Single Electricity Market

FINAL RECOMMENDATION REPORT

MOD_01_25 SYNCHRONOUS CONDENSERS SDP_06 V3

9 APRIL 2025

Document History

Version	Date	Author	Comment
1.0	7th May 2025	Modifications Committee Secretariat	Issued to Modifications Committee for review and approval
2.0	14th May 2025	Modifications Committee Secretariat	Issued to Regulatory Authorities for final decision

Reference Documents

Document Name
Trading and Settlement Code
Modification Proposal Form
Modification Proposal Form v2
Presentation 26.02.25
Modification Proposal Form v3
Presentation 12.03.25
Industry Call Minutes
Presentation 09.04.25

Table of Contents

1. MODIFICATIONS COMMITTEE RECOMMENDATION

RECOMMENDED FOR APPROVAL– MAJORITY VOTE

Recommended for Approval by Majority Vote		
Stacy Feldmann (Chair)	Generator Member	Reject
Andrew Burke	Renewable Generator Member	Approve
Andrew Kelly	Generator Member	Reject
Christopher Mullan	Supplier Alternate	Reject
Eoin Murphy	Assetless Member	Approve
Niamh Trant	Supplier Alternate	Approve
Nick Brown	Supplier Alternate	Approve
Bryan Hennessy	Supplier Member	Approve
Richard Crowley	Generator Alternate	Approve
Robert McCarthy	DSU Member	Reject
Nick Heyward	Flexible Participant Member	Reject

2. BACKGROUND

This Modification Proposal was raised by EirGrid and received by the Secretariat on 22nd January 2025 and raised at Modifications Committee Meeting 127 on 5th February 2025. A version 2 of the proposal was raised for an Industry Call was held on 26th February 2025 and a version 3 for Extraordinary Modifications Committee Meeting held on 12th March 2025. Version 3 was finally discussed and voted on at Meeting 128 on 9th April 2025.

The integration of synchronous condensers is a crucial step in enabling Ireland's transition towards achieving 80% renewable electricity (RES-E) and 95% System Non-Synchronous Penetration (SNSP) by 2030. Synchronous condensers play a vital role in ensuring system stability by providing inertia, reactive power control, as well as addressing short circuits.

The current market and scheduling framework does not accommodate the unique characteristics of synchronous condensers, leading to inefficiencies in scheduling and dispatch of these units. Initiative 6 of the Scheduling & Dispatch Programme (SDP_06) seeks to address these issues by introducing a structured approached to the registration and data submission of synchronous condensers within the Trading and Settlement Code (TSC) and establishing optimal scheduling and dispatch mechanisms for synchronous condensers to ensure they meet applicable system service requirements.

Synchronous condensers are not accounted for in the TSC at present, meaning multiple workarounds are in place to accommodate current operational synchronous condensers. At present, synchronous condensers are modelled as multi-fuel generator units in the Market Management System (MMS), which does not support negative dispatch instruction for such units, nor does it allow units to be considered

"ON" at 0MW. To work around this limitation, synchronous condensers are issued a 1MW dispatch instruction, which is unreflective of their unique operational characteristics. Additionally, synchronous condensers are capable of submitting non-zero Commercial Offer Data (COD) such as Start Up Costs, No Load Costs and Incremental and Decremental Price/Quantity Pairs in the Balancing Market. These non-zero costs can force scheduling / dispatch outcomes that may not be optimal.

The integration of synchronous condensers is a crucial step in enabling Ireland's transition towards achieving 80% renewable electricity (RES-E) and 95% System Non-Synchronous Penetration (SNSP) by 2030. Synchronous condensers play a vital role in ensuring system stability by providing inertia, reactive power control, as well as addressing short circuits.

The current market and scheduling framework does not accommodate the unique characteristics of synchronous condensers, leading to inefficiencies in scheduling and dispatch of these units. Initiative 6 of the Scheduling & Dispatch Programme (SDP_06) seeks to address these issues by introducing a structured approached to the registration and data submission of synchronous condensers within the Trading and Settlement Code (TSC) and establishing optimal scheduling and dispatch mechanisms for synchronous condensers to ensure they meet applicable system service requirements.

Synchronous condensers are not accounted for in the TSC at present, meaning multiple workarounds are in place to accommodate current operational synchronous condensers. At present, synchronous condensers are modelled as multi-fuel generator units in the Market Management System (MMS), which does not support negative dispatch instruction for such units, nor does it allow units to be considered "ON" at 0MW. To work around this limitation, synchronous condensers are issued a 1MW dispatch instruction, which is unreflective of their unique operational characteristics. Additionally, synchronous condensers are capable of submitting non-zero Commercial Offer Data (COD) such as Start Up Costs, No Load Costs and Incremental and Decremental Price/Quantity Pairs in the Balancing Market. These non-zero costs can force scheduling / dispatch outcomes that may not be optimal.

This modification introduces changes to the TSC, which can be summarised as follows:

- 'Synchronous Condenser Units' is defined in the TSC Glossary. The definition of 'Generator Unit' and 'Fuel Type' have also been updated.
- Registration criteria for Synchronous Condenser Units have been defined in TSC Chapter B.
- Physical Notifications (PNs) for Synchronous Condenser Units shall be zero.
- The following elements of Commercial Offer Data (COD) shall be zero:
    - Start Up Costs
    - No Load Costs
    - Incremental and Decremental Price/Quantity pairs
- Synchronous Condenser Units shall submit Technical Offer Data (TOD) that is relevant to Synchronous Condenser Units. The applicable fields will be defined in TSC Appendix I – Offer Data.
- Instruction Profiling will not be performed for Synchronous Condenser Units.
- Dispatch Quantity data will not be calculated for Synchronous Condenser Units.

The application of Mod_13_19 will remain, meaning that units providing system services at 0MW (including synchronous condensers) will not incur charges for their energy consumption while providing these services.

The changes between Version 1 (V1) to Version 2 (V2) of the modification proposal are highlighted below:

- Synchronous Condenser Units will not be entirely excluded from submitting Commercial Offer Data (COD), and will submit their Forecast Availability Profile, Forecast Minimum Output Profile and Forecast Minimum Stable Generation Profile. This data is necessary for scheduling purposes.

- Appendix I – An additional column has been added to *Table 1 – Commercial Offer Data Elements*, titled "Synchronous Condenser Unit". This column will reflect the elements of COD to be submitted by Synchronous Condenser Units, as listed above.
- Appendix I – Synchronous Condensers will submit three additional elements of TOD outlined in *Table 2 – Technical Offer Data Elements*. These are Start Up Time (Hot, Warm and Cold).
- All references to 'DS3 System Services' have been changed to 'System Services' throughout the TSC, Appendix, and Glossary since the 'DS3 System Services 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.

The changes between Version 2 (V2) and Version 3 (V3) of the modification proposal are highlighted below:

- Clarifications to Forecast Availability Profile, Forecast Minimum Output Profile and Forecast Minimum Stable Generation Profile in D.4.2.11A, D.4.2.12, D.4.2.15 respectively.
- Clarification to the definition of "Synchronisation" in the Glossary.

Note: Changes to ensure optimal scheduling and dispatch mechanisms for synchronous condensers will be required as part of SDP_06 but will not form part of the TSC modification.

Implementing this modification will establish a structured framework for synchronous condensers within the TSC and eliminate the workarounds in place for their registration, scheduling and dispatch. SDP_06 will provide a scalable solution that can accommodate more synchronous condensers as they become operational in Ireland and Northern Ireland. By formalising these changes, SDP_06 will provide an improved and more efficient solution for the stable integration of synchronous condensers into Ireland's evolving energy market.

