ESB Networks & EirGrid Joint System Operator Programme Virtual Briefing Webinar

Operating Model Detailed Design Webinar

03 December 2025

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Use MS Teams chat feature for comments/ reactions/ questions.

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Today's presentation will be shared after the session.

Please note that by registering for this webinar, your name and email address are visible to relevant programme teams at EirGrid and ESB Networks and used solely to process your invitation to our webinar.

This session will not be recorded; however, by joining this webinar on Teams, your name will be visible to other attendees on the call today.

The Q&A at the end of the session will be limited to the questions posted in the chat which relate directly to the content presented today.

Agenda

1. Introduction & recap of previous webinars
2. Operating Model Development – Progress update
3. Scope areas in Detailed Conceptual Design
   - Procurement & Registration
   - Aggregation Model
   - Scheduled Services
   - Operating Envelopes
   - Unscheduled Services
4. Engagement approach going forward
5. Q&A

Speakers

Teresa Fallon
ESB Networks, Head of DMSO Design

Eoin Kennedy
EirGrid, Director of Innovation and Planning

Adrienne Behan
ESB Networks, JSOP Lead

Martin Kerin
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Kevin Doyle
ESB Networks, Market Design Specialist

Stephen Clarke
EirGrid, Project Manager

Joint Operating Model Industry Engagement

WEBINAR 01

- Focused on the **WHY?**
- Background to JSOP
- Introduction to operating model
- Challenges on the system
- Drivers for change

June 2025

WEBINAR 02

- Focused on the **WHAT?**
- High level process
- Challenges on the system
- High level use cases

June 2025

WEBINAR 03

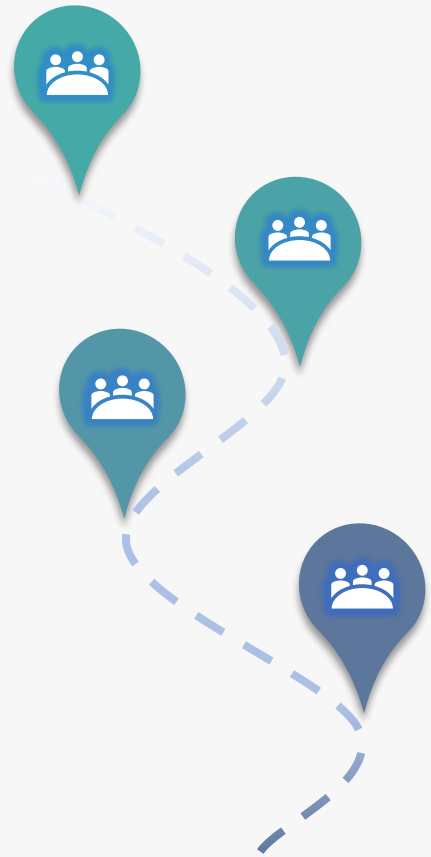
- Focus on the **HOW**?
- Discuss key/mature concepts and how they impact participants
- Development approach
- Approach to further industry engagement

We are here! ★

WEBINAR 04

- Further information on the DSO-TSO operating model design
- Updates on the development
- Timeline & implementation

2026



EirGrid ESB NETWORKS

Overview of Joint System Operator Programme

EirGrid ESB NETWORKS

TSO-DSO Joint System Operator Programme

Joint System Operator Programme

TSO-DSO co-ordination is essential for **a successful energy transition** and **long-term** resilience of electricity supply and demand meeting our climate plan targets.

Both system operators work closely to deliver **milestones** and an **outturn report** each year.

The workstream focuses on delivering a **whole of system approach**, **reducing dispatch down**, **securing our future power systems** and **facilitating new technologies**.

TSO-DSO Operating Model Process

Developing an approach **to optimise the electricity system as a whole** rather than focusing on the distribution or transmission systems in isolation.

Workshops held between EirGrid and ESB Networks since November 2022.

Examples of topics discussed include system **security** and operating **constraints, climate action plan targets**, **safety**, and **customer value**.

Joint Systems Operator Programme Pillars

Facilitate New Technologies

Creating the tools & processes to connect and manage new technologies like EVs, batteries, and solar panels on the grid.

Reducing Dispatch Down

Highlight initiatives for future-facing projects reducing dispatch down.

Securing Future Power Systems

Strengthening the electricity system to meet growing demand and keep power secure, especially in high-growth areas.

Whole of System Approach

Working as one team across the transmission (TSO) and distribution (DSO) networks to plan, operate, and deliver a more efficient electricity system.

Communications, Engagement & Reporting

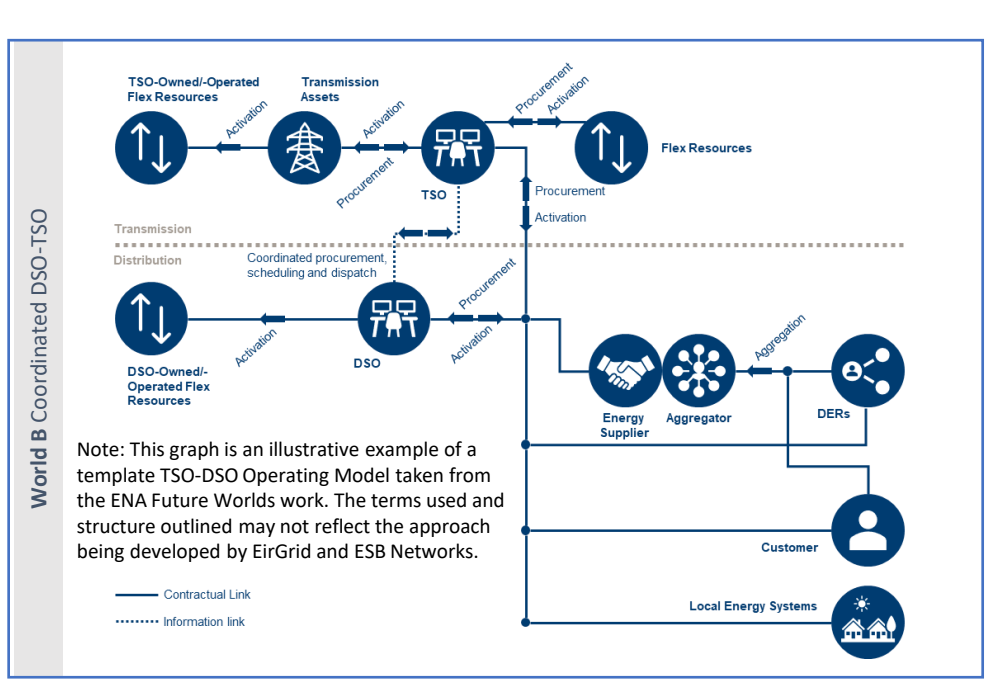
Promotes transparency of new processes through effective communication and stakeholder engagement activities.

**Additional Pillar for PR6 Period*

EV	Electric Vehicle

DSO-TSO Operating Model Design

TSO-DSO Operating Model Overview



- Energy Network Association Future Worlds – published June 2018.
- The ENA Open Networks Project proposed five "future" worlds for co-ordination in the energy sector.
- **A World B** solution considers TSO-DSO procurement and dispatch – a World **where the DSO and TSO work together** to efficiently manage networks through coordinated procurement and dispatch of flexibility resources.
- The "world" is still high level and a wide variety of solutions could exist under this model. The following was discussed at TSO-DSO Operating Model High Level Design stage.

Key areas where detail would need to be defined within World B…

01 Forecasting & Bid Management

02 Optimisation & Scheduling

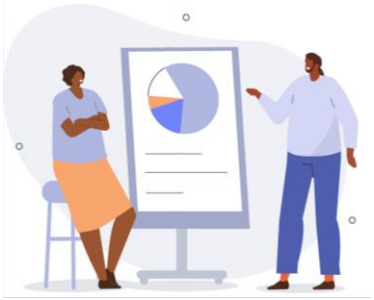
03 Activation & Dispatch

04 Settlement

Scope – TSO-DSO Operating Model Objective Statement

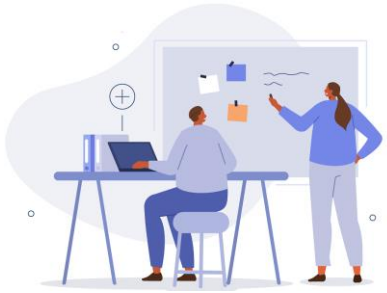
A TSO-DSO Operating Model is a description of the set of agreements, frameworks, rules, processes, protocols, and systems that enable safe and secure coordination between the TSO and DSO, ensuring they inform each other about actions that impact the other's operations and to agree on how to operate distribution-connected resources participating in both TSO and DSO arrangements.

What it IS



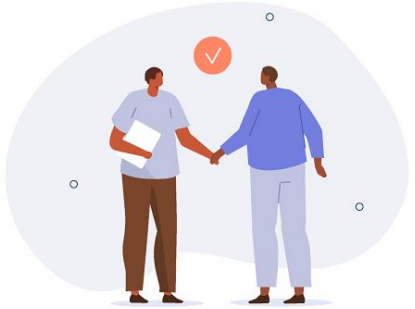
- Conceptual aspects and principles of how the TSO and DSO will functionally operate
- Defines roles and responsibilities
- Describes the interfaces and information shared and used in TSO and DSO operations
- Includes long, medium and short timeframes

What it is NOT



- A business model
- A detailed future state business process flows, organizational charts, or technology architecture design
- An end in itself, rather the activities required to implement and transition to operating the model

Why it is IMPORTANT



- Ensures a coherent approach to optimising the electricity system
- Defines governance, accountability, and control for operational decision making
- Facilitates changes in production and consumption while delivering efficient solutions for consumers

The TSO – DSO Operating Model

Improving co-ordination between the DSO and TSO to deliver more efficient markets and a more resilient system.

2023 – Vision & Principles

2024 – High-Level Design & Implementation Plan

2025 – Detailed Design

2026 - 2030 – Delivery

ESB Networks and EirGrid are working to develop a base line TSO-DSO Operating Model detailed conceptual design. This will initially provide the detail for TSO-DSO co-operation in the following areas:

Forecasting and Bid Management

- Operating envelope
- Wholesale & flex market interoperability
- TSO-DSO forecasting & data exchange
- Procurement and bid management process
- Aggregation model
- Registration model

Scheduling and Optimisation

- Stacking services
- 'Primacy rules'
- DSO congestion management scheduling process
- Product 'table of equivalences'
- Flexible connections

Activation and Dispatch

- Joint dispatch and activation process
- Mechanism for post-schedule, real time amendments to flexibility services
- DSO congestion management activation process
- Materiality thresholds
- Joint roles and responsibilities

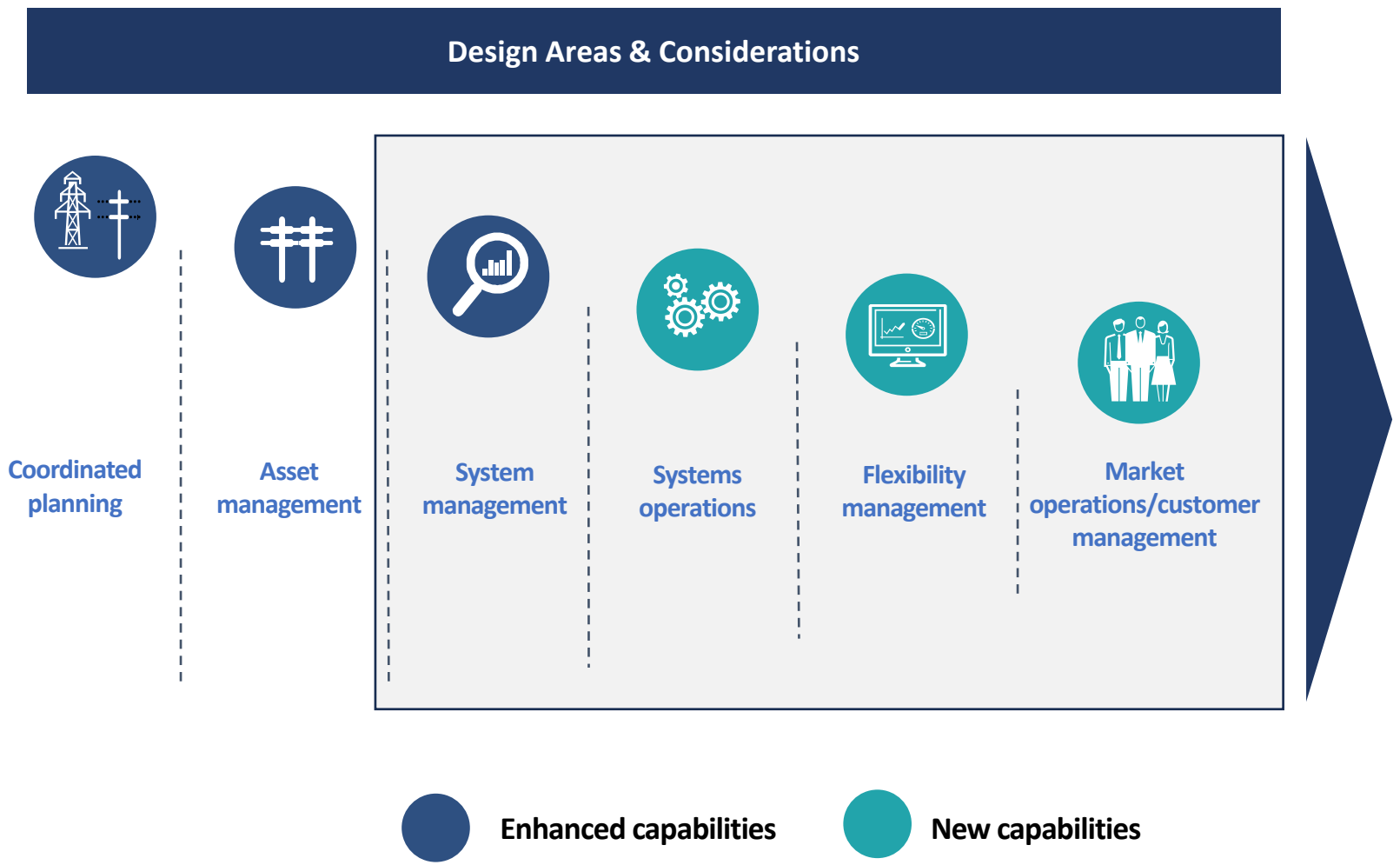
Settlement

- Wholesale market imbalance and energy balance impacts
- Settlement and compensation model
- TSO-DSO settlement co-ordination and timing
- Market power mitigation
- Query & dispute management

Scope Areas in Detailed Conceptual Design

EirGrid ESB NETWORKS

Future TSO-DSO Operating Model - Key Design Concept



DSO-TSO Op Model Key Design Concepts

- Procurement & Registration
- Aggregation Model
- Operating Envelopes
- Scheduled and Unscheduled Services

Please note, key concepts continue to evolve and are subject to change

ADMS	Advanced Distribution Management System
AMI	Advanced metering infrastructure
DER	Distributed Energy Resource
DERMS	Distributed Energy Resource Management System

EirGrid ESB NETWORKS

Procurement/Registration Future Impact on Industry

Procurement / Registration: refers to the procurement/registration of assets in local flex services/ wholesale markets.

- ✓ Existing registration process for Wholesale Market Participants.
- ✓ Existing qualification process for Capacity Market participants.
- ✓ Local Flexibility registration will take place at the time of procurement of the service.
- ✓ The processes outlined in the next slide do not add additional steps for industry but instead detail the future central platform that will allow for visibility between DSO and TSO.
- ✓ Market Participants/Flexibility Service Providers have the responsibility of registering, and the DSO/TSO have the responsibility of managing those registrations and communicating effectively.

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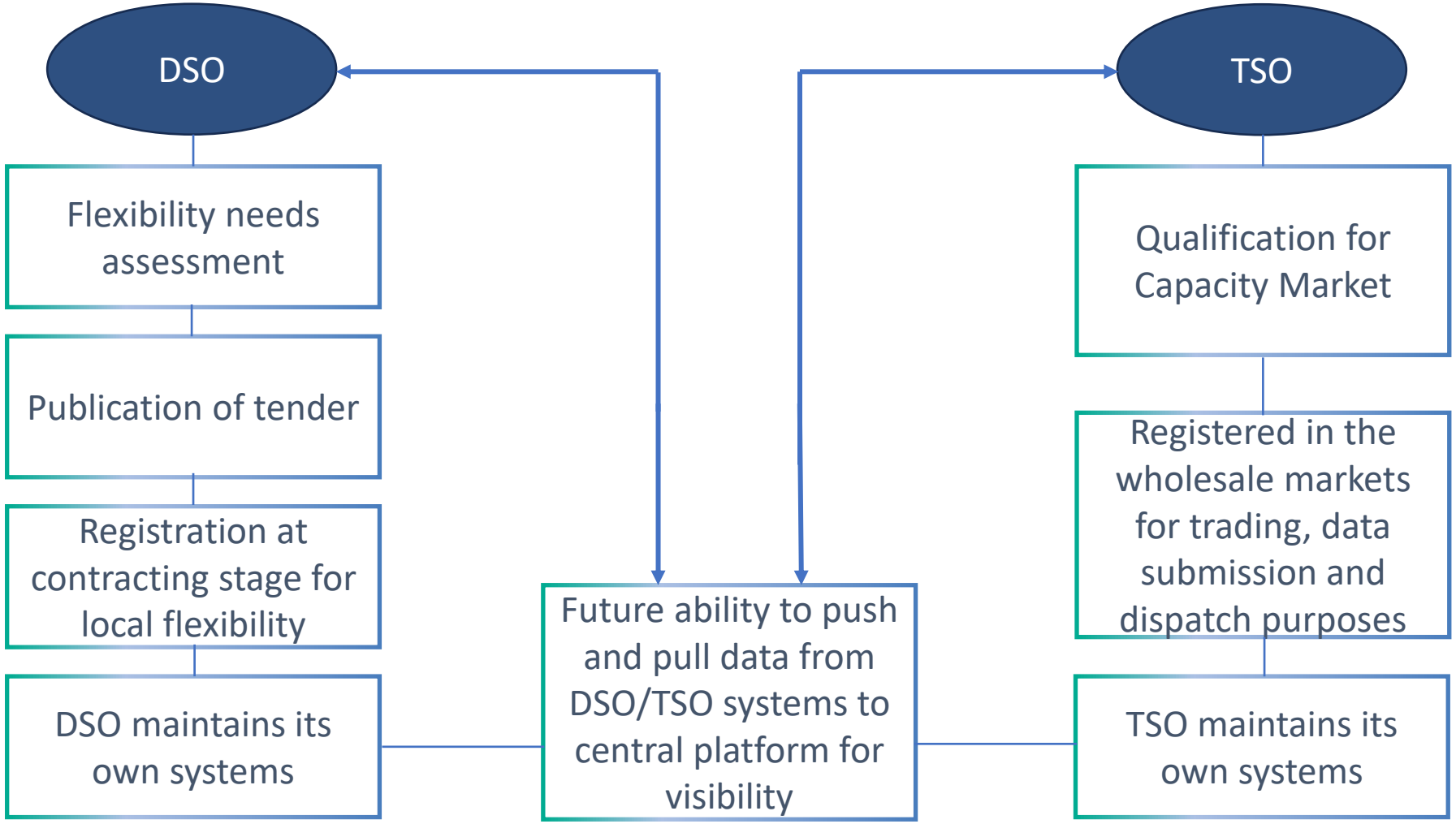
Procurement/Registration



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Aggregation Model

Outlines the resources, and the units they are a part of, in the wholesale and local flexibility market arrangements.

Demand Side Units

- DSO product schedules need to be broken down by the FSP for each FSU to FSA level so that the impact can be communicated to the wholesale market participant
- The wholesale market participant would have an obligation to comply with the limits communicated

Demand Flexibility Products

- No aggregation, one FSP per location, one-to-one relationship between FSA, FSU, and GU, between FSP and MP
- MP/FSP (same company) has obligation to directly account for the DSO schedule issued to its FSU in the local flexibility market in how it operates its GU in the wholesale market

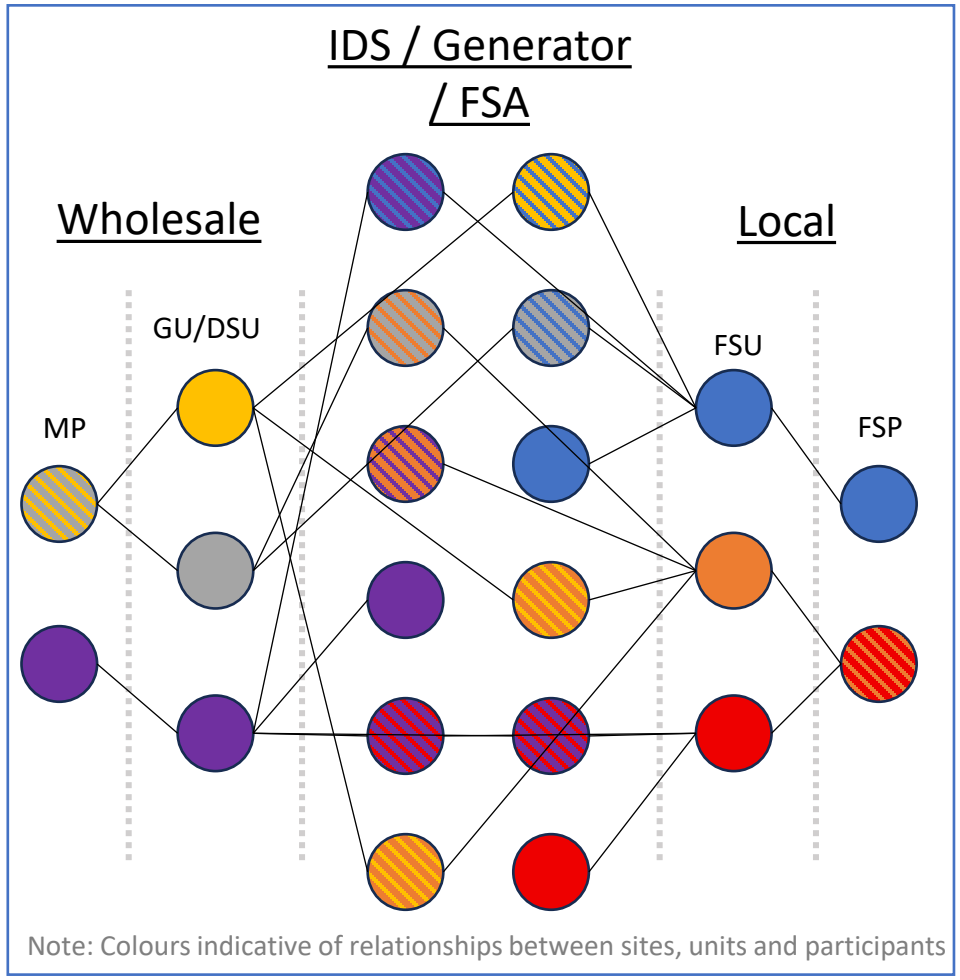
Non-Wholesale Participant

- DSO product schedules need to be broken down by the FSP for each FSU to FSA level so that the impact can be communicated
- Direct communication by DSO to the TSO of the aggregated impact on relevant demand or renewable forecast

Please note, key concepts continue to evolve and are subject to change

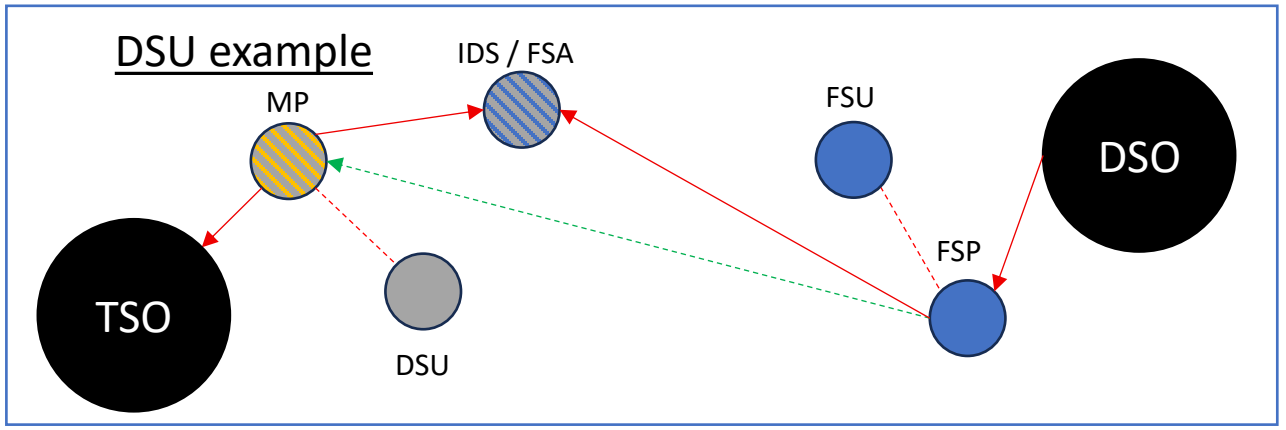
FSA	Flexible Service Asset
FSP	Flexible Service Provider
FSU	Flexible Service Unit
GU	Generating Unit
MP	Market Participant

Aggregation Model



Note: Colours indicative of relationships between sites, units and participants

- A resource can be:
  - a Flexibility Service Asset which is part of a Flexibility Service Unit, under an Flexibility Service Provider, in the local market arrangements, and
  - also be a Generator Unit (or Individual Demand Site within a Demand Side Unit) under a Market Participant in the wholesale market arrangements
  - or be in only one or other of the local or wholesale arrangements
- The aggregation model structure enables the flow of data exchanges needed to ensure local flexibility market schedules are accounted for in the wholesale market arrangements (example below)



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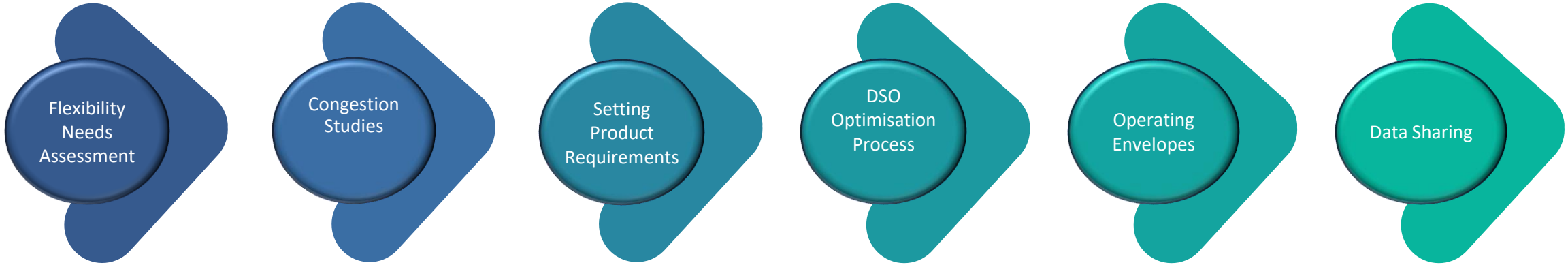
DSU	Demand Side Units	FSU	Flexible Service Unit
FSA	Flexible Service Asset	GU	Generating Unit
FSP	Flexible Service Provider	IDS	Individual Demand Site
		MP	Market Participant

DSO Forecasting/Bid Management



Flexibility Needs Assessment	Congestion Studies	Setting Product Requirements	DSO Optimisation Process	Operating Envelopes	Data Sharing
Gives an indication of flexibility needs across locations	Network studies determine the congestion need and specific product requirements	Product Requirements set and published in tender	Iterative DSO Optimisation process	Operating envelopes issued	Operational data sharing between DSO, participants, and TSO.
2 Year Process	*Completed ahead of product procurement.*		*Frequency depends on scheduling frequency.*	*DFP optimisation process ran daily, & op envelopes issued daily at D-2.*	

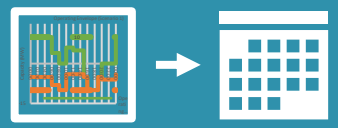
Please note, key concepts continue to evolve and are subject to change

Scheduling and Optimisation

DSO scheduling process refers to the scheduling of assets for DSO Flex services.

The DSO scheduling process is used to forecast congestion management needs and determine the schedules of resources to manage these needs. This process which will take place prior to wholesale energy and system services markets, is **cleared prior to the TSO scheduling process**.

DSO scheduling will be based on meeting technical network needs, e.g. using forecast available station capacity and preventing an overload of the station.



The **results of the DSO schedule will provide input to the TSO schedule** indirectly for wholesale market participants (through unit Operating Envelope limits and obligations) and directly for non-wholesale market resources (impact on forecasts).

The results of the TSO schedules should meet both TSO and DSO needs. The results of the TSO's Long Term Schedule and Real Time Commitment scheduling runs will be **shared with the DSO** if they wish to incorporate them into further iterations of their schedules within-day.

Please note, key concepts continue to evolve and are subject to change

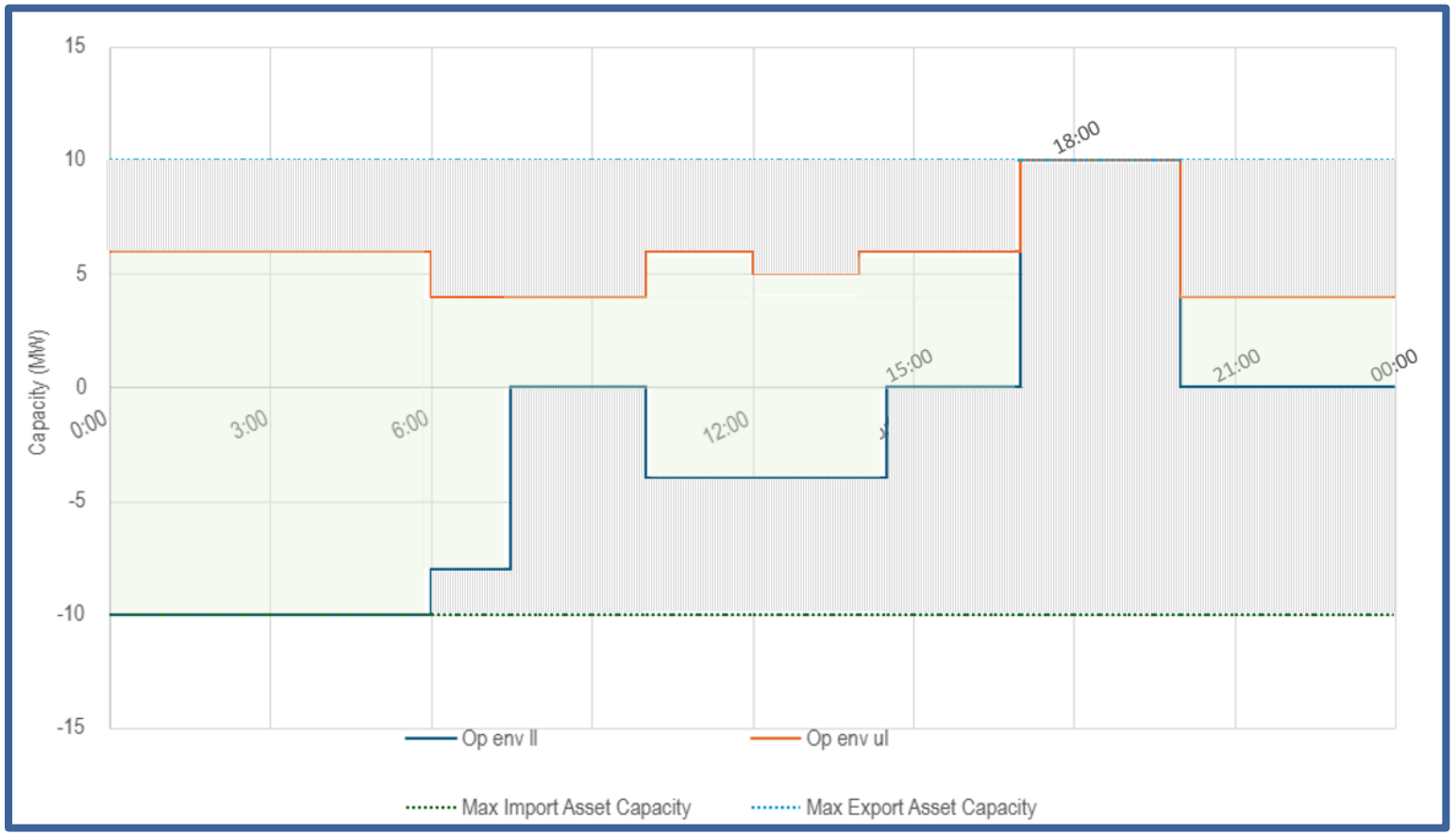
Operating Envelopes

Definition: An "Operating Envelope" is an instruction which comprises upper and lower MW limits for export and/or import within which a resource may be safely operated while maintaining distribution system security, primarily managing distribution system network congestion.

- Represents the range within which a resource may be utilised in other market arrangements, taking into account already committed/utilised or limited capabilities on the distribution network.

DSO sign convention to align with SEM where:
- Export into SEM is positive
- Import from SEM is negative
- Used for communicating DSO limits for all resources which are also directly taking part in the wholesale market arrangements for all scheduled DSO products

Operating Envelope Example:



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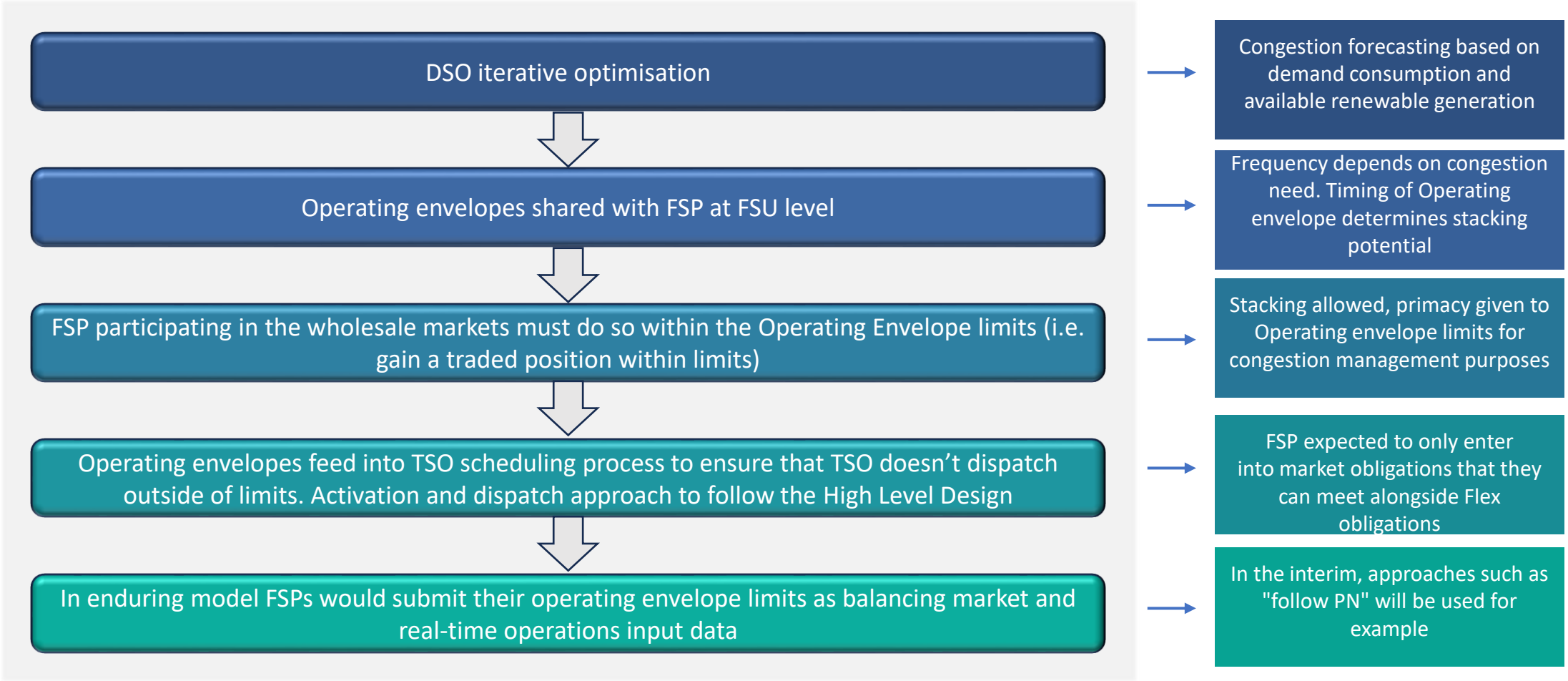
SEM Single Electricity Market

Communication of Schedules and Stacking:



Please note, key concepts continue to evolve and are subject to change

FSP	Flexible Service Provider
FSU	Flexible Service Unit

TSO Forecasting/Scheduling

Two routes for accounting for impact of DSO schedules in TSO schedule:
- Indirectly, for resources affected which are also part of a Wholesale Market Unit
- Directly, for resources affected which are not part of a Wholesale Market Unit (to be accounted for on impact to forecasts)

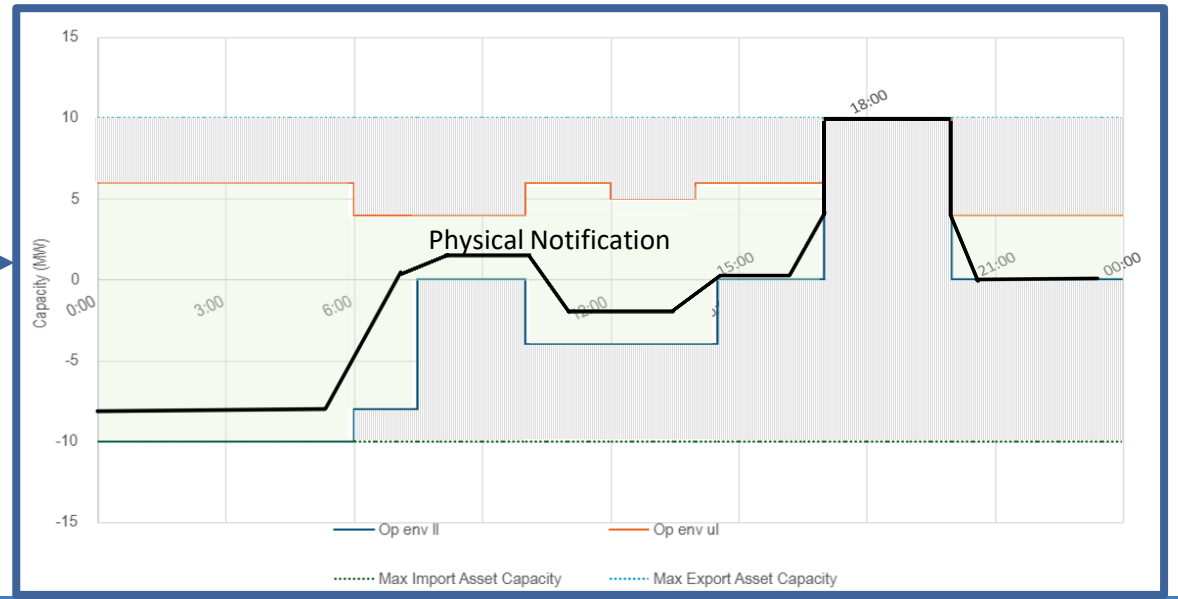
This means that the TSO and DSO schedules should be aligned with consistent outputs and outcomes

Indirect route impacting Wholesale Market Participants:
- Impact of DSO schedule on resource communicated to Market Participant of Wholesale Market Unit following aggregation model
- Market Participant of Wholesale Market Unit to translate the impact this has on Operating Envelope of the unit
- Market Participant of the Wholesale Market Unit submits Operating Envelopes to the TSO, and trades and submits PNs, availabilities, etc., within Operating Envelope limits

Wholesale Market Participant submits:

- TOD
- COD
- Availabilities (**change**)
- PN (**change**)
- Operating Envelopes (**new**)

TSO Schedule (LTS/RTC/ RTD)



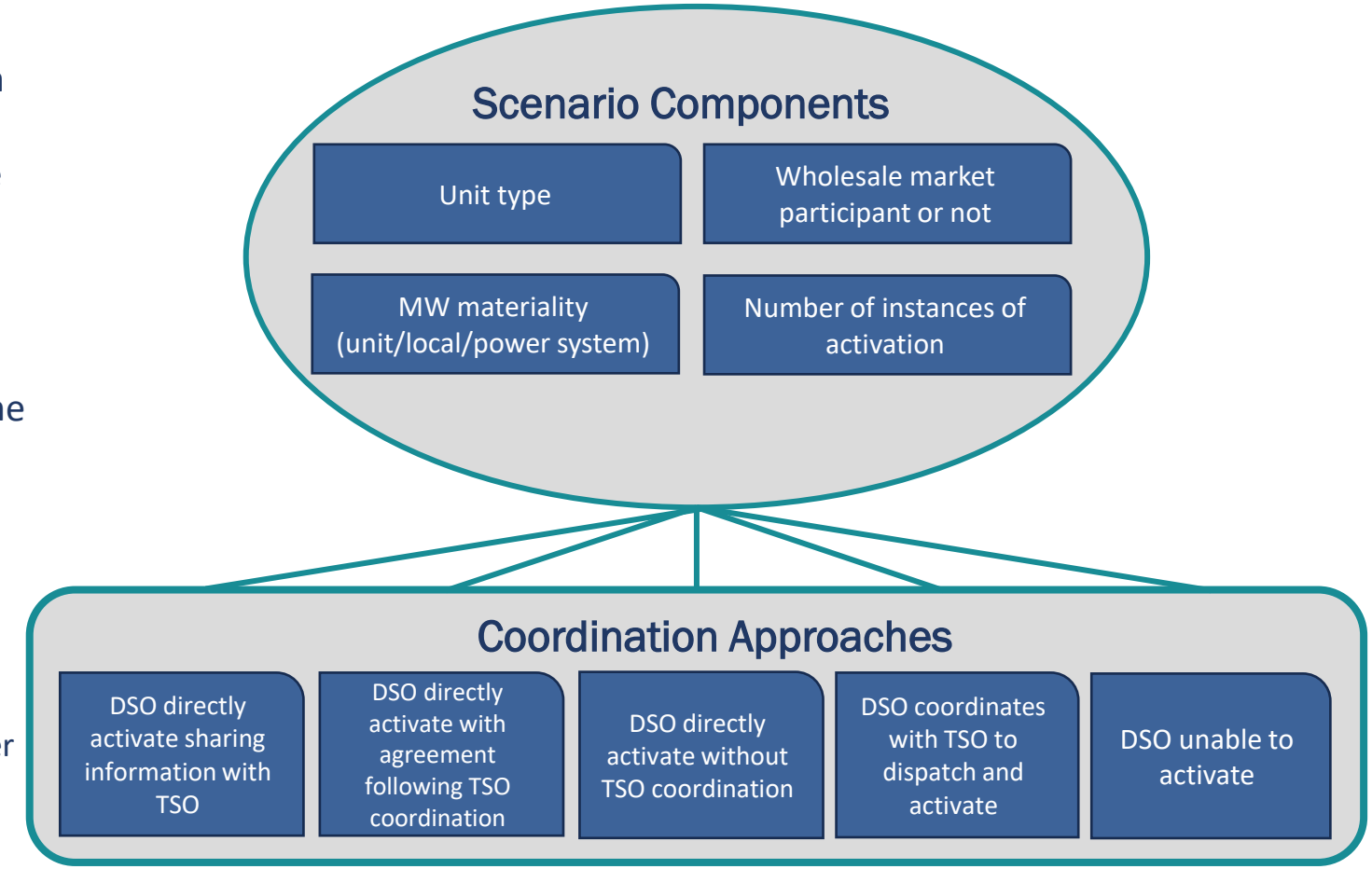
Please note, key concepts continue to evolve and are subject to change

COD	Commercial Offer Data
FSA	Flexible Service Asset
LTS	Long Term Schedule
PN	Physical Notification
RTC	Real-Time Commitment
RTD	Real Time Dispatch
TOD	Technical Offer Data

Unscheduled Process Framework

- In addition to planned scheduled products, in future the DSO intends to also develop unscheduled products which have:
  - Shorter activation notice time (after BM gate closure, close to real-time, post-fault / contingency)
  - Operating Envelopes cannot be used effectively in this timeframe – manual coordination needed
- TSO and DSO to coordinate on instruction and determine when it is the relevant instance for the instruction to come from TSO or DSO
  - Participants just need to comply with instructions they receive from either SO
- **Conceptual framework** developed to determine when coordination is needed, and reduce instances of coordination where not needed:
  - **Scenario Parameters** to balance ensuring impacts on power system are accounted for vs not causing barriers through unwarranted operational burden close to real-time

* *Parameter details to be determined in next stages.*



Please note, key concepts continue to evolve and are subject to change

BM	Balancing Market
SO	System Operator

Engagement Approach Going Forward

Regulatory Drivers for TSO-DSO Future Operating Model

► European

Regulation (EU) 2019/943 → Regulation (EU) 2024/1747

Directive (EU) 2019/944 → Directive (EU) 2024/1711

EU Elec Reg/Dir (outlining market design) updated in June 2024 – flex requirements methodology etc.

- Network Code on Demand Response
- Demand Connection Code
- Balancing Guideline
- System Operation Guideline

- New rules currently being drafted by ACER / EU bodies & due to enter into force in 2026 – Alignment where possible and prepare implementation / compliance monitoring.
- Includes market principles, data exchange, TSO-DSO co-ordination etc.
- Existing codes are also being amended to expanding requirements to the DSO

REMIT — Rules on data transparency for market monitoring

Emergency rules — Continued voluntary support to reduce EU gas consumption

► National

- CAP
- NEDS

- Impact on emissions
- Flex targets
- Hybrid Connections

PR5 / PR6 — PR6 incentives & reopener / uncertainty mechanism TBC

Codes — Network / Market rules

- Grid Code
- D Code
- Connection codes

Requires review for flex compatibility / modification requirements

► All-island

Trading & Settlement Code (Wholesale market) — TSC – Governed by the SEM-C

Future Arrangements for System Services — New DASSA market go-live **May 2027**

- Products/ Methodologies
- DASSA / SS code

Market interaction / product alignment / timings, settlement etc

Market reform for EU market coupling & XB trading with GB — New SEM arrangements (EirGrid SMP*)

Market Monitoring & Reporting — New reporting requirements TBC

*SMP- EirGrid Strategic Markets Programme

Engagement Plan Going Forward

Webinars

- Our next webinar early in 2026 to update on our progress and gather feedback on the detailed design
- Further webinars will be held as required to ensure all stakeholders are engaged as the detailed design and implementation plan are fully developed and agreed

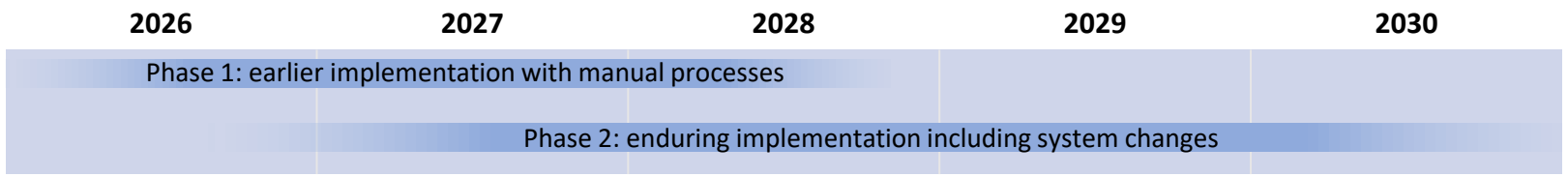
Publications

- We will continue developing material to explain how participants will need to operate under the proposed operating model
- Publications will be developed to summarise the relevant aspects of the design and implementation plan

Market / Regulatory Policy

- Analysis will be carried out to determine impact of Future Operating Model on policies, decisions, and rules in the wholesale electricity market
- Where there is an impact, we will work with the RAs to consider the engagement and change approach
- In relation to the rules changes processes and T&Cs from NCDR (Network Code for Demand Response), we will continue to engage industry participants

Phased implementation approach: (plan details TBC)



Questions

Q&A

Please use MS Teams chat feature for comments, reactions, or questions on the TSO-DSO Operating Model.

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We'd love to hear your feedback!

Please use the QR code to submit your feedback or kindly go to chat box to click the survey link.

Thank You

Appendix

Glossary

ADMS	Advanced Distribution Management System
AMI	Advanced Metering Infrastructure
CAP	Climate Action Plan
CM	Capacity Market
COD	Commercial Offer Data
DER	Distributed Energy Resource
DERMS	Distributed Energy Resource Management System
DFP	Demand Flexibility Product
DSU	Demand Side Units
EV	Electric Vehicle
FASS	Future Arrangements for System Services
FSA	Flexible Service Asset
FSP	Flexible Service Provider
FSU	Flexible Service Unit
GU	Generating Unit
IDS	Individual Demand Site
JSOP	Joint System Operator Programme
LDES	Long Duration Energy Storage
LTS	Long Term Schedule
MO	Market Operator
MP	Market Participant
NCDR	Network Code on Demand Response
NEDS	National Energy Demand Strategy
OT	Operational Technology
PN	Physical Notification
PV	Photo Voltaic
REMIT	Regulation on Wholesale Energy Market Integrity and Transparency
RTC	Real-Time Commitment
RTD	Real Time Dispatch
SDP	Scheduling and Dispatch
SEM	Single Electricity Market
SS	System Services
TOD	Technical offer Data