

Scheduling & Dispatch Programme - SDP_06

Proposed Changes for Synchronous Condensers - V2

Industry Call - 26th February 2025

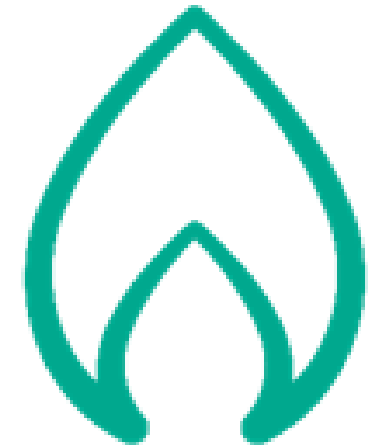
This presentation provides background, content, and an explanation for the proposed changes to the Trading & Settlement Code for the Scheduling & Dispatch Programme initiative 6 (SDP_06)

Achievable - valuable - “Simple”



Agenda

- ① Scheduling & Dispatch Programme
- ② Background
- ③ T&SC Modification
- ④ Modifications Meeting 127
- ⑤ Modification Proposal - Version 2 Changes
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- ⑦ Questions?



Scheduling & Dispatch Programme

Initiative 6 (SDP_06)

The integration of synchronous condensers is vital for achieving Ireland's goal of **80% renewable electricity** and **95% SNSP** by 2030.

Synchronous condensers provide the same benefits to the grid as conventional generators, without providing electricity.

Synchronous condensers provide **inertia**, **reactive power control**, as well as addressing **short circuit** issues.

The current market framework does not accommodate the unique characteristics of synchronous condensers.

SDP_06 aims to:

- **Realise the value** of the services provided by synchronous condensers
- Enhance **scheduling and dispatch mechanisms** for synchronous condensers.



Background



Background - Current Challenges



Synchronous condensers are currently **not defined** in the TSC and there are various **system limitations** for these units at present.

System limitations / workarounds:

- Synchronous condensers are modeled as **multi-fuel generator units** in the Market Management System (MMS), which does not support **negative dispatch instructions** or allow them to be considered “ON” at OMW.
- To address this, synchronous condensers receive a **1MW dispatch instruction**, which misrepresents their operational characteristics.
- Synchronous condensers can submit **non-zero Commercial Offer Data (COD)** in the Balancing Market. However, they are not settled using this COD, and these prices can lead to **sub-optimal scheduling and dispatch outcomes**.



Background - Mod_13_19



- The aim of this modification is to ensure System Services Providing Units are **not charged for their energy consumption** while providing System Services.
- This includes synchronous condensers and windfarms that provide system services at 0MW.
- For each Trading Site Supplier Unit which is registered in a Trading Site with a System Service Providing Unit, a **System Services flag** indicates the Imbalance Settlement Periods where the System Services Providing Unit is dispatched to provide System Services.
- Energy consumed during flagged periods will not be charged. In non-flagged periods, units will pay for their energy consumption as usual.



Background - Revenue Streams



Low Carbon Inertia Services (LCIS)

In SEM-21-021, the SEM Committee requested that the TSOs bring forward proposals for a **fixed term procurement**, in relation to LCIS. The aim of this was to procure services such as inertia from low carbon sources.

SEM-23-002 decided LCIS would be procured through a phased approach, with a targeted volume of 10,000 MVA.s, in Phase 1, to meet LCIS requirements for 2026. For **Phase 1 procurement**, TSOs contracted **10,963 MVA.s** of LCIS.

The contract duration and payment information for LCIS are outlined in SEM-23-064. Units with an LCIS contract *“will be prohibited from the provision of other related system services (i.e. Synchronous Inertial Response and Steady State Reactive Power) as these services overlap with the LCIS service procured”*.

System Service Payments

System services are products, other than energy, that are required for the continuous, secure operation of the power system. System services payments are paid outside of the SEM by the TSOs.

Synchronous condensers that do not have an LCIS contract are eligible for the following System Services payments.

- **Synchronous Inertial Response (SIR)** utilizes stored kinetic energy to enhance system stability, with payments adjusted based on performance and capability improvements.
- **Steady State Reactive Power (SSRP)** incentivizes payments through scalars that reward automatic voltage regulation and the provision of reactive power at zero MW output.



T&SC Modification



Summary

Proposes a modification to establish a structured framework for synchronous condensers within the T&SC.

The primary changes include:

- The ability to **register** and identify these units correctly as Synchronous Condenser Units.
- Outlining appropriate **data submissions** (Availability, TOD) for synchronous condensers.
- Dispatch instructions for synchronous condensers shall not be utilised in Imbalance Pricing or Imbalance Settlement **Instruction Profiling** calculations.
- References to '**DS3 System Services**' have been changed to 'System Services' throughout the TSC, Appendices and Glossary.

Important notes

- The application of Mod_13_19 will remain, meaning that units providing System Services at OMW (including synchronous condensers) will not incur charges for their energy consumption while providing these services.
- Changes to ensure optimal scheduling and dispatch mechanisms for synchronous condensers will be required but will not form part of the TSC modification.
- EirGrid and SONI are currently progressing Grid Code modifications in relation to Synchronous Condensers. These were drafted based on out-of-date assumptions. The TSOs are aware and will update the modifications accordingly.



Modifications Meeting 127



Modifications Meeting 127



1 Meeting Recap

- Modifications Meeting 127 took place on Wednesday 5th February
- New Modification Proposal Mod_01_25 was presented
- No vote was taken
- Modification was deferred pending a version 2 of the proposal

2 Timelines

- It was agreed to set up an Industry Call - scheduled for Wednesday 26th February
- It was agreed to convene Modifications Committee Meeting 127B - scheduled for Wednesday 12th March



Modifications Meeting 127



3 Actions

→ Various queries and questions were raised by the Modifications Committee Members relating to the proposed modification

→ The following actions were established:

- Proposer to submit a version 2 of this proposal and liaise with Secretariat to arrange an industry call - Closed
- Secretariat to convene Modifications Committee Meeting 127B in March - Closed
- Proposer to assess how Synchronous Condensers will function alongside standard GU that can operate in Synchronous Condenser Mode - to be addressed today
- Proposer to review how the times to sync and de-sync within the TODs will be handled - to be addressed today
- Proposer to review LCIS contracts and confirm this proposal does not run contrary to them - to be addressed today



Actions



Proposer to assess how Synchronous Condensers will function alongside standard GU that can operate in Synchronous Condenser Mode

Wind units:

- System Services Providing Units that are wind units can provide reactive power but **do not provide inertia**.
- Control rooms do not explicitly schedule for reactive power.
- These units will not impact the SDP_06 solution which is aimed at scheduling for inertia.

Other units:

- There is currently one conventional generator unit that can operate in synchronous condenser mode.
- This unit has a Synchronous Compensation Service Agreement in place and does not have a DS3 or LCIS contract. As there are separate arrangements in place, this unit is not impacted by the T&SC modification.
- The TSOs do not envisage additional units of this nature i.e. needs will be met by LCIS procurement.



Actions



Proposer to review LCIS contracts and confirm this proposal does not run contrary to them

Both the DS3 / LCIS Contracts were internally reviewed:

- It was determined that neither the DS3 / LCIS Contracts contain any provisions that conflict with the proposed changes to the T&SC.
- References to Technical Offer Data (TOD) were noted but no apparent conflicts with proposed modification, as Synchronous Condensers will be submitting relevant TOD.
- There is a clause in the both agreements which states that nothing shall prevent the Service Provider from operating the Unit in such a manner so as to comply with its obligations under the T&SC.

Important Note: Both contracts contain a clause that allows them to be amended to avoid conflicts arising from changes in the: Grid Code, Distribution Code, Network Codes, Metering Code or Trading and Settlement Code, to “most closely reflect the intentions” of the original agreement.



Actions



 *Proposer to review how the times to sync and de-sync within the TOD will be handled*

- Elements of Technical Offer Data have been reviewed and synchronous condensers will now also submit Start Up Time elements of Technical Offer Data i.e.
 - Synchronous Start Up Time Hot (hours)
 - Synchronous Start Up Time Warm (hours)
 - Synchronous Start Up Time Cold (hours)
- This has been included in V2 of the modification.
- This will allow schedulers to determine how quickly a synchronous condenser can be committed.



Modification Proposal - Version 2 Changes



Version 2 Changes - Technical Offer Data (TOD)



Appendix I - Synchronous Condensers will submit three additional forms of Technical Offer Data (TOD). These applicable fields will be defined in **TSC Appendix I - Offer Data - Table 2**.

Technical Offer Data for Generator Units

12. A Participant shall only submit Technical Offer Data to the Market Operator in respect of its Generator Units as provided for in Table 2.

Synchronous Condenser Units will only submit:

- | | |
|-------------------------------------|--|
| 1. Minimum On Time (Hours) | 8. Block Load Flag (True or False) |
| 2. Minimum Off Time (Hours) | 9. Registered Minimum Stable Generation (MW) |
| 3. Maximum On Time (Hours) | 10. Registered Minimum Output (MW) |
| 4. Ramp Down Rate 1 (MW / Minute) | <u>11. Synchronous Start Up Time Hot (Hours)</u> |
| 5. Ramp Up Rate 1 (MW / Minute) | <u>12. Synchronous Start Up Time Cold (Hours)</u> |
| 6. Start of Restricted Range 1 (MW) | <u>13. Synchronous Start Up Time Warm (Hours)</u> |
| 7. End of Restricted Range 1 (MW) | |



Version 2 Changes - Commercial Offer Data (COD)



- Synchronous Condenser Units will only submit Forecast Availability Profile, Forecast Minimum Output Profile, and Forecast Minimum Stable Generation Profile, which are used for scheduling purposes.
- Since these units are not settled in the Balancing Market, they will not submit other COD elements such as Start Up Costs, No Load Costs, and Incremental/Decremental prices.
- Appendix I, Table 1 - Commercial Offer Data Elements has been updated to have an additional column - 'Synchronous Condenser Unit'



Data Element	Energy Limited Unit	Demand Side Unit	<u>Synchronous Condenser Unit</u>	Other Generator Units not included in paragraph 4 of this Appendix
Simple Incremental Price Quantity Pairs (MW quantities and € / MWh or £ / MWh prices)	Yes	Yes		Yes
Simple Decremental Price Quantity Pairs (MW quantities and € / MWh or £ / MWh prices)	Yes	Yes		Yes
Complex Incremental Price Quantity Pairs (MW quantities and € / MWh or £/MWh prices)	Yes	Yes		Yes
Complex Decremental Price Quantity Pairs (MW quantities and € / MWh or £ / MWh prices)	Yes	Yes		Yes
No Load Costs (€ / hr or £ / hr)	Yes			Yes
Start Up Costs (€ or £)	Yes			Yes
Shut Down Cost (€ or £)		Yes		
Energy Limit (MWh)	Yes			
Forecast Availability Profile (MW)	Yes	Yes	<u>Yes</u>	Yes
Forecast Minimum Output Profile (MW)	Yes	Yes	<u>Yes</u>	Yes
Forecast Minimum Stable Generation Profile (MW)	Yes	Yes	<u>Yes</u>	Yes



Version 2 Changes - ‘DS3 System Services’



- References to ‘DS3 System Services’ have been changed to ‘System Services’ throughout the TSC, Appendices and Glossary.
- The ‘System Services Provider Flag’ will continue to be used for System Services Providing Units, and it is recognised that the terminology could be rendered obsolete in the future.
- For example, from T&SC Glossary:

DS3 -System Service Arrangements	means, the contractual framework in place between each System Operator and DS3 -System Services Providing Unit governing the provision of and remuneration for DS3 -System Services required by each System Operator to maintain the secure and reliable operation of the system.
DS3 -System Services	means the services essential to the proper functioning of the power system as defined in the DS3 -System Services Arrangements.
DS3 -System Services Provider Flag	means, a binary value derived by the Market Operator for a Trading Site Supplier Unit indicating whether a DS3 -System Services Providing Unit registered to that site was operating to provide DS3 -System Services while at zero MW exported energy in a given imbalance settlement period.
DS3 -System Services Providing Unit	means, an apparatus or group of apparatus connected to the Transmission System or Distribution System that are contracted to provide DS3 -System Services to their respective System Operator.



Scheduling and Dispatch Principles



Scheduling and Dispatch Principles (1/3)



- Synchronous condensers will be scheduled so that they are only ON when required to meet:
 - regional inertia requirement;
 - jurisdictional inertia requirement;
 - all-island inertia requirement; or
 - to satisfy any other constraint they may be subject to (e.g. voltage support in a region).
- This will be achieved in scheduling by ensuring **commitment of a synchronous condenser** results in an **increase to the Production Cost** of the optimisation in all instances.
- The contribution to the overall Production Cost of scheduling a synchronous condenser unit will **implicitly include the cost of additional generation** scheduled to meet the additional demand when the Synchronous Condenser is ON.
- Synchronous condensers should not be scheduled in order to increase demand (e.g. to maximise priority dispatch generation).



Scheduling and Dispatch Principles (2/3)



- Synchronous condensers will be scheduled taking inertia contribution & consumption levels into account.
- The following technical, locational and operational characteristics will be required to appropriately schedule synchronous condensers:
 - Consumption level (Minimum Output) (MW)
 - Inertia contribution (MWs)
 - Location
 - Forecast availability (MW)
 - Minimum On Time (hours)
 - Minimum Off Time (hours)
 - Maximum On Time (hours)
 - Start-Up Time Hot/Warm/Cold (hours)
 - Ramp Up Rate 1 (MW/Min)
 - Ramp Down Rate 1 (MW/Min)
 - Start Forbidden Range 1 (MW)
 - End Forbidden Range 1 (MW)



Scheduling and Dispatch Principles (3/3)



- To ensure the commitment of a synchronous condenser results in an increase to the Production Cost, the SDP_06 solution will allow for configurable unit-level prices to be applied in scheduling.
- If these prices are all the same, synchronous condensers will be scheduled using the technical, locational and operational characteristics as previously discussed - or random tie-breaking if these characteristics are identical.
- The SDP_06 solution allows for these prices to be different which would introduce an additional distinguishing factor between synchronous condensers. The rationale for this is in the event that the RAs make decisions regarding any future hierarchy for synchronous condenser units (e.g. to favour one procurement method over another, including LCIS vs non-LCIS).
- The expectation is that SDP_06 would go live in 2025 without any such hierarchy (unless such decisions were made).



Questions?