3. PURPOSE OF PROPOSED MODIFICATION

3A.) JUSTIFICATION OF MODIFICATION

These changes will allow the TSOs to accommodate synchronous condensers by establishing a structured framework within the TSC and eliminate the workarounds currently in place for their registration, scheduling and dispatch. SDP_06 will provide a scalable solution that can accommodate more synchronous condensers as they become operational in Ireland and Northern Ireland. By formalising these changes, SDP_06 will provide an improved and more efficient solution for the stable integration of synchronous condensers into Ireland's evolving energy market.

3B.) IMPACT OF NOT IMPLEMENTING A SOLUTION

The Scheduling & Dispatch Programme aims to enhance scheduling and dispatch processes in Ireland and Northern Ireland and facilitate low carbon grid technologies such as synchronous condensers. Over the coming years, more synchronous condensers will become operational and if this modification is not implemented, the current limitations and workarounds described for synchronous condenser units will remain in place.

3C.) IMPACT ON CODE OBJECTIVES

The aim of this Modification is to further the following Code objectives:

(a) to facilitate the participation of electricity undertakings engaged in the generation, supply or sale of electricity in the trading arrangements under the Single Electricity Market;

(g) to promote the short-term and long-term interests of consumers of electricity on the island of Ireland with respect to price, quality, reliability, and security of supply of electricity.

4. WORKING GROUP AND/OR CONSULTATION

N/A

5. IMPACT ON SYSTEMS AND RESOURCES

Impact Assessment on Market System changes to be provided by the vendor.

6. IMPACT ON OTHER CODES/DOCUMENTS

N/A

7. MODIFICATION COMMITTEE VIEWS

MODIFICATIONS MEETING 127 – 5TH FEBRUARY 2025

A representative from EirGrid's Scheduling and Dispatch Team provided some context to this Modification Proposal before the presentation was delivered. The delivery plan was discussed, and it was noted that the go-live would be during the month of November provided that the Modification and related system changes would be approved in due time. It was advised that the Modification changes and the system changes would be carried out in parallel and although there would be some risk involved in this process, it was viewed that waiting for the full approval of the regulatory changes without initiating the system design delivery would cause significant delays to the project, affecting the process for new units contracted to go live at the end of 2025.

The Proposer delivered a presentation on this Modification Proposal providing a brief overview and highlighting the challenges of Synchronous Condensers. It was noted that Mod_13_19 currently ensures that Synchronous Condensers are not charged for their energy consumption when they are dispatched by the TSOs to provide system services and that would remain in place.

The Proposer advised that the Modification would establish a structured framework so that workarounds in place for existing Synchronous Condensers would no longer be needed. It was noted that Grid Code Modifications were based on older assumptions because had been drafted well in advance of this review and as such there was some misalignment there. Assurance was given that in any aspect relating to Market processes, the Grid Code proposals would be updated to ensure alignment once agreement was reached.

The Proposer went through the details of the proposal and the legal drafting advising that there would be submission of zero for CODs and PNs and no Instruction Profiling calculated for Synchronous Condensers. It was also noted that a version 2 of this proposal was ready and would incorporate changes to specify which Commercial Offer Data (COD) data would be required (such as Forecast Availability), rather than excluding Synchronous Condenser Units from submitting all elements of COD. It was advised that Code references to the term 'DS3' would also be removed leaving the references in the T&SC simply to 'System Services'.

An overview of a day in the life of Synchronous Condensers was given and it was confirmed that 9 condensers will have to be managed in the near future starting from the first new one at the end of 2025.

Generator Member started the discussion by asking if the Grid Code changes were live already and was assured by the Proposer that they were not. It was also queried if Standard Generators that have Synchronous Condenser Mode were being looked at and what impact this Modification would have on them. The Proposer advised that they were currently focusing on just Synchronous Condensers but agreed that this would need to be considered. Generator Member also advised that there was no clarity

on why inertia was not incorporated into the program for the Future Arrangements for System Services (FASS). The Proposer confirmed that Synchronous Condensers were not providing energy balancing, but the Market Code was considered the most appropriate tool to get the inputs needed considering that the FASS programs won't be operational in time for the new planned Synchronous Condensers. Generator Member felt that a more holistic picture was required with this proposal.

Renewable Generator Member queried how the times to sync and de-sync would be handled within the Technical Offer Data (TOD). The Proposer advised that TODs would normally feed into Instruction Profiling which would not be calculated for Synchronous Condensers. It was queried that these units could not just be brought on instantaneously and risk being committed to a value it could not deliver. An Observer from EirGrid advised that this could perhaps be covered in Notification times and that commitment times for these units was considered negligeable, however it was considered that the question merits further review.

Renewable Generator Member also queried Transmission System Operator (TSO) contracts for Low Carbon Inertia Services (LCIS) and if anything in this proposal ran contrary to any conditions of those contracts. If a version 2 of this proposal was to be submitted, it was requested that the contracts would be reviewed before then. It was also asked if Commercial Offer Data or Physical Notifications (PNs) would need to be submitted on a daily basis. The Proposer advised that it is envisaged that they would only have to be submitted at the registration stage as standing data; however, the Forecast Availability would have to be submitted regularly.

Generator Member regretted that further engagement had not happened before the meeting and asked the Regulatory Authority (RAs) where the route to market was for those units not covered by Low Carbon Inertia Services (LCIS) and why a decision was taken that certain units won't be able to compete unless they have LCIS contracts. RA Member asked what issue this Modification would cause in this regard, and outlined that CODs are zero for Synchronous Condensers as they do not provide active power. It was clarified that this was a query for Future Arrangements for System Services (FASS) rather than for this Modification.

RA Member outlined that the RAs would consider this Modification to facilitate the November 2025 timeline for implementation of scheduling and dispatch changes for Synchronous Condensers; however, in the medium-term alternatives to the Trading and Settlement Code should be considered for the registration of units that only provide system services and not active power, for example in the context of the system services code.

Generator Member asked what other changes were expected either in terms of additional Modifications or changes to the Balancing Market Principle Statement (BMPS), and whether these will lead to changes to the dispatch hierarchy. The Proposer replied that this was the only aspect that would affect the Trading and Settlement Code. Other changes with regards to the operational dispatch were still in consideration and would require further engagements; only at that point would it be decided which related documentations would need to be updated.

Assetless Member queried if there was an impact on pricing and if these will be considered Decremental Actions. Assurance was given by the Proposer that Synchronous Condensers would not set the price, but they would have an impact on the schedule due to their inertia contributions and the requirement to schedule additional generation to meet their demand, and this would be included in the Long-Term Schedule (LTS).

There was support in principle given for this proposal by the Renewable Generator Member if the queries raised above were answered and various Members stated that they would not be ready to vote until a Version 2 was submitted for review. An EirGrid Representative from the S&D team advised that the timeline to have this proposal implemented was November 2025 and asked the Secretariat if an ad hoc meeting could be held in March with an industry call held by EirGrid's S&D team scheduled before

then. Secretariat confirmed that if a version 2 was brought forward and all the actions agreed could be reviewed and responded to, then a meeting may be accommodated by the Committee.

Generator Member advised it would be beneficial to look at dispatch down and its potential benefits in the Future Market workstream.

INDUSTRY CALL – 26TH FEBRUARY 2025

EirGrid introduced the Modification Proposal and noted there were learnings gained from how previous Scheduling & Dispatch Modifications were raised and discussed. It was advised that the Scheduling & Dispatch Tranche 2 was at the design stage and the target for it to go live was November/December 2025. The design and build would be happening in parallel with SEM Committee approvals and there was a risk associated with this. Assurance was given that if concerns were to be raised on the implementation, the process would be stopped, and the vendors would be engaged with.

