hard quantity requirement D for service s in region r for a specific quality range h, summing only bidders in that region that can provide the quality range h for service s |
| $\sum_{i \in r, j, s \notin Q} \alpha^{s}{}_{i,j} q^{s}{}_{i,j} \geq D^{s}_{r}$ | Hard quantity requirement for service s in region r |
| $\sum_{s \in Q, i \in r \,\&\, i \in V^{Q}_{h}\ \forall h \in V^{Q}_{h}} \alpha^{s}{}_{i,j} q^{s}{}_{i,j} \geq D\_T^{s}_{h,r}$ | The total requirement for services that have h different quality variation represents a hard quantity constraint across all h quality variations for that service. |

# Section 4 - How does optimisation work in the presence of value functions for bundles?

# How to follow the example




In practice, the optimisation will set the optimal value for the implicit bundle as well as individual services simultaneously but for illustrative benefits we will break this example into a series of steps

0 Input Data, Assumptions and creation of implicit bundle and individual service supply functions

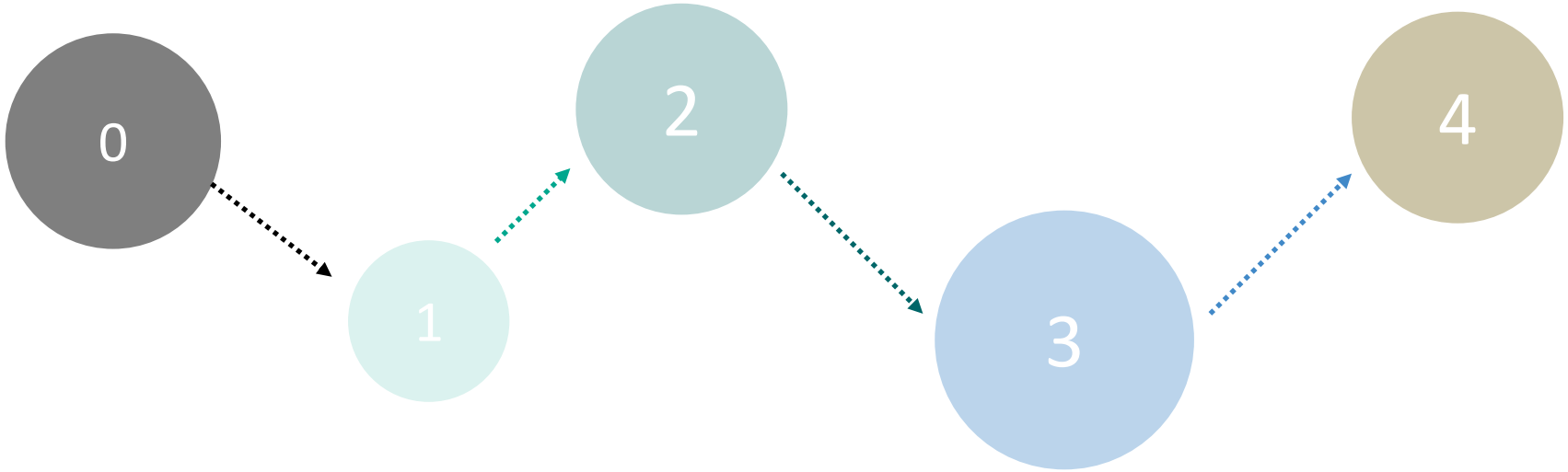
1 An optimal value for the implicit bundle of S1 and S2 is assumed and the clearing price for the implicit bundle is obtained

2 Merit order residual demand of individual services will be calculated by adjusting the individual service merit orders

3 The individual Service clearing prices are determined

4 The prices are compared by considering TSOs' willingness to pay for the bundle – the optimal value is verified.

# How to follow the example

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3 The individual Service clearing prices are determined

4 The prices are compared by considering TSOs' willingness to pay for the bundle – the optimal value is verified.

0

# Worked Example
## Assumptions & Input Data

**A**


Two Services S1 & S2 defined as a bundle
Value function for this bundle is €4
All Bids are divisible
No Locational Considerations

TSOs' willingness to pay is €4 more for the bundle of S1 and S2

**B Minimum Requirements**

| | Minimum Requirement for Individual Services [MW] |
|---|---|
| Service 1 (S1) | 200 |
| Service 2 (S2) | 150 |
| Bundle of S1 & S2 | 50 |

**C Service Providers Submit P-Q Pairs for S1 and S2**

| | |
|---|---|
| Unit 1 for S1 | {(5,50), (7,100) , (10,120), (11,150)} |
| Unit 1 for S2 | {(4,30), (5,60), (9,90)} |
| Unit 2 for S1 | {(7,30), (9,120), (10,200)} |
| Unit 2 for S2 | {(5,80), (7,120) , (9,200)} |
| Unit 3 for S1 | {(4,50), (5,120)} |
| Unit 4 for S2 | {(4,30), (5,60) } |

**D DASSA Optimisation for System Service Requirements and associated clearing prices**

Optimisation

- Procured Volumes
1) S1
2) S2
3) Bundle of S1 & S2
- Clearing prices for S1, S2 and Bundle

0

# DASSA Worked Example

## Implicit Bundle Supply Functions for Unit 1 and Unit 2

Implicit Bundle supply functions are created for both Unit 1 And Unit 2, for both Service 1 and Service 2 based on the submitted PQ pairs

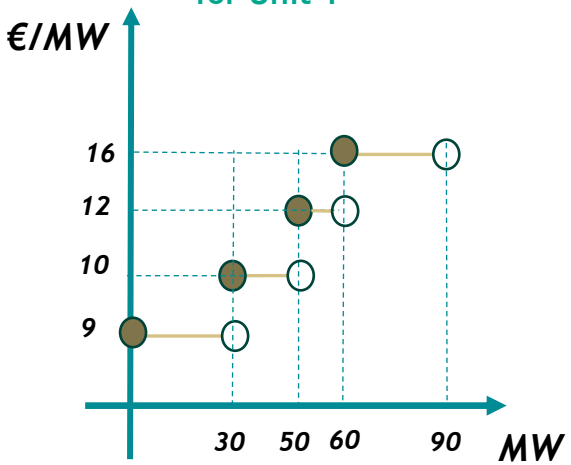
### P-Q Pairs

| | |
|---|---|
| Unit 1 for S1 | {(5,50), (7,100) , (10,120), (11,150)} |
| Unit 1 for S2 | {(4,30), (5,60), (9,90)} |

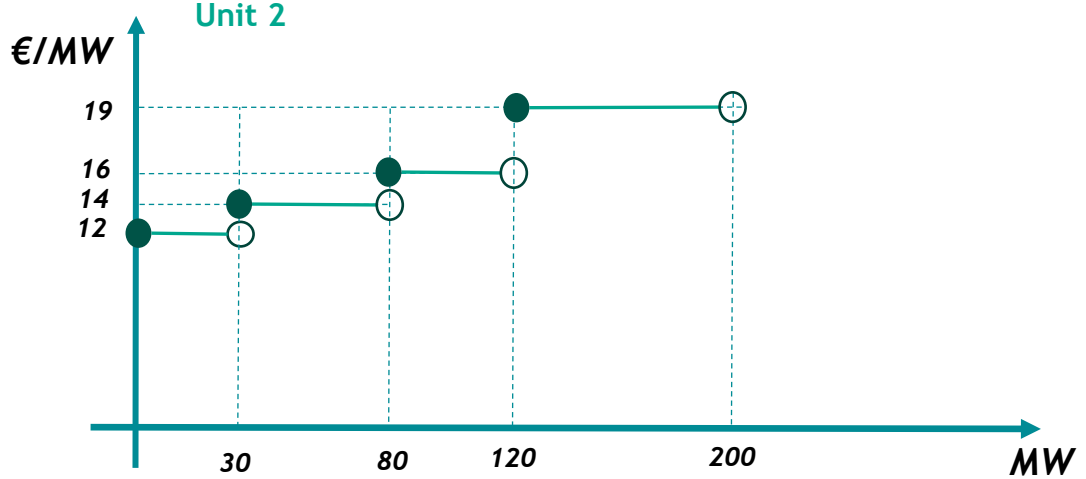
### P-Q Pairs

| | |
|---|---|
| Unit 2 for S1 | {(7,30), (9,120), (10,200)} |
| Unit 2 for S2 | {(5,80), (7,120) , (9,200)} |

Implicit Bundle Supply Function for Unit 1




Implicit Bundle Supply Function for Unit 2



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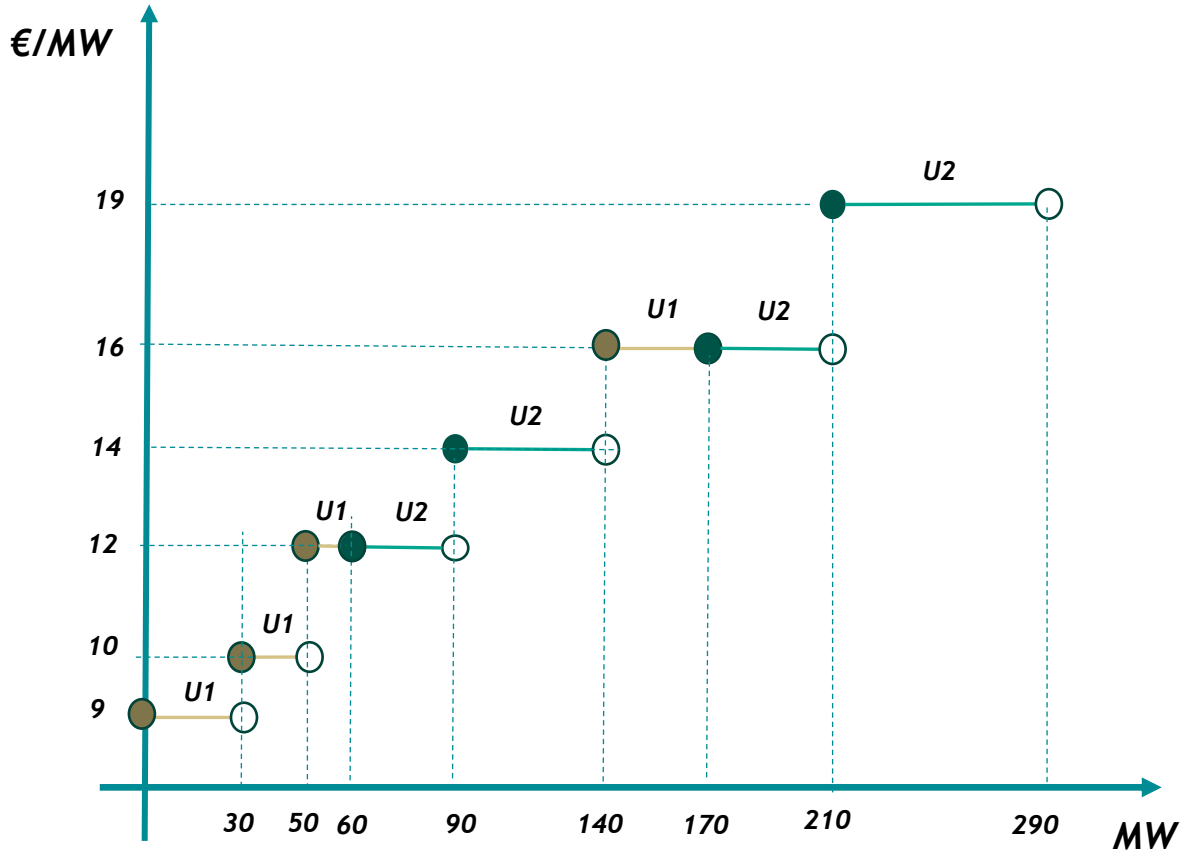
# DASSA Worked Example

## Aggregated Supply function for both units and Services for the Implicit Bundle

Aggregated Implicit Bundle supply functions are created for both Unit 1 (U1) And Unit 2 (U2) for each Service (S1 & S2)



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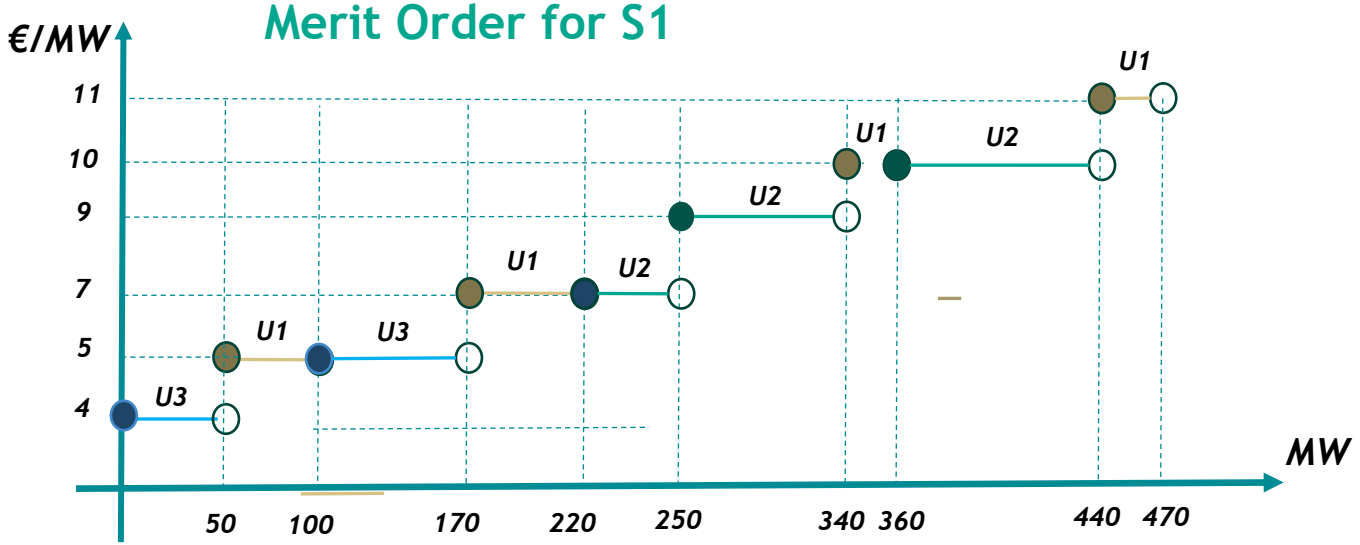
# Worked Example

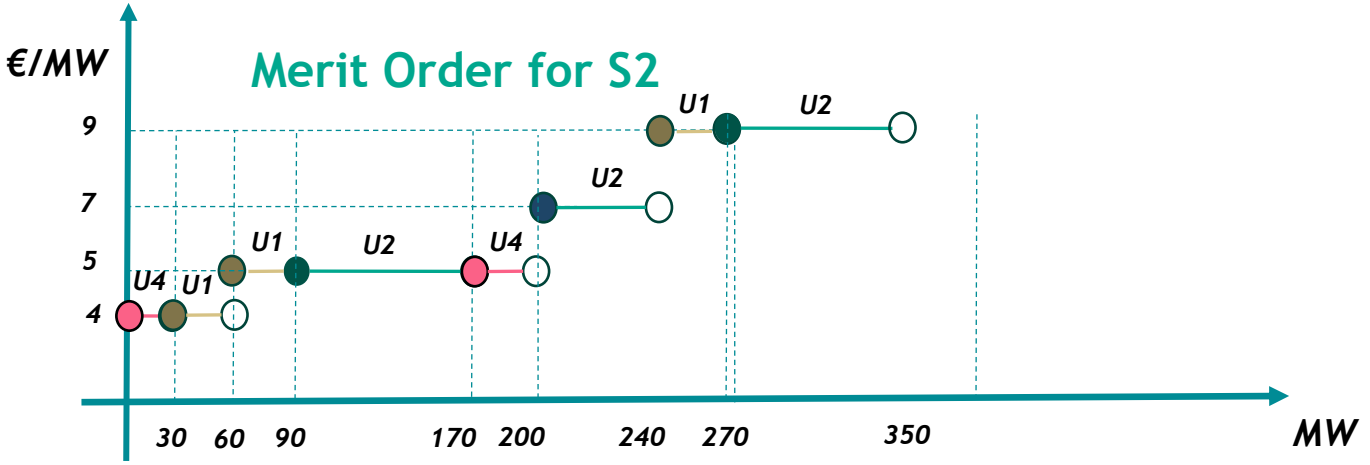
## Creation of Supply functions for individual Services

Supply functions are created for both Unit 1 (U1) And Unit 2 (U2) for each individual Service type (S1 & S2) based on the submitted PQ pairs

### Merit Order for S1



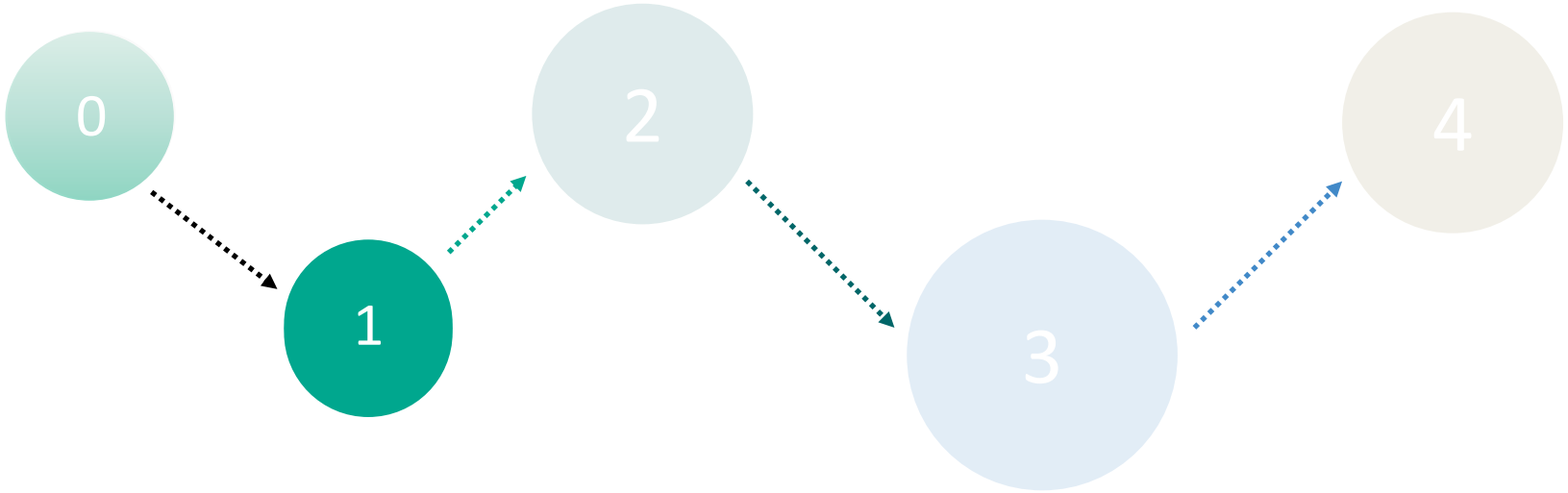

### Merit Order for S2




### P-Q Pairs

| | |
|---|---|
| Unit 1 for S1 | {(5,50), (7,100) , (10,120), (11,150)} |
| Unit 1 for S2 | {(4,30), (5,60), (9,90)} |
| Unit 2 for S1 | {(7,30), (9,120), (10,200)} |
| Unit 2 for S2 | {(5,80), (7,120) , (9,200)} |
| Unit 3 for S1 | {(4,50), (5,120)} |
| Unit 4 for S2 | {(4,30), (5,60)} |

# How to follow the example

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2 Merit order residual demand of individual services will be calculated by adjusting the individual service merit orders

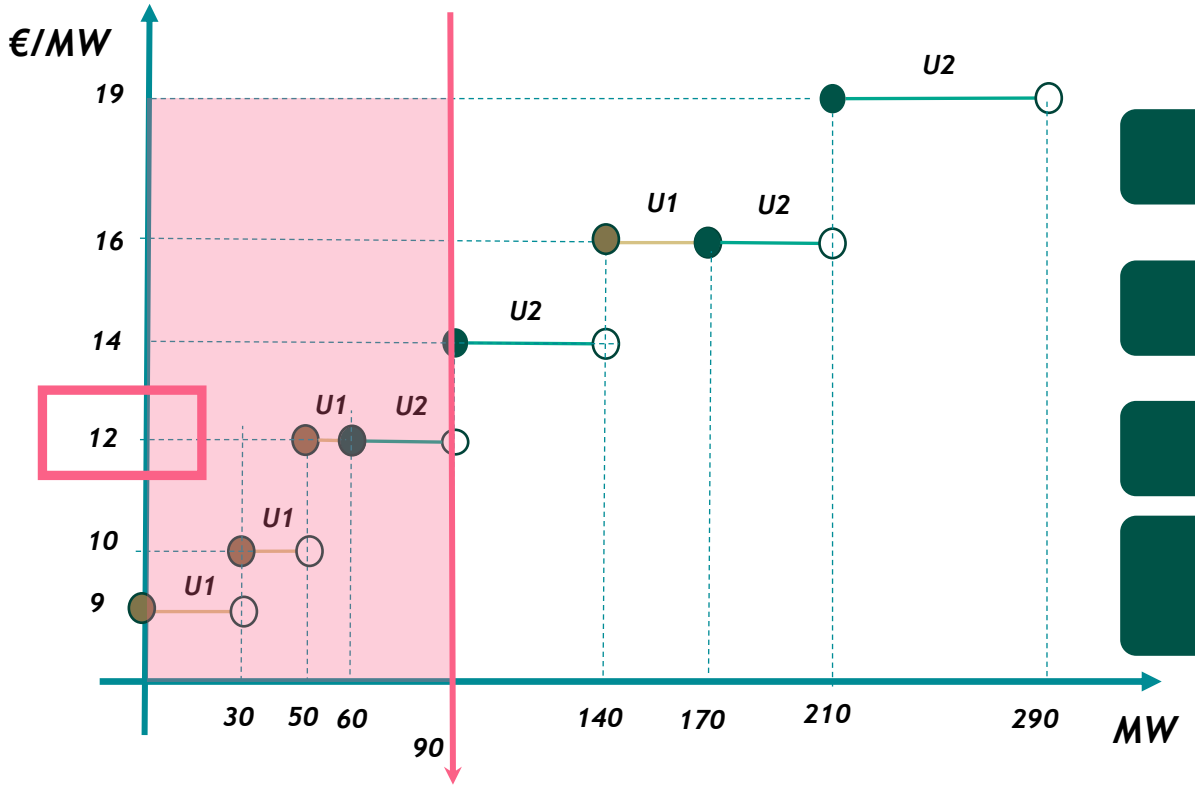
3 The individual Service clearing prices are determined

4 The prices are compared by considering TSOs' willingness to pay for the bundle – the optimal value is verified.

# 1 DASSA Worked Example: Step 1

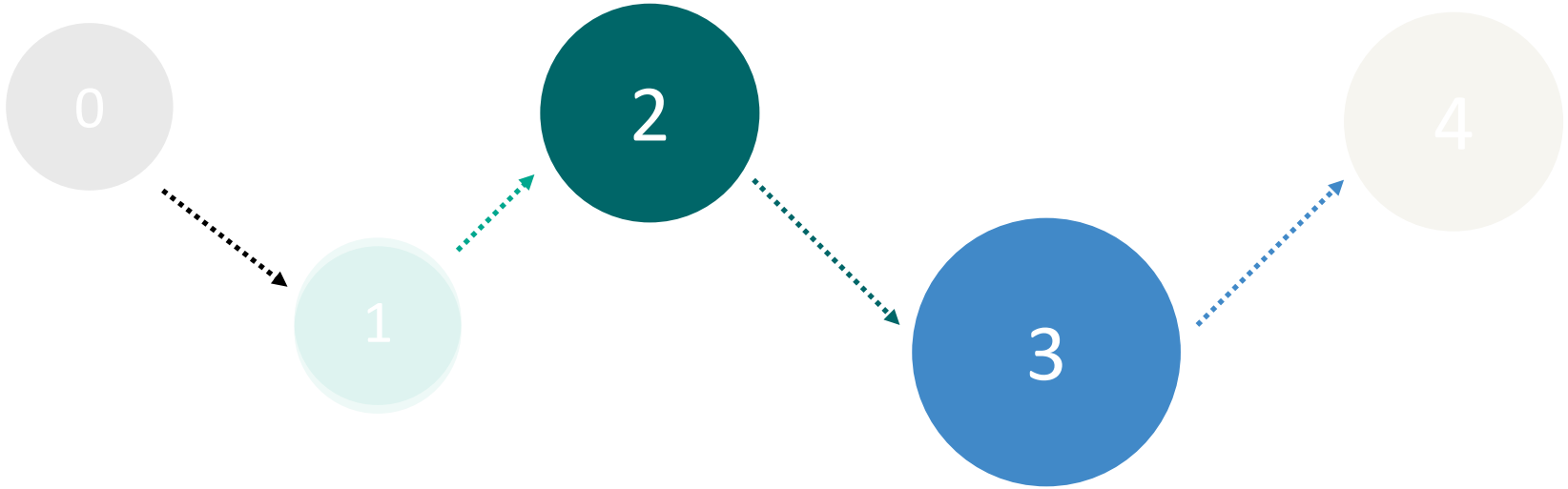
Assumption: 90 MW is the optimal value for the implicit bundle of Service 1 and Service 2 i.e. the objective function would clear 90MW in Bundle based on the valuation function of €4.00 for a bundle.

In the constructed Supply function below Unit 1 would clear 60MW across S1 and S2 and Unit 2 would clear 30MW across Unit 1 and Unit 2 at a bundle clearing price of €12.00.
To clear an additional bundle MW, would result in a bundle clearing price of €14.00.




| | |
|---|---|
| Unit 1 | 60 MW |
| Unit 2 | 30 MW |
| Clearing Price | € 12 per MW |
| Next MW of Bundle | € 14 per MW |

# How to follow the example

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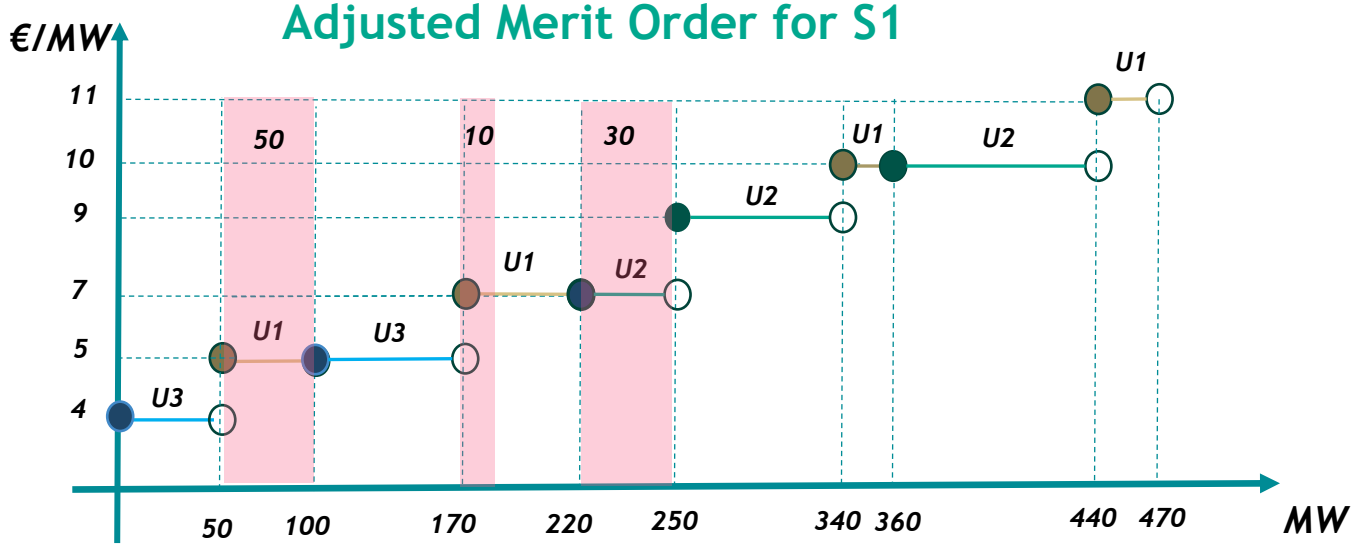
2 Merit order residual demand of individual services will be calculated by adjusting the individual service merit orders

3 The individual Service clearing prices are determined

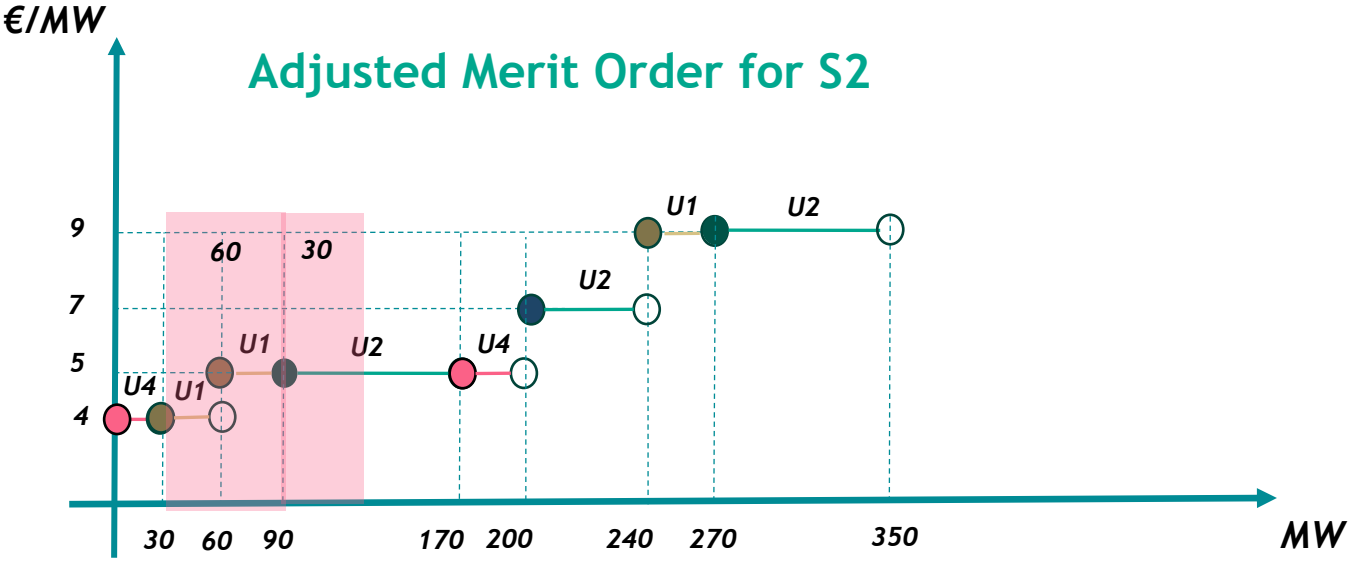
4 The prices are compared by considering TSOs' willingness to pay for the bundle – the optimal value is verified.

# 2 3 DASSA Residual Volume of Individual Services

## Adjusted Merit Order for S1




## Adjusted Merit Order for S2




## DASSA remaining Individual Service Volume Requirement

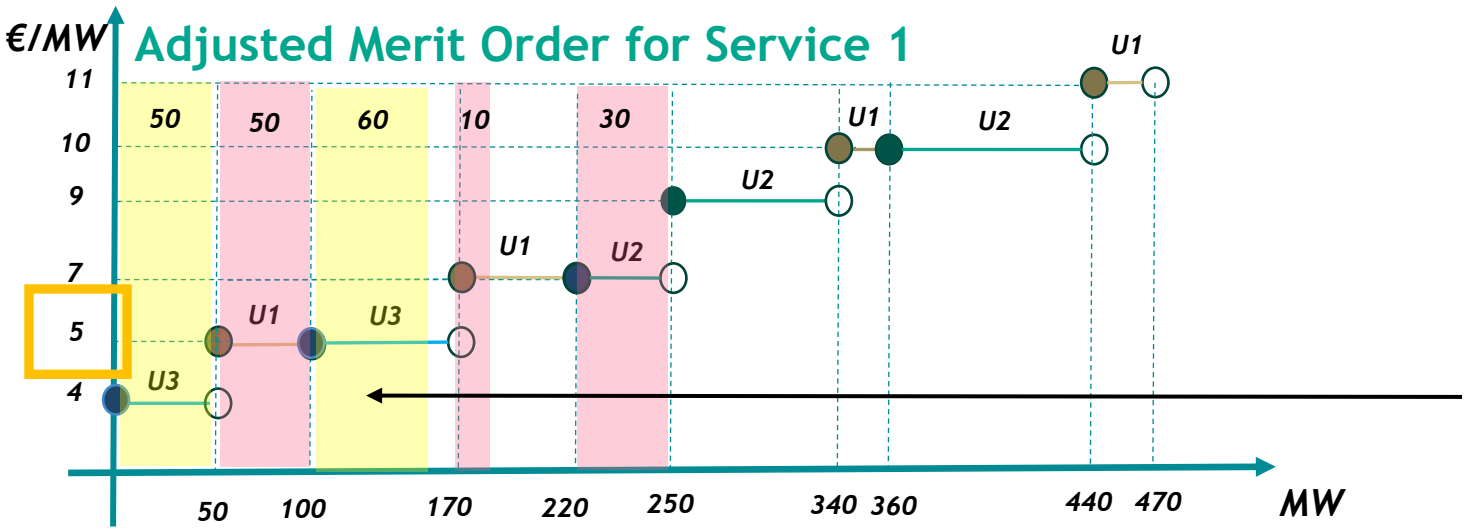
With the assumption that 90MW clears as a bundle of S1 and S2, the DASSA residual volume is calculated by subtracting 90MW from the Individual Service Requirement (as the bundled service will also partially satisfy the individual product volume requirement)

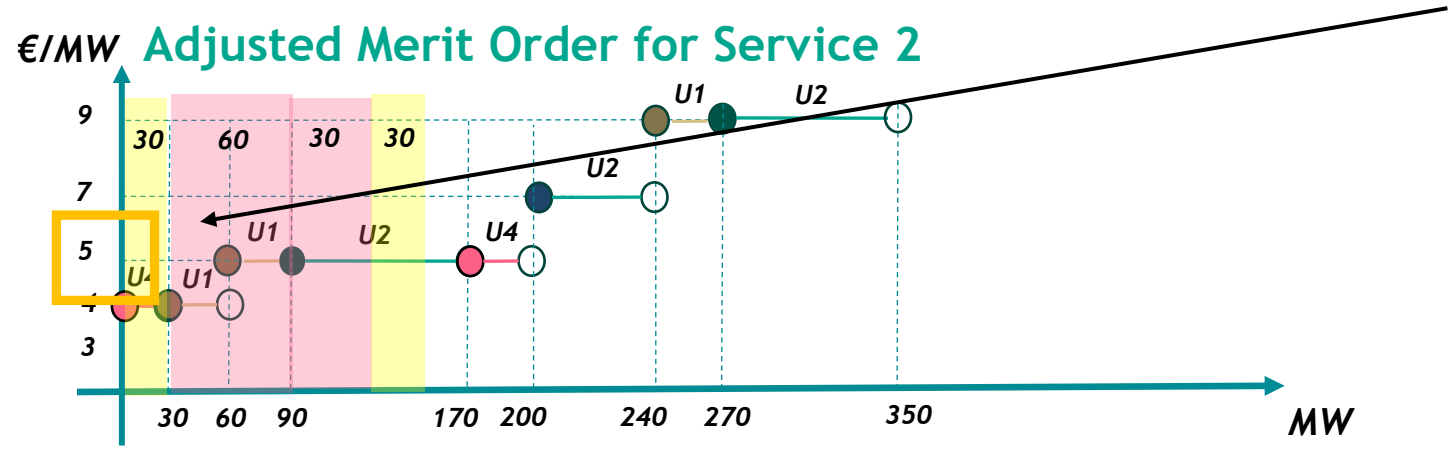
This results in a remaining individual Service requirement of:

- 110 MW for Service 1
- 60 MW for Service 2

| | Minimum Requirement for Individual Service | DASSA adjusted Volume Requirement for individual services |
|---|---|---|
| S1 | 200 MW | 110 MW |
| S2 | 150 MW | 60 MW |
| Bundle of S1 & S2 | 50 MW | NA |

# 2 3 DASSA Residual Volume of Individual Services

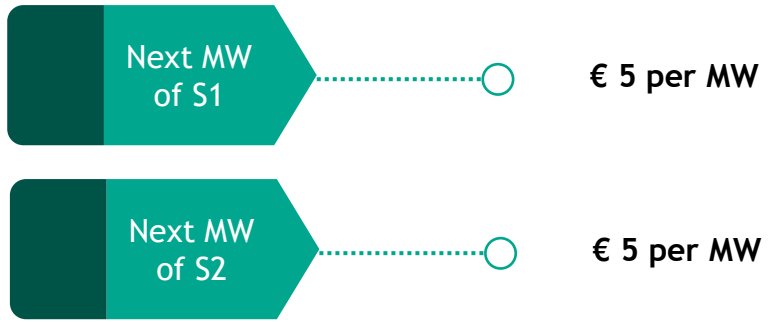


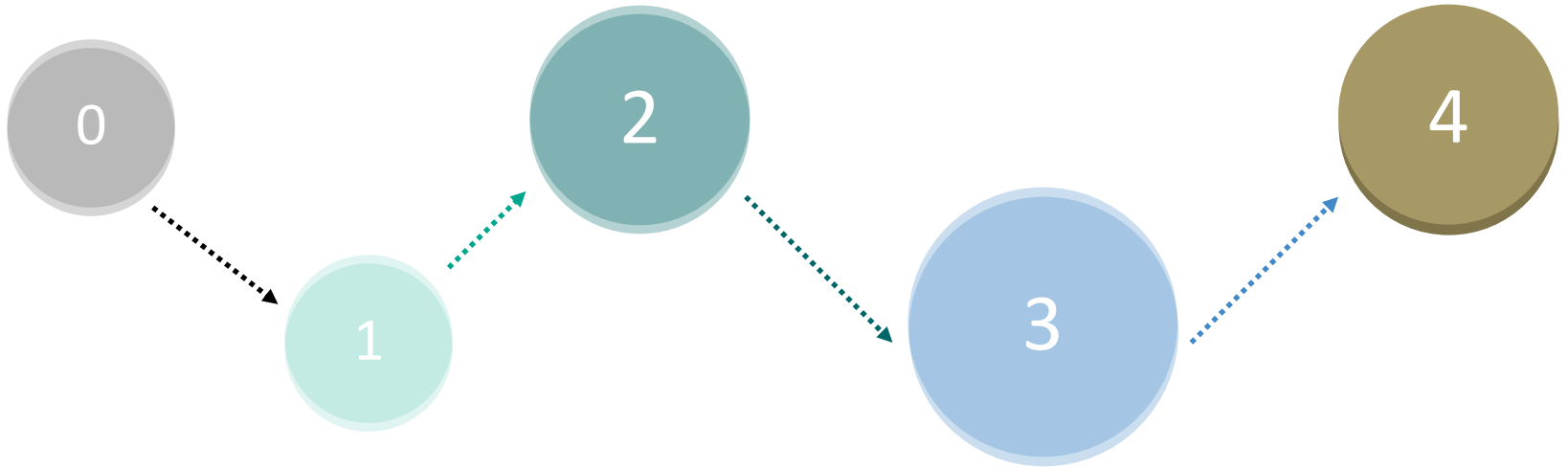

| | Minimum Requirement for Individual Service | DASSA adjusted Volume Requirement for individual services |
|---|---|---|
| S1 | 200 MW | 110 MW |
| S2 | 150 MW | 60 MW |
| Bundle of S1 & S2 | 50 MW | NA |

Adjusted Merit orders are constructed to determine additional PQ pairs that did not clear in the bundle optimisation ( yellow cells).

To procure an additional MW of either S1 or S2 will cost €5.00 per MW ( see orange box)



# How to follow the example




0 Input Data, Assumptions and creation of bundle and individual service supply functions

1 An optimal value for the implicit bundle of S1 and S2 is assumed and the clearing price for the implicit bundle is obtained

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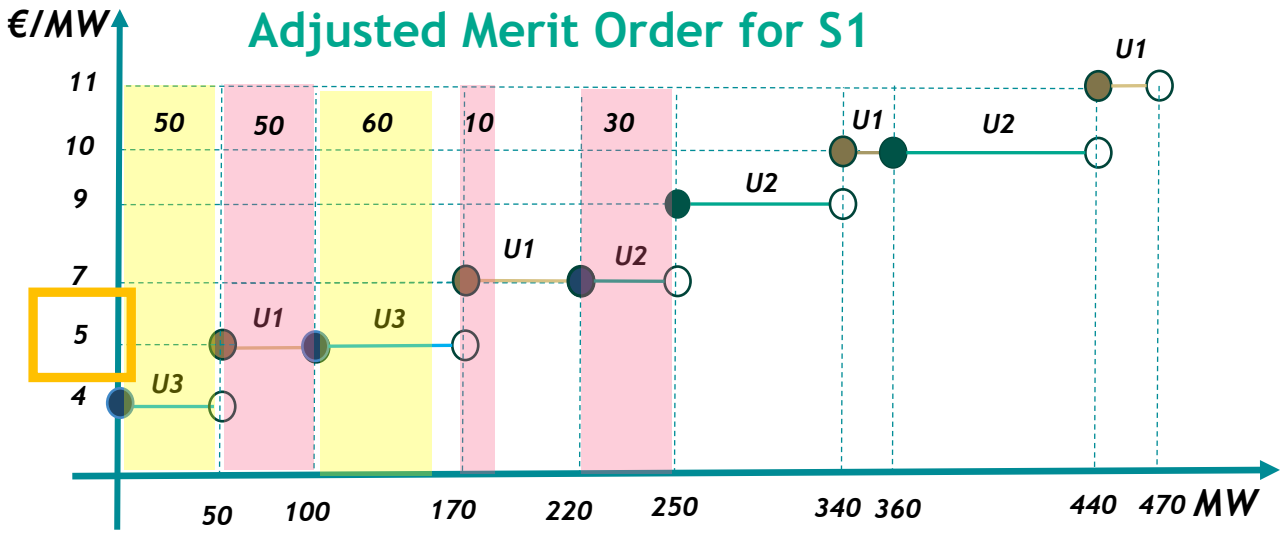
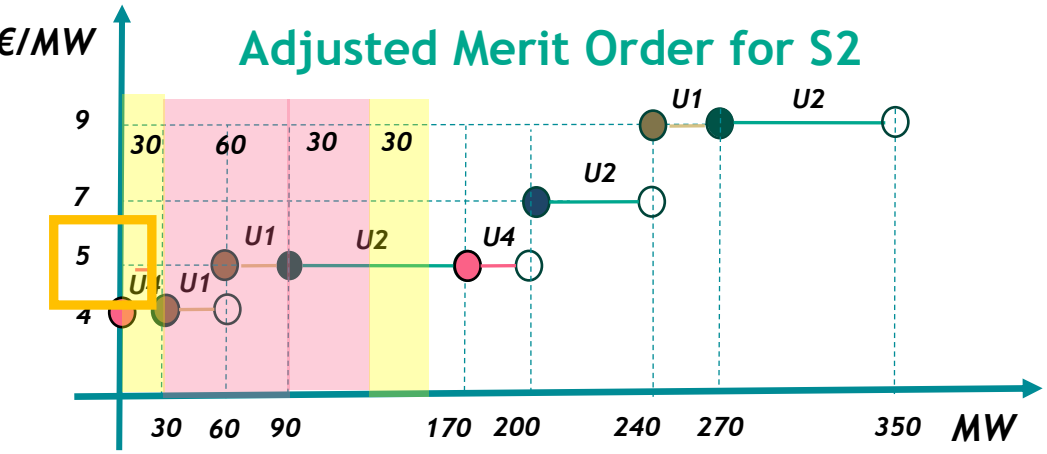
# 4 Verifying the assumption




| | Minimum Requirement for Individual Service | DASSA adjusted Volume Requirement for individual services |
|---|---|---|
| S1 | 200 MW | 110 MW |
| S2 | 150 MW | 60 MW |
| Bundle of S1 & S2 | 50 MW | NA |

Next MW of S1 — € 5 per MW

Next MW of S2 — € 5 per MW

Cost of additional MW for each Individual Service — € 5+5=10 per MW

Cost of Additional MW of bundle — € 14 per MW

The difference equals to the TSOs' willingness to pay for the bundle — € 4 = € 4

Verifies that the price to purchase an additional MW of a bundle is €4.00 more than the price to purchase an additional MW of those services individually

# Summary

- Optimisation overview
- Fundamental terms of the objective function
- Jurisdictional requirements
- Suite of constraints
- Structure of the value functions & the associated constraints
- Example of clearing the DASSA in the presence of an implicit bundle requirement

Questions?

21 January 2025

# FASS: DASSA Top-Up Mechanism

## Briefing on Joint Options Assessment between RAs and TSOs

## Introduction of proposed DASSA Top-Up Mechanism: Procurement of Residual Availability

# Introduction

## TSOs' DASSA Design Recommendation (July 2024):

- **Daily Day-Ahead System Services Auction (DASSA), initially for reserve services.**
- **Secondary trading of DASSA Orders up to gate closure.**
- **Commitment obligations and real-time incentives regime.**
- **Ex-post top-up Final Assignment Mechanism (FAM).**

## SEMC Decision (September 2024):

- **Most of the TSOs' recommendations were approved.**
- **Notable exception was the FAM:**
  - FAM reduces incentive to participate in the DASSA and secondary trading – reducing liquidity in these markets.
  - Bids (submitted in DASSA day-ahead) cannot be updated closer to real-time.
  - Secondary trading mitigates the need for a top-up mechanism.
- **Decision acknowledged TSOs' concerns:**
  - RAs happy to work with the TSOs to develop any alternative approaches to incentivising real-time availability above DASSA procured volumes.

# Introduction cont.

## DASSA Top-Up Workstream

- **TSOs have been consistent that a DASSA top-up mechanism is necessary.**
- **Two 'work packages' were agreed with the RAs with the following scope:**
  - Work Package #1: Identify if TSO system security needs will be met by a design without a top-up mechanism.
  - Work Package #2: Perform an Options Assessment (jointly between TSOs and RAs) to determine a preferred option for a top-up mechanism.
- **Joint Options Assessment (WP#2) was initiated in September 2024 and concluded in December 2024.**

## Outcome of the Joint Options Assessment Process (WP#2)

- **Procurement of Residual Availability:**
  - Ex-ante bids, separate from the DASSA.
  - Ex-post clearing based on the real-time system needs.
  - Payments made to service providers in merit.
- **Proposal for Consultation:**
  - Industry consultation to commence in coming weeks – we welcome your feedback!
  - TSOs' recommendations paper.
  - SEMC decision.

# Joint Options Assessment Overview

- **Activities associated with Joint Options Assessment:**

| | | |
|---|---|---|
| 1. | Confirm criteria for options assessment | Joint |
| 2. | Capture options | Joint |
| 3. | Assess options | Joint |
| 4. | Confirm preferred option | Joint |
| 5. | Publish consultation paper | TSOs |
| 6. | Consolidate consultation responses | TSOs |
| 7. | Submit recommendations paper to SEMC | TSOs |
| 8. | SEMC decision | RAs |

- **Workshops took place from 7 October 2024 to 2 December 2024.**
- **Outcome of Joint Options Assessment was presented at the SSFA Project Panel meeting on 16 December 2024.**

Given the limited time available to complete the assessment, options were only considered if accompanied by the following:

- Description of the features of the option.
- Benefits of the option.
- Challenges associated with the option.
- Day-in-the-life view and detailed E2E worked example (how the option will work in practice).
- Compliance view.

# Options Assessment Criteria & Weightings

- The following assessment criteria were agreed during Workshop 1 with appropriate weighting for each criterium based on their importance. These criteria were used to score the options determined in Workshop 2.

| Criteria | Score Range | Weighting |
|---|---|---|
| **Consumers** | 1 = Inefficient economic outcomes and/or not aligned across markets<br>5 = Delivers full efficiency and alignment across markets | 22.5 |
| **System Need** | 1 = No contribution towards system security<br>5 = Fully aligned with support to system security | 22.5 |
| **Compliance** | 1 = No level of compliance<br>5 = Fully compliant | 15 |
| **Deliverability** | 0 = Complex / high risk to deliver to timelines and not adaptable<br>5 = Simple, easy to deliver per timelines and highly adaptable | 15 |
| **Enable the Energy Transition** | 1 = No enablement of energy transition<br>5 = Full enablement of energy transition | 15 |
| **Investors** | 1 = Complex to understand, unclear investment clarity, not transparent<br>5 = Simple to understand, clear investment information and transparent | 10 |

# Options for Assessment

- The following options were considered by the TSO and RAs as part of the Joint Options Assessment.

| Option | Title | Description |
|---|---|---|
| 1 | **Procure only in the DASSA.** | ➢ DASSA is the only procurement mechanism for the TSOs.<br>➢ No over-procurement nor other mechanism to procure additional volume.<br>➢ DASSA is the only means of payment for service providers. |
| 2 | **Enhance the Grid Code.** | ➢ DASSA is the only procurement mechanism for the TSOs.<br>➢ Grid Code to be enhanced such that service providers would be required to declare their true availability and be available to the TSOs to meet any additional real-time system service requirement.<br>➢ No over-procurement nor other mechanism to procure additional volume.<br>➢ Service providers are not remunerated for providing any volume above any awarded DASSA volume. |
| 3 | **Over-procure in the DASSA.** | ➢ DASSA is the only procurement mechanism for the TSOs.<br>➢ TSOs significantly over-procure in the DASSA so that sufficient additional volumes would be available to ensure real-time system needs would be met. |

# Options for Assessment cont.

- The following options were agreed by the TSO and RAs to be considered as part of the Joint Options Assessment.

| Option | Title | Description |
|---|---|---|
| 4 | **Procure baseload services via an LPF auction, with commitment obligation.** | ➢ TSOs procure a baseload volume of system services on a monthly, quarterly or bi-annual basis through a Layered Procurement Framework (LPF) auction ahead of the DASSA, with a commitment obligation to be available for any awarded volume.<br>➢ DASSA remains the primary procurement mechanism in terms of service volume.<br>➢ LPF procured volumes are aimed at meeting additional real-time system requirements. |
| 4ii | **Procure additional services via an LPF auction, with no commitment obligation.** | ➢ TSOs procure additional system service volumes on a monthly, quarterly or bi-annual basis (through an LPF auction) ahead of the DASSA, with no commitment obligation to be available for any awarded volume.<br>➢ Contracted LPF service providers are required to make technically available any residual volumes net of other markets in real-time.<br>➢ Contracted service providers receive a payment irrespective of eventual availability.<br>➢ DASSA remains the primary procurement mechanism in terms of service volume. |

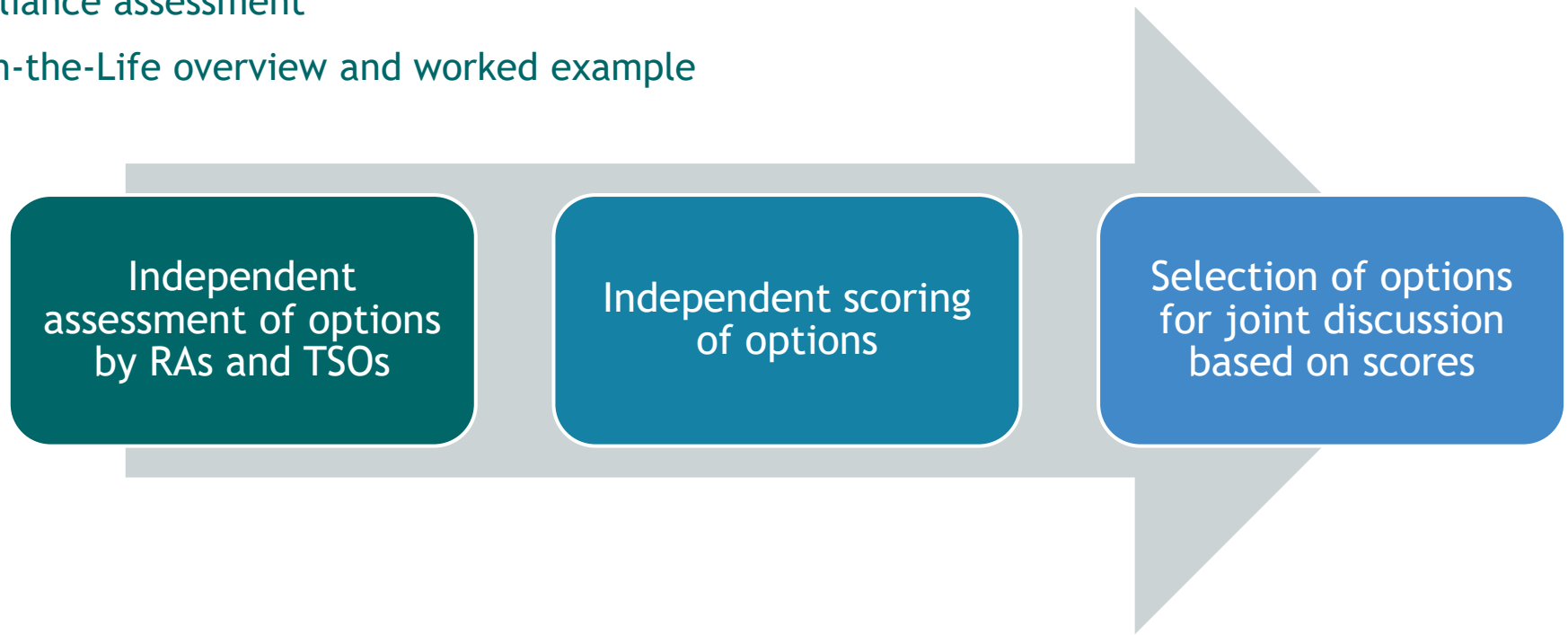
# Options for Assessment cont.

- The following options were agreed by the TSO and RAs to be considered as part of the Joint Options Assessment.

| Option | Title | Description |
|---|---|---|
| 5 | **Procure baseload services via LPF contracts < 6 months, with commitment obligation.** | ➢ As per Option 4, except TSOs procure a baseload volume of system services on a fixed contract basis ahead of the DASSA, with a commitment obligation to be available for any awarded volume.<br>➢ Contracts are for less than 6 months in duration. |
| 6 | **Procure baseload services via LPF contracts > 13 months, with commitment obligation.** | ➢ As per Option 4, except TSOs procure a baseload volume of system services on a fixed contract basis ahead of the DASSA, with a commitment obligation to be available for any awarded volume.<br>➢ Contracts are for greater than 13 months in duration. |
| 7 | **Reconcile system needs ex-post.** | ➢ TSOs perform an analysis of real-time system needs ex-post to identify any additional volumes that needed to be procured.<br>➢ Service providers are paid if in merit (based on price submission) in addition to any DASSA Order payment.<br>➢ DASSA remains the primary procurement mechanism in terms of service volume. |
| 8 | **Amend Balancing Market rules.** | ➢ Amend BM such that simple offers rather than complex offers are used.<br>➢ Service providers are remunerated on a pay-as-clear basis in the BM.<br>➢ DASSA remains the primary procurement mechanism. |

# Assessment & Scoring of Options

- **To ensure that the options were sufficiently described to ensure consistent assessment, each considered all the following:**
  - Key benefits
  - Key challenges
  - Compliance assessment
  - Day-in-the-Life overview and worked example




- **A summary of the benefits and challenges will be contained in the consultation paper.**

# Development of Preferred Option

## Joint Options Assessment then focussed on the benefits and challenges of:

- **Procuring a volume of system services in advance with no commitment obligation (Option 4ii).**
- **Reconciling the real-time needs of the system ex-post (Option 7).**

| Option 4ii |
| --- |
| • Mitigates system needs via payments for technical availability. |
| • Enables all technologies to participate. |
| • Service providers can participate in other markets. |
| • May disincentivise participation in DASSA. |
| • Not deliverable by FASS Go-Live. |

| Option 7 |
| --- |
| • Procurement of actual real-time volume requirement only. |
| • Enables all technologies to participate. |
| • Mechanism already within FASS IT solution requirements. |
| • May disincentivise participation in DASSA. |
| • Non-compliance with SEMC decision. |

## Outcome: Extension of Option 4ii

- **Procure residual availability ex-ante.**
- **Clear ex-post based on real-time system needs.**

# Proposal for Residual Availability Procurement


## Overview

- Additional auction of Residual Availability, on top of the DASSA.
- System services to be procured as per the DASSA - upward and downward reserve.
- No change to Registration and Qualification.
- Ex-ante bids for an Auction Timeframe that aligns with the DASSA (23:00 D-1 to 23:00 D).
- Ex-post evaluation of real-time system needs and outcomes of DASSA procurement.
- Ex-post execution of the auction to procure any additional real time volume requirement.
- Service providers awarded based on merit and availability.
- Settlement of Residual Availability in addition to the DASSA.

# Proposal cont.


## Ex-ante design

- **Bids may be submitted by service providers no later than day ahead of the target Auction Timeframe.**
- **Bids are submitted up a gate closure which is before execution of the DASSA for the same Auction Timeframe.**
- **Bids may be updated up to gate closure; after gate closure rebids / updating of bids will not be permitted:**
  - Rationale: market power concerns of service providers having asymmetric knowledge following outcome of the DASSA and the Long-Term Schedule (LTS); this proposal is consistent with the SEMC decision on the DASSA bidding process.
- **Bidding process and format is largely similar to the DASSA.**

# Proposal cont.


## Ex-post design

- **TSOs determine any additional volume requirements, above that procured in the DASSA, ex-post:**
  - Determine real-time system requirements.
  - Identify any lapsed DASSA Orders.
  - Perform real-time availability checks on Confirmed DASSA Order holders.
- **TSOs execute the ex-post auction if any additional volume is required.**
- **TSOs utilise a supply curve derived from a merit order of submitted bids and service providers' availability.**
- **The auction applies those constraints that have been defined for the DASSA.**
- **The auction also accounts for the ability of service providers to physically deliver a service i.e. taking account of local network issues.**

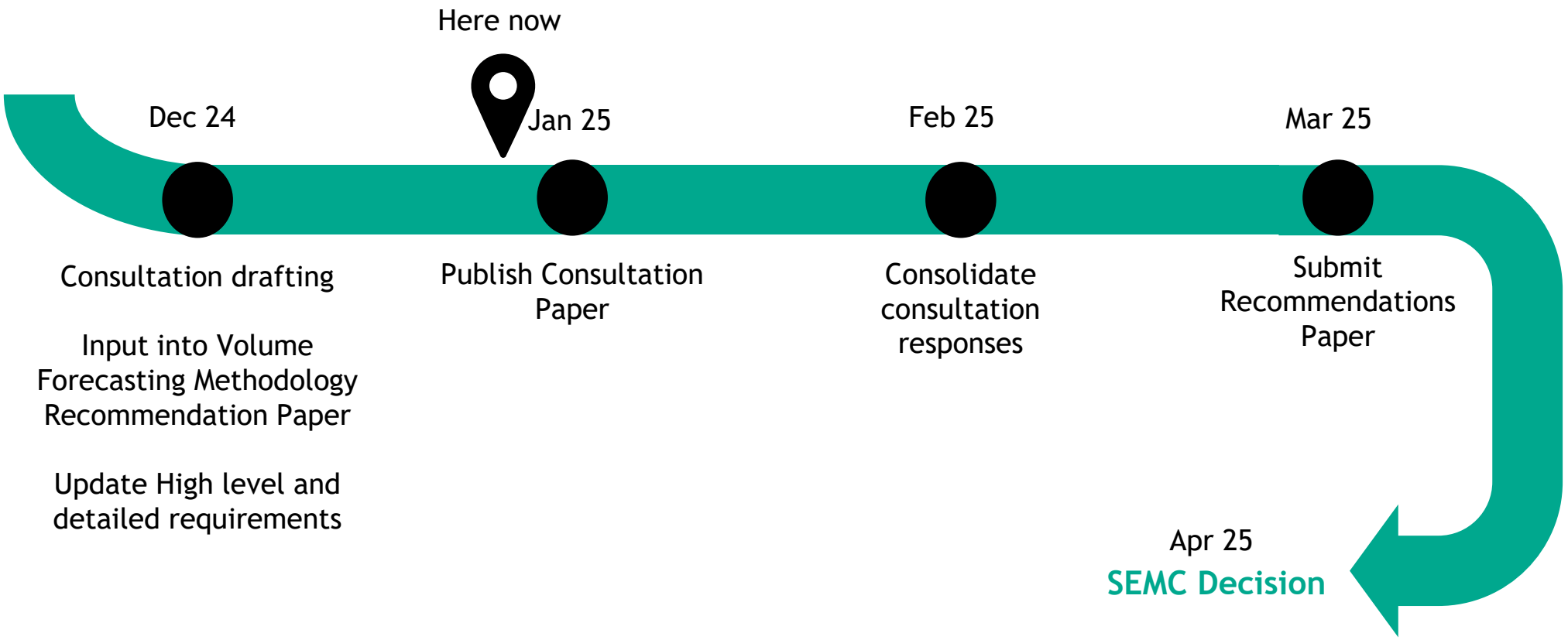
# Proposal cont.


## Outcomes

- A clearing price is determined per system service product / zone / quality category, as per the DASSA.
- Residual Availability orders are awarded to service providers who cleared in the auction.
- In settlement, Residual Availability payments are made to contracted service providers, in addition to any DASSA Order payments.

# Indicative Consultation Timeline

- **The timeline indicated below for the consultation period is on the critical path for the overall FASS programme go-live and system delivery.**



# Summary

- DASSA design context – TSOs' recommendations paper and SEMC decision on the FAM
- Joint Options Assessment overview
- Assessment and scoring of options
- Development of preferred option
- Proposal for procurement of Residual Availability – ex-ante bids and ex-post clearing
- Indicative consultation timeline targeting April SEMC decision

Questions?