A presentation was delivered giving an overview of the Scheduling & Dispatch programme, the current challenges, revenue streams and legal drafting updates.

One participant queried if Synchronous Condenser units would be in the LTS or if the pricing used would appear somewhere. Currently Participants can view Synchronous Condensers registered as Multi Fuel Generators and they would expect to see data flow through to market in the future as well so that they can respond to market signals.

EirGrid explained that the Synchronous Condenser units will appear in all indicative operations schedules and real time schedules such as LTS, RTD, RTC.

A participant asked about tie break rules and where other data on Synchronous Condenser units would be published.

EirGrid provided assurance that current tie break rules would be applied in the same way to Synchronous Condenser units as to all other units and that the TSOs would assess whether updates are required to the relevant documentation. As for publication of data in reports, this would need to be confirmed.

One participant asked about how costs would be applied in tie break situations and how would differentiation on the volume of MVAR/MWs be seen? It was queried if there would be a new report highlighting the different energy consumption and how could they calculate how much service had been provided?

One participant also asked if there was some level of co-optimisation happening in the scheduler?

EirGrid noted that the TSOs would optimise the energy cost while satisfying constraints and that the schedulers would take into account the cost of the additional generation needed to cover the demand used by Synchronous Condenser, in addition to the configurable prices. It was noted that there would be tuning exercises in configuring parameters in order to achieve the correct results.

One participant commented that it would be useful to see reports on which units provided those services and how other units responded in the market. It was advised that a market auction-based approach was needed in the long run and that this project should align with FASS.

EirGrid advised that although FASS is a separate project with longer timelines, they are communicating with them to ensure no misalignment, and a consultation would be run by the FASS team on the long-term approach.

One participant advised that it would be useful to take into consideration how synchronous condensers would transition in FASS as this would help with transparency.

EirGrid advised that they would take this away to consider further.

EirGrid summarised the actions below:

- TSOs to assess whether updates are required to Tie Breaking Rules to mention Synchronous Condensers and will update if required.
- TSOs to confirm reports for System Services Providing Units.
- TSOs to take comments on working more closely with FASS into consideration.

MODIFICATIONS MEETING 127B – 12TH MARCH 2025

The Proposer delivered a presentation on version 3 of this Modification Proposal noting the actions from the Industry Call held on the 26th of February would be addressed and further updates to the legal drafting had been circulated. It was also noted that updates to the Grid Code related Modification were also discussed internally to ensure alignment.

A reminder of the timelines to this proposal was given and the Proposer gave an update on the below actions raised at the Industry Call.

- Tie Breaking Rules – It was confirmed that no updates were required as tie breaking occurs randomly.
- TSO to confirm reports for System Services Providing Units – It was advised that there was an existing report for Operational Schedules and for Dispatch Instructions and there would be no new reports resulting from SDP_06.
- TSO working more closely with Future Arrangements for System Services (FASS) – confirmation given that there was collaboration with SDP and FASS and as per SEMC decision non reserve services would not be included for DASSA go live. Assurance was given that FASS have published a Phased Implementation Roadmap (PIR) and a consultation would be issued in the coming months on non-Reserve products.

The changes to version 3 of this proposal were discussed which included legal drafting changes.

Generator Member queried why Synchronous Condensers should be included in the Trading and Settlement Code. Generator Member questioned why there was no specific mention of Synchronous Condenser Units in the updated definition for Synchronization. The Proposer advised that the units were covered by the updated definition of Generator Unit and the new definition was reviewed by System Operators and in line with Grid Code. A concern was raised that these units do not produce energy, but they were included in the definition of Generator Unit with other energy producing units. MO Member advised that Generator Unit is an umbrella term under which many units fall including DSU and Assetless units which do not produce energy.

Generator Alternate voiced a concern that there wasn't clarity on what this Modification could do in relation to the future arrangements for system services and non-reserve procurement. It was noted that the framework of non-reserve products procurement contract could be tied to a Layered Procurement Framework (LPF), as per the 2023 SEMC Decision, and confirmation was needed on how this proposal would work in respect to this as well as implications to the Residual Availability Determination (RAD)/ Final Assignment Mechanism (FAM). There was a concern that the LPF would contract for the remaining service provision (total system requirement less LCIS procured volumes), and then when it came to dispatching the system, the LCIS contracted assets wouldn't be dispatched and the RAD/FAM would not compensate for the additional Synchronous Inertia Response (SIR) and State-Steady Reactive Power (SSRP) services procured in the Balancing Market. It was advised that Committee Members should have a full view of the consultation paper on non-reserve before making a decision on the Modification. The Proposer advised that the Scheduling and Dispatch Programme related to the

scheduling and dispatch of Synchronous Condensers and that system services contracting was outside their remit. It was further discussed that Synchronous Condensers are system services and they could not be looked at with an S&D lens only. Generator Alternate also queried a statement from the Proposer's presentation in relation to different prices applied which would introduce an additional distinguishing factor between synchronous condensers and how this aligns with European legislation.

Generator Member questioned what was the function of the Modification if Scheduling is out of the TSC and was it just to specify the submission of Commercial and Technical Offer Data (COD and TOD) even though they cannot be profiled? The Proposer advised that Synchronous Condensers currently are registered under the Code but without an appropriate framework, they can submit COD and TODs like a standard unit which leads to sub optimal scheduling outcomes. There was a need to include them in the scheduler in a more optimal way and the Modification defines the data that would be needed for that to happen.

Generator Member noted that this could potentially be the correct solution but there was a lack of governance with this proposal, lack of clear interactions with the FASS program and the Balancing Market Principles Statement needed to be updated. Furthermore, there has been no impact assessment on how dispatch down was going to impact the market in terms of Constraints and how large number of Synchronous Condensers would eventually impact the system.

Generator Member also stated that when LCIS were set up, it was agreed that they would be able to recover their DTUoS network charges. The issue had been raised of how non-LCIS units could recover their full costs and this is yet not been addressed. Mod_13_19 addressed recovery of energy but not Network charges. It was asked if Synchronous Condensers were not under LCIS contract how would the charges be recovered.

It was questioned what the implication would be if this proposal did not meet its timeline. The Proposer confirmed that the status quo would remain, and scheduling of synchronous condensers would be sub optimal. These Service Providers are unique insofar as they consume energy therefore, they might not fit necessarily into the System Services Code. They could be added to FASS, but it was not yet clear if that could happen in its first phase.

DSU Member suggested that this proposal is deemed urgent but impacted the system quite a bit and asked for an impact assessment on Constraints. The Proposer advised that the proposal was raised as standard however the limitation on the release scope would be that it is either implemented in 2025 or would not be able to be implemented. As for the impact assessment that would be taken away, but this proposal was to facilitate renewable targets and optimize the Scheduling process.

RA Member advised that to integrate Synchronous Condensers in the Scheduler was important, and that in the RAs' view this proposal could come in after November 2025 with a number of months' delay, rather than years, if more time was needed to develop it.

Generator Alternate further questioned on why it was not being optimized on diversion from Final Physical Notifications (FPNs). SO Observer explained that with the current set up Synchronous Condensers submit CODs that are not a true reflection of their costs or the cost to the system. with the result of being scheduled more often than needed. This affects the schedulers optimization, so the objective is to reduce overall production costs and only having them scheduled on when needed.

Questions were also raised on setting dummy prices. SO Observer clarified that these prices are only a facility in case a prioritization policy were to be decided upon between LCIS and non-LCIS units. Generator Alternate reflected that it would be a policy matter that would need to be consulted on.

Members finally advised that consideration must be given to updating the Balancing Market Principle Statement (BMPS).

It was agreed that this proposal would be deferred subject to more information on the impact to systems.

MODIFICATIONS MEETING 128 – 9TH APRIL 2025

The Proposer delivered a presentation on this Modification Proposal noting that only the slides with updates from previous Meeting 127B would be addressed. The Proposer went through different scenarios explaining why currently Synchronous Condensers are scheduled even when they are not

required because in the scheduler's eyes, they do not have any associated cost leading to unnecessary payments.

The Proposer went through the actions that were raised at the previous meeting and listed the benefits of reducing the minimum number of conventional unit's constraints from 8 to 5 by the end of 2026 thanks to the correct dispatch of Synchronous Condensers. Other benefits include the reduction of dispatch down of Renewable's, improvement in security of supply and carbon reduction. Assurances were also provided that coordination with the Future Arrangement for System Services (FASS) team was ongoing and that it had been confirmed that the changes proposed in the Modification will not prevent participation in future arrangements for inertia and reactive power.

Generator Alternate advised that at a recent Grid Code review panel, it was advised by a TSO member that a tiebreak decision was based on energy consumption and queried if forcing Synchronous Condensers to bid at zero and have decisions based on consumptions compliant with the Energy Balancing Guidelines (EBGL). It was felt that the TSO main objective in scheduling is to minimize deviation from Final Physical Notification (FPN) and given that Synchronous Condensers don't have FPNs, the conventional units would always be chosen ahead of them as they are providing energy and inertia. Generator Alternate stated it was not clear how this will work or how synchronous condensers will operate. An Observer from EirGrid advised that the scenario of tie breaking was not being represented correctly: in a tiebreak an additional cost is added when the same amount of energy from Generators with the same cost can be provided; this would still be the same for two (or More) Synchronous Condensers with the same consumption and inertia contributions. If a synchronous condenser provides the same level of inertia but consumes less power than another it would be selected on that basis, not requiring the tiebreak logic to be applied. The Observer advised that they would also take the EGBL query away for further review.

The cost of deviating from FPN was also discussed further. Generator Alternate felt that the opportunities for Synchronous Condensers were limited, and they could be underutilized as there was no signal to run those assets. EirGrid Observer replied that was not the case as once a starting point is being identified, which in the case of Synchronous Condensers is zero and for other generators is the FPNs; the objective is to minimize system costs taking into account FPNs, energy requirements and other constraints such as reserve & inertia requirements etc. into account. This means that if required to provide inertia to meet system requirements then synchronous condensers will be considered alongside conventional generators. Generator Alternate felt that an assessment should have been provided regarding the running of Synchronous Condensers because in the past they were given the opposite view that conventional generators would always be favourite and Synchronous Condensers seemed to be left behind with this proposal.

Generator Alternate also noted that the Proposer's presentation included the minimum conventional unit's constraint going from 8 units to 5 in 2026, but the TSO operational roadmap says that anything below 7 probably won't happen until 2028.

Generator Alternate also raised the issue of compensation of Network Charges for non-LCIS (Low Carbon Inertia Services) units which in their view currently constitutes a barrier to entry. RA Member responded that relevant SEM Committee decisions had been reviewed, and nothing was noted to show there would be a rebate for network charges for non-LCIS Synchronous Condensers. Generator Alternate also explained that LCIS units just had to identify the costs and request a refund under their contracts with the TSO but other units in the Market, such as Batteries, can include this in their No-Load Cost. RA Member asked for information to be shared with them regarding LCIS contracts and replied that Batteries provide balancing energy which is not the case for Synchronous Condensers, which goes back to the initial question the RAs and Modifications Committee had regarding why Synchronous Condensers should be included in the Trading and Settlement Code (T&SC) in the first place and not just in the System Services Code.

A Generator Member asked if there would be a dispatch hierarchy for Synchronous Condensers but if their starting point was zero while other units had FPNs, then the comparison would not be like with like. It was also pointed out that the Balancing Market Principal Statement (BMPS) also refers to deviation from FPNs and this Modification does not explain how the optimization of Synchronous Condensers within the scheduler will happen. It was noted that it had been very difficult to go through the various versions of the Proposal without an analysis of the overall impact.

Another Generator Member looked for a guarantee that there will be no obligation or penalty tied to FPNs in the FASS project for Synchronous Condensers. The Proposer provided assurance that the submission of FPNs would not be a determining factor for Synchronous Condensers and explained that the FASS team was satisfied that there would be no barrier created from this Modification in the future development of non-reserve services.

Several Members raised concerns about the process by which this modification proposal was developed and the fact that fundamental issues and questions raised by the Modifications Committee regarding the proposal and treatment of synchronous condensers had not been resolved or addressed. Proposer advised that they were happy for the Proposal to be voted on and following Member feedback the Chair confirmed that a vote would be taken.

Assetless Member asked if there would still be an avenue for non-LCIS Synchronous Condensers to recover Network Charges once a vote is taken. The Proposer replied that it was not in their remit.

8. PROPOSED LEGAL DRAFTING

As per Appendix 1.

9. LEGAL REVIEW

N/A

10. IMPLEMENTATION TIMESCALE

It is recommended that this Modification is implemented on a Trading Day basis following the relevant Market System Release.

1 APPENDIX 1: MOD_01_25 SYNCHRONOUS CONDENSERS SDP_06 V3

Proposer *(Company)*	**Date of receipt** *(assigned by Secretariat)*	**Type of Proposal** *(delete as appropriate)*	**Modification Proposal ID** *(assigned by Secretariat)*
EirGrid	**10th March 2025**	**Standard**	**Mod_01_25 v3**

Contact Details for Modification Proposal Originator		
Name	**Telephone number**	**Email address**
Elaine Corcoran		

Modification Proposal Title
Synchronous Condensers SDP_06

Documents affected *(delete as appropriate)*	**Section(s) Affected**	**Version number of T&SC or Agreed Procedure used in Drafting**
T&SC **Appendices** **Glossary**	**T&SC:** B.7.2.2, B.9.6.1, B.9.6.2, D.4.2.11A, D.4.2.12, D.4.2.15, D.4.3.4, D.4.4.1, D.7.1.4, F.2.8.1, F.2.8.2, F.2.8.3, F.2.8.4, F.2.8.5, F.5.3.2, F.12.2.3, F.19.2.2, F.19.4.2, F.20.3.2 **Appendix I:** Table 1, Table 2, paragraph 15 **Appendix K:** paragraph 2, paragraph 25A, Table 35A **Appendix O:** paragraph 6 **Glossary**: Definitions and List of Variables and Parameters	**V30 + Mod_02_24 (SDP_02 Battery Integration V3)**

Explanation of Proposed Change *(mandatory by originator)*
The integration of synchronous condensers is a crucial step in enabling Ireland's transition towards achieving 80% renewable electricity (RES-E) and 95% System Non-Synchronous Penetration (SNSP) by 2030. Synchronous condensers play a vital role in ensuring system stability by providing inertia, reactive power control, as well as addressing short circuits. The current market and scheduling framework does not accommodate the unique characteristics of synchronous condensers, leading to inefficiencies in scheduling and dispatch of these units. Initiative 6 of

the Scheduling & Dispatch Programme (SDP_06) seeks to address these issues by introducing a structured approached to the registration and data submission of synchronous condensers within the Trading and Settlement Code (TSC) and establishing optimal scheduling and dispatch mechanisms for synchronous condensers to ensure they meet applicable system service requirements.

Synchronous condensers are not accounted for in the TSC at present, meaning multiple workarounds are in place to accommodate current operational synchronous condensers. At present, synchronous condensers are modelled as multi-fuel generator units in the Market Management System (MMS), which does not support negative dispatch instruction for such units, nor does it allow units to be considered "ON" at 0MW. To work around this limitation, synchronous condensers are issued a 1MW dispatch instruction, which is unreflective of their unique operational characteristics. Additionally, synchronous condensers are capable of submitting non-zero Commercial Offer Data (COD) such as Start Up Costs, No Load Costs and Incremental and Decremental Price/Quantity Pairs in the Balancing Market. These non-zero costs can force scheduling / dispatch outcomes that may not be optimal.

This modification introduces changes to the TSC, which can be summarised as follows:

- 'Synchronous Condenser Units' is defined in the TSC Glossary. The definition of 'Generator Unit' and 'Fuel Type' have also been updated.
- Registration criteria for Synchronous Condenser Units has been defined in TSC Chapter B.
- Physical Notifications (PNs) for Synchronous Condenser Units shall be zero.
- The following elements of Commercial Offer Data (COD) shall be zero:
    - Start Up Costs
    - No Load Costs
    - Incremental and Decremental Price/Quantity pairs
- Synchronous Condenser Units shall submit Technical Offer Data (TOD) that is relevant to Synchronous Condenser Units. The applicable fields will be defined in TSC Appendix I – Offer Data.
- Instruction Profiling will not be performed for Synchronous Condenser Units.
- Dispatch Quantity data will not be calculated for Synchronous Condenser Units.

The application of Mod_13_19 will remain, meaning that units providing system services at 0MW (including synchronous condensers) will not incur charges for their energy consumption while providing these services.

The changes between Version 1 (V1) to Version 2 (V2) of the modification proposal are highlighted below:

- Synchronous Condenser Units will not be entirely excluded from submitting Commercial Offer Data (COD), and will submit their Forecast Availability Profile, Forecast Minimum Output Profile and Forecast Minimum Stable Generation Profile. This data is necessary for scheduling purposes.

- Appendix I – An additional column has been added to *Table 1 – Commercial Offer Data Elements*, titled "Synchronous Condenser Unit". This column will reflect the elements of COD to be submitted by Synchronous Condenser Units, as listed above.
- Appendix I – Synchronous Condensers will submit three additional elements of TOD outlined in *Table 2 – Technical Offer Data Elements*. These are Start Up Time (Hot, Warm and Cold).
- All references to 'DS3 System Services' have been changed to 'System Services' throughout the TSC, Appendix, and Glossary since the 'DS3 System Services 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.

The changes between Version 2 (V2) and Version 3 (V3) of the modification proposal are highlighted below:

- Clarifications to Forecast Availability Profile, Forecast Minimum Output Profile and Forecast Minimum Stable Generation Profile in D.4.2.11A, D.4.2.12, D.4.2.15 respectively.
- Clarification to the definition of "Synchronisation" in the Glossary.

Note: Changes to ensure optimal scheduling and dispatch mechanisms for synchronous condensers will be required as part of SDP_06 but will not form part of the TSC modification.

Implementing this modification will establish a structured framework for synchronous condensers within the TSC and eliminate the workarounds in place for their registration, scheduling and dispatch. SDP_06 will provide a scalable solution that can accommodate more synchronous condensers as they become operational in Ireland and Northern Ireland. By formalising these changes, SDP_06 will provide an improved and more efficient solution for the stable integration of synchronous condensers into Ireland's evolving energy market.

Legal Drafting Change

*(Clearly show proposed code change using **tracked** changes, if proposer fails to identify changes, please indicate best estimate of potential changes)*

From the Code:

B. LEGAL AND GOVERNANCE

B.7.2 Participation Notices

B.7.2.2 A Party (or Applicant, as applicable) shall, in a Participation Notice in respect of a Generator Unit, specify if the Unit is:

(a) a Wind Power Unit;

(b) an Energy Limited Generator Unit;

(c) a Pumped Storage Unit;

(d) a Battery Storage Unit;

(e) a Demand Side Unit;

(f) an Aggregated Generator Unit;

(g) a Trading Unit;

(h) an Assetless Unit;

(i) a Dual Rated Generator Unit; ~~or~~

(j) a Solar Power Unit; or

(k) a Synchronous Condenser Unit.

B.9.6.1 For each Synchronous Condenser Unit, a Party (or Applicant as applicable) shall register as part of a single Trading Site in accordance with this section B.9:

(a) the Synchronous Condenser Unit or Units;

(b) a single Supplier Unit which is a Trading Site Supplier Unit; and

(c) no other Unit.

B.9.6.2 Any Trading Site with a Synchronous Condenser Unit must meet and continue to meet the following criteria:

(a) the Trading Site shall have the technical and operational capability to deliver agreed System Services in response to Dispatch Instructions from the relevant System Operator in accordance with the relevant Grid Code; and

(b) the Demand Site shall have appropriate equipment to permit real-time monitoring of delivery by the relevant System Operator.

BALANCING MARKET DATA SUBMISSION

D.4.2.11A A Participant shall ensure that values of the Forecast Availability Profile submitted in respect of Synchronous Condenser Units, as part of Commercial Offer Data, shall be equal to zero in each relevant Imbalance Settlement Period.

D.4.2.12 A Participant shall ensure that values of the Forecast Minimum Output Profile submitted in respect of Pumped Storage Units, ~~or~~ Battery Storage Units or Synchronous Condenser Units, as part of Commercial Offer Data, shall be equal to the expected pumping capability for that Pumped Storage Unit, ~~or~~ storage capability for that Battery

Storage Unit or Demand for that Synchronous Condenser Unit (as the case may be) in each relevant Imbalance Settlement Period.

D.4.2.15 A Participant shall ensure that values of the Forecast Minimum Stable Generation Profile submitted in respect of Battery Storage Units and Synchronous Condenser Units, as part of Commercial Offer Data, shall be equal to zero.

D.4.3 Start Up Costs and No Load Costs

D.4.3.4 In respect of a Synchronous Condenser Unit, No Load Cost, Cold Start Up Cost, Warm Start Up Cost and Hot Start Up Cost components of Complex Bid Offer Data, including Default Data shall be zero.

D.4.4 Incremental and Decremental Price Quantity Pairs

D.4.4.1 A Participant submitting Commercial Offer Data in respect of a Generator Unit, u, which is not a Synchronous Condenser Unit:

(a) shall include a set of Incremental Price Quantity Pairs; and
(b) shall include a set of Decremental Price Quantity Pairs.

D.7.1 Physical Notification Data Format

D.7.1.4 Participants shall ensure that all Physical Notification Data submitted in respect of a Generator Unit are consistent with the Technical Offer Data for that Generator Unit, except for Synchronous Condenser Units where Physical Notification Data shall be 0 in all circumstances.

CALCULATION OF PAYMENTS AND CHARGES

F.2.8 ~~DS3~~ System Services Provider

Subject to F.2.8.3, each System Operator shall submit to the Market Operator, in accordance with the Settlement Calendar, in respect of each Trading Site Supplier Unit which is registered in a Trading Site with a ~~DS3~~ System Service Providing Unit contracted with the respective System Operator under the ~~DS3~~ System Services Arrangements to provide ~~DS3~~ System Services at zero MW exported energy, a flag with a value of 1 for each imbalance settlement periods where the ~~DS3~~ System Services Providing Unit is dispatched to provide ~~DS3~~ System Services to the System Operator.

Each System Operator shall submit the flag referred to in F.2.8.1 in accordance with the Appendix K “Other Market Data Transaction” based on the settlement of the respective ~~DS3~~ System Services Providing Unit under the ~~DS3~~ System Service Arrangements.

The System Operators shall not submit the flag referred to in F.2.8.1 for any Trading Site Supplier Unit, v, which is on a Trading Site, s, where a Demand Side Unit or any Autoproducer Unit is also registered to that Trading Site.

The Market Operator shall derive the binary value of the ~~DS3~~ System Services Provider Flag (SSPFvy) for each Trading Site Supplier Unit, v, which is on the Trading Site, s, in each Imbalance Settlement Period, y, in accordance with F.2.8.5.

The Market Operator shall set the ~~DS3~~ System Services Provider Flag (SSPFvγ) to zero unless a value of one has been submitted by the System Operator for a Trading Site Supplier Unit, v, which is on Trading Site, s, in imbalance Settlement Period, γ, in accordance with F.2.8.1.

F.5.3 Calculation of Imbalance Component Payments and Charges

F.5.3.2 The Market Operator shall calculate the Imbalance Component Payment or Charge ($CIMB_{v\gamma}$) for each Supplier Unit, v, in Imbalance Settlement Period, γ, as follows:

$\text{if } (\text{SSPFvy} = 0, \text{then}$

$CIMB_{v\gamma} = PIMB_{\gamma} \times (QMLF_{v\gamma} - QEX_{v\gamma})$

$Else$

$CIMB\,v\gamma = 0)$

where:

(a) $SSPF_{v\gamma}$ is the ~~DS3~~ System Service Provider Flag for Supplier Unit, v, in Imbalance Settlement Period, γ.

(b) $PIMB_{\gamma}$ is the Imbalance Settlement Price in Imbalance Settlement Period, γ, calculated in accordance with Chapter E (Imbalance Pricing);

(c) $QMLF_{v\gamma}$ is the Loss-Adjusted Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ; and

(d) $QEX_{v\gamma}$ is the Ex-Ante Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ.

F.12.2 Calculation of Imperfections Charges

F.12.2.3 The Market Operator shall calculate the Imperfections Charge ($CIMP_{v\gamma}$) for each Trading Site Supplier Unit, v, in each Imbalance Settlement Period, γ, as follows:

$if\,(SSPFvy = 0\ then$

$$CIMP_{v\gamma} = Min\left(\sum_{u \in s} QMLF_{u\gamma} + \sum_{v \in s} QMLF_{v\gamma}, 0\right) \times PIMP_{y} \times FCIMP_{\gamma}$$

else

$$CIMP_{v\gamma} = 0$$

where:

(a) $SSPF_{v\gamma}$ is the ~~DS3~~ System Services Provider Flag for Supplier Unit, v, in Imbalance Settlement Period, γ.

(b) $PIMP_y$ is the Imperfections Price for Year, y;

(c) $QMLF_{v\gamma}$ is the Loss-Adjusted Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ;

(d) $QMLF_{u\gamma}$ is the Loss-Adjusted Metered Quantity for Generator Unit, u, in Imbalance Settlement Period, γ;

(e) $\sum_{u \in s}$ is a summation over all Generator Units, u, in Trading Site, s, relevant to the Trading Site Supplier Unit;

(f) $\sum_{v \in s}$ is the value for the single Trading Site Supplier Unit, v, in Trading Site, s, in accordance with paragraph B.9.1.2; and

(g) $FCIMP_\gamma$ is the Imperfections Charge Factor for Imbalance Settlement Period, γ.

F.19.2 Calculation of Capacity Charges

F.19.2.2 The Market Operator shall calculate the Capacity Charge ($CCC_{v\gamma}$) for each Supplier Unit, v, which is a Trading Site Supplier Unit, in each Imbalance Settlement Period, γ, as follows:

$$if (SSPFvy = 0\ then$$

$$CCC_{v\gamma} = Min\left(\sum_{u \in s} QMLF_{u\gamma} + \sum_{v \in s} QMLF_{v\gamma}, 0\right) \times FQMCC_\gamma \times PCCSUP_y$$

$$else$$

$$CCC_{v\gamma} = 0$$

where:

(a) $SSPF_{v\gamma}$ is the ~~DS3~~ System Services Provider Flag for Supplier Unit, v, in Imbalance Settlement Period, γ.

(b) $QMLF_{v\gamma}$ is the Loss-Adjusted Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ;

(c) $QMLF_{u\gamma}$ is the Loss-Adjusted Metered Quantity for Generator Unit, u, in Imbalance Settlement Period, γ;

(d) $PCCSUP_y$ is the Supplier Capacity Charge Price in Capacity Year, y;

(e) $FQMCC_\gamma$ is the Capacity Charge Metered Quantity Factor in Imbalance Settlement Period, γ;

(f) $\sum_{u \in s}$ means the value for all Generator Units, u, in Trading Site, s, relevant to the Trading Site Supplier Unit; and

(g) $\sum_{v \in s}$ means the value for the single Trading Site Supplier Unit, v, in Trading Site, s, in accordance with paragraph B.9.1.2.

F.19.4 Calculation of Difference Payment Socialisation Charges

F.19.4.2 The Market Operator shall calculate the Difference Payment Socialisation Charge ($CSOCDIFFP_{vγ}$) for each Supplier Unit, v, which is a Trading Site Supplier Unit, in each Imbalance Settlement Period, γ, as follows:

$$if (SSPFvy = 0 \; then$$

$$CSOCDIFFP_{vγ} = Min\left(\sum_{u \in s} QMLF_{uγ} + \sum_{v \in s} QMLF_{vγ}, 0\right) \times FQMCC_{γ} \times PCCSUP_{y} \times FSOCDIFFP_{y}$$

$$else$$

$$CSOCDIFFP_{vγ} = 0$$

where:

(a) $SSPF_{vγ}$ is the ~~DS3~~ System Services Provider Flag for Supplier Unit, v, in Imbalance Settlement Period, γ.

(b) $QMLF_{vγ}$ is the Loss-Adjusted Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ;

(c) $QMLF_{uγ}$ is the Loss-Adjusted Metered Quantity for Generator Unit, u, in Imbalance Settlement Period, γ;

(d) $PCCSUP_{y}$ is the Supplier Capacity Charge Price in Capacity Year, y;

(e) $FQMCC_{γ}$ is the Capacity Charge Metered Quantity Factor in Imbalance Settlement Period, γ;

(f) $\sum_{u \in s}$ is a summation over all Generator Units, u, in Trading Site, s, relevant to the Trading Site Supplier Unit;

(g) $\sum_{v \in s}$ is the value for the single Trading Site Supplier Unit, v, in Trading Site, s, in accordance with paragraph B.9.1.2; and

(h) $FSOCDIFFP_{y}$ is the Difference Payment Socialisation Multiplier in Capacity Year, y.

F.20.3 Calculation of Imbalance Difference Quantities and Payments

F.20.3.2 The Market Operator shall calculate the Imbalance Difference Quantity ($QDIFFPIMB_{v\gamma}$) for each Trading Site Supplier Unit, v, in each Imbalance Settlement Period, γ, as follows:

$$if (SSPFvy = 0 \; then$$

$$QDIFFPIMB_{v\gamma} = Min\left(\sum_{u \in s} QMLF_{u\gamma} + \sum_{v \in s} QMLF_{v\gamma}, 0\right)$$

$$else$$

$$QDIFFPIMB_{v\gamma} = 0$$

where:

(a) $SSPF_{v\gamma}$ is the ~~DS3~~ System Services Provider Flag for Supplier Unit, v, in Imbalance Settlement Period, γ.

(b) $\sum_{u \in s}$ is a summation over all Generator Units, u, in Trading Site, s, relevant to the Trading Site Supplier Unit;

(c) $\sum_{v \in s}$ is the value for the single Trading Site Supplier Unit, v, in Trading Site, s, in accordance with paragraph B.9.1.2;

(d) $QMLF_{u\gamma}$ is the Loss-Adjusted Metered Quantity for Generator Unit u in Imbalance Settlement Period γ; and

(e) $QMLF_{v\gamma}$ is the Loss-Adjusted Metered Quantity for Supplier Unit, v, in Imbalance Settlement Period, γ.

From Appendices:

APPENDIX I : OFFER DATA

COMMERCIAL OFFER DATA

Commercial Offer Data for Generator Units

A Participant shall only submit Commercial Offer Data to the Market Operator in respect of its Generator Units, as provided for in **Error! Not a valid bookmark self-reference.**.

Table 1 – Commercial Offer Data Elements

Data Element	**Energy Limited Unit**	**Demand Side Unit**	**Synchronous Condenser Unit**	**Other Generator Units not included in paragraph** Error! Reference source not found. **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	Yes	Yes

Forecast Minimum Output Profile (MW)	Yes	Yes	Yes	Yes
Forecast Minimum Stable Generation Profile (MW)	Yes	Yes	Yes	Yes

TECHNICAL OFFER DATA

Technical Offer Data for Generator Units

A Participant shall only submit Technical Offer Data to the Market Operator in respect of its Generator Units as provided for in **Error! Reference source not found.**.

Table 2 – Technical Offer Data Elements

	TYPE OF DATA		SUBMISSION REQUIREMENT BY UNIT				
	Validation Technical Offer Data	**Validation Registration Data**	**Battery Storage Unit**	**Pumped Storage Unit**	**Demand Side Unit**	**Synchronous Condenser Unit**	**Other Generator Units not included in paragraph Error! Reference source not found. of this Appendix**
Minimum On Time (hours)	Yes		Yes	Yes		Yes	Yes
Minimum Off Time (hours)	Yes		Yes	Yes		Yes	Yes
Maximum On Time (hours)	Yes		Yes	Yes		Yes	Yes
Synchronous Start Up Time Hot (hours)	Yes		Yes	Yes		Yes	Yes
Synchronous Start Up Time Warm (hours)	Yes		Yes	Yes		Yes	Yes
Synchronous Start Up Time Cold (hours)	Yes		Yes	Yes		Yes	Yes

Block Load Cold (MW)	Yes		Yes	Yes			Yes
Block Load Hot (MW)	Yes		Yes	Yes			Yes
Block Load Warm (MW)	Yes		Yes	Yes			Yes
Deload Break Point (MW)	Yes		Yes	Yes			Yes
Deloading Rate 1 (MW / minute)	Yes		Yes	Yes			Yes
Deloading Rate 2 (MW / minute)	Yes		Yes	Yes			Yes
Dwell Time Up 1 (minutes)	Yes		Yes	Yes			Yes
Dwell Time Up 2 (minutes)	Yes		Yes	Yes			Yes
Dwell Time Up 3 (minutes)	Yes		Yes	Yes			Yes
Dwell Time Down 1 (minutes)	Yes		Yes	Yes			Yes
Dwell Time Down 2 (minutes)	Yes		Yes	Yes			Yes
Dwell Time Down 3 (minutes)	Yes		Yes	Yes			Yes
Dwell Time Up Trigger Point 1 (MW)	Yes		Yes	Yes			Yes
Dwell Time Up Trigger Point 2 (MW)	Yes		Yes	Yes			Yes

Dwell Time Up Trigger Point 3 (MW)	Yes		Yes	Yes			Yes
Dwell Time Down Trigger Point 1 (MW)	Yes		Yes	Yes			Yes
Dwell Time Down Trigger Point 2 (MW)	Yes		Yes	Yes			Yes
Dwell Time Down Trigger Point 3 (MW)	Yes		Yes	Yes			Yes
End Point of Start Up Period (MW)	Yes		Yes	Yes			Yes
Load Up Break Point Cold 1 (MW)	Yes		Yes	Yes			Yes
Load Up Break Point Cold 2 (MW)	Yes		Yes	Yes			Yes
Load Up Break Point Hot 1 (MW)	Yes		Yes	Yes			Yes
Load Up Break Point Hot 2 (MW)	Yes		Yes	Yes			Yes
Load Up Break Point Warm 1 (MW)	Yes		Yes	Yes			Yes
Load Up Break Point Warm 2 (MW)	Yes		Yes	Yes			Yes

Loading Rate Cold 1 (MW / minute)	Yes		Yes	Yes			Yes
Loading Rate Cold 2 (MW / minute)	Yes		Yes	Yes			Yes
Loading Rate Cold 3 (MW / minute)	Yes		Yes	Yes			Yes
Loading Rate Hot 1 (MW / minute)	Yes		Yes	Yes			Yes
Loading Rate Hot 2 (MW / minute)	Yes		Yes	Yes			Yes
Loading Rate Hot 3 (MW / minute)	Yes		Yes	Yes			Yes
Loading Rate Warm 1 (MW / minute)	Yes		Yes	Yes			Yes
Loading Rate Warm 2 (MW / minute)	Yes		Yes	Yes			Yes
Loading Rate Warm 3 (MW / minute)	Yes		Yes	Yes			Yes
Ramp Down Break Point 1 (MW)	Yes		Yes	Yes			Yes
Ramp Down Break Point 2 (MW)	Yes		Yes	Yes			Yes

Ramp Down Break Point 3 (MW)	Yes		Yes	Yes			Yes
Ramp Down Break Point 4 (MW)	Yes		Yes	Yes			Yes
Ramp Down Rate 1 (MW / minute)	Yes		Yes	Yes		Yes	Yes
Ramp Down Rate 2 (MW / minute)	Yes		Yes	Yes			Yes
Ramp Down Rate 3 (MW / minute)	Yes		Yes	Yes			Yes
Ramp Down Rate 4 (MW / minute)	Yes		Yes	Yes			Yes
Ramp Down Rate 5 (MW / minute)	Yes		Yes	Yes			Yes
Ramp Up Break Point 1 (MW)	Yes		Yes	Yes			Yes
Ramp Up Break Point 2 (MW)	Yes		Yes	Yes			Yes
Ramp Up Break Point 3 (MW)	Yes		Yes	Yes			Yes
Ramp Up Break Point 4 (MW)	Yes		Yes	Yes			Yes
Ramp Up Rate 1 (MW / minute)	Yes		Yes	Yes		Yes	Yes
Ramp Up Rate 2 (MW / minute)	Yes		Yes	Yes			Yes

Ramp Up Rate 3 (MW / minute)	Yes		Yes	Yes			Yes
Ramp Up Rate 4 (MW / minute)	Yes		Yes	Yes			Yes
Ramp Up Rate 5 (MW / minute)	Yes		Yes	Yes			Yes
Soak Time Cold 1 (minutes)	Yes		Yes	Yes			Yes
Soak Time Cold 2 (minutes)	Yes		Yes	Yes			Yes
Soak Time Trigger Point Cold 1 (MW)	Yes		Yes	Yes			Yes
Soak Time Trigger Point Cold 2 (MW)	Yes		Yes	Yes			Yes
Soak Time Hot 1 (minutes)	Yes		Yes	Yes			Yes
Soak Time Hot 2 (minutes)	Yes		Yes	Yes			Yes
Soak Time Trigger Point Hot 1 (MW)	Yes		Yes	Yes			Yes
Soak Time Trigger Point Hot 2 (MW)	Yes		Yes	Yes			Yes
Soak Time Warm 1 (minutes)	Yes		Yes	Yes			Yes
Soak Time Warm 2 (minutes)	Yes		Yes	Yes			Yes

Soak Time Trigger Point Warm 1 (MW)	Yes		Yes	Yes			Yes
Soak Time Trigger Point Warm 2 (MW)	Yes		Yes	Yes			Yes
Start of Restricted Range 1 (MW)	Yes		Yes	Yes		Yes	Yes
End of Restricted Range 1 (MW)	Yes		Yes	Yes		Yes	Yes
Start of Restricted Range 2 (MW)	Yes		Yes	Yes			Yes
End of Restricted Range 2 (MW)	Yes		Yes	Yes			Yes
Hot Cooling Boundary (hours)	Yes		Yes	Yes			Yes
Warm Cooling Boundary (hours)	Yes		Yes	Yes			Yes
Block Load Flag (True or False)	Yes		Yes	Yes		Yes	Yes
Short-Term Maximisation Capability (MW)	Yes		Yes	Yes			Yes
Short-Term Maximisation Time (minutes)	Yes		Yes	Yes			Yes

Registered Minimum Stable Generation (MW)	Yes		Yes	Yes		Yes	Yes
Registered Minimum Output (MW)		Yes	Yes	Yes		Yes	Yes
Pumped Storage Cycle Efficiency (percentage)	Yes			Yes			
Battery Storage Efficiency (percentage)	Yes		Yes				
Pumping Capacity (MW)	Yes			Yes			
Off to Generating Time (minutes)	Yes			Yes			
Off to Spin Pump Time (minutes)	Yes			Yes			
Spin Pump to Pumping Energy Time (minutes)	Yes			Yes			
Battery Storage Capacity (MW)	Yes		Yes				

Minimum Battery Storage Quantity (MWh)		Yes	Yes				
Maximum Battery Storage Quantity (MWh)		Yes	Yes				
Maximum Storage Quantity (MWh)		Yes		Yes			
Minimum Storage Quantity (MWh)		Yes		Yes			
Maximum Ramp Down Rate (MW / minute)	Yes				Yes		
Maximum Ramp Up Rate (MW / minute)	Yes				Yes		
Minimum Down Time (hours)	Yes				Yes		
Maximum Down Time (hours)	Yes				Yes		

PHYSICAL NOTIFICATION DATA

Physical Notification Data Submission

Participants shall not submit Physical Notification Data in respect of each of the following Generator Units:

(a) Trading Unit;

(b) Assetless Unit;

(c) Interconnector Residual Capacity Unit; ~~or~~

(d) Interconnector Error Unit; or

(e) Synchronous Condenser Unit.

APPENDIX K: OTHER MARKET DATA TRANSACTIONS

DATA TRANSACTIONS

The Data Transactions in this Appendix K include:

Data Transactions from System Operator to Market Operator

System Parameters (FCLAF)

Loss Adjustment Factors (FTLAF and FDLAF)

Generator Unit Technical Characteristics

Short Term Reserves (qSTR and qORR)

System Operator Flags (FSO, FNM and FSS)

Demand Control (QDC)

System Characteristics (FRQAVG and FRQNOR)

Dispatch Instructions

SO Interconnector Trades

SO Interconnector Physical Notifications

Annual Load Forecast

Four Day Load Forecast

Wind and Solar Power Unit Forecast

Uninstructed Imbalance Parameters (FPUG, FDOG, FUREG, TOLMW, TOLENG)

Testing Tariffs

Strike Price Parameters (PCARBON, PFUELNG and PFUELO)

(p2) ~~DS3~~ System Services Provider Flag

Data Transactions from Interconnector Administrator to Market Operator

Interconnector Capacity Market Availability

~~DS3~~ System Services Provider Flag Data Transaction

25A The Data Records for the ~~DS3~~ System Services Provider Flag Data Transaction are described in Table 35A and the Submission Protocol in Table 35B.

Table 35A – System Services Provider Flag Data Records

Jurisdiction
Trading Site Unit
Trading Day
Imbalance Settlement Period
~~DS3~~ System Services Provider Flag Value

APPENDIX O: INSTRUCTION PROFILING CALCULATIONS

Instruction Profiling shall not be performed for Generator Units which are not Dispatchable and not Controllable, Assetless Units, ~~or~~ Interconnector Residual Capacity Units or Synchronous Condenser Units, and the values of Dispatch Quantity for these Generator Units, where applicable, shall be calculated as set out in section F.2.4.

From Glossary:

DEFINITIONS

~~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.

Fuel Type	means the fuel or fuels registered in accordance with the Grid Code as the principal fuel(s) authorised for energy production by the Generator Unit except for Synchronous Condenser Units where the Fuel Type will be set to 'SYNCHRONOUS_CONDENSER'.
Generator Unit	means one or more Generators, other item of Dispatchable plant or a notional unit registered as a Generator Unit under this Code. For the purposes of the Code a Generator Unit may be any one of the following types: (b) physical: Aggregated Generator Unit, Demand Side Unit, Energy Limited Generator Unit, Hydro-electric Generator Unit, Pumped Storage Unit, Battery Storage Unit, Trading Unit, Wind Power Unit, Solar Power Unit, ~~or~~ Dual Rated Generator Unit or a Synchronous Condenser Unit; (c) notional: Assetless Unit, which includes a unit registered by a SEM NEMO or a Shipping Agent under section B.8, an Interconnector Error Unit or Interconnector Residual Capacity Unit.
Synchronous Condenser Unit	A Dispatchable apparatus that provides System Services only, as agreed with the System Operator.
Synchronisation	means the process where a Generator Unit or Interconnector is preparing to connect ~~and produce energy on~~ to the system to which it is Connected in accordance with a Dispatch Instruction as appropriate, so that the frequencies, voltage levels and phase relationships of that Generator Unit or Interconnector, as the case may be and the system to which it is Connected are aligned. "Desynchronisation", "Synchronised" "Synchronise" and "Desynchronised" will be interpreted accordingly.

LIST OF VARIABLES AND PARAMETERS

Topic:	Element:	Long Name:	Definition/Description:	Units:
Variable	$SSPF_{v\gamma}$	~~DS3~~ System Services Provider Flag	~~DS3~~ System Services Provider Flag for Supplier Unit, v, in Imbalance Settlement Period, γ	Number

Modification Proposal Justification

(Clearly state the reason for the Modification)

These changes will allow the TSOs to accommodate synchronous condensers by establishing a structured framework within the TSC and eliminate the workarounds currently in place for their registration, scheduling and dispatch. SDP_06 will provide a scalable solution that can accommodate more synchronous condensers as they become operational in Ireland and Northern Ireland. By formalising these changes, SDP_06 will provide an

improved and more efficient solution for the stable integration of synchronous condensers into Ireland's evolving energy market.

Code Objectives Furthered

(State the Code Objectives the Proposal furthers, see Section A.2.1.4 of Pa of the T&SC for Code Objectives)

The aim of this Modification is to further the following Code objectives:

(d) to facilitate the participation of electricity undertakings engaged in the generation, supply or sale of electricity in the trading arrangements under the Single Electricity Market;

(g) to promote the short-term and long-term interests of consumers of electricity on the island of Ireland with respect to price, quality, reliability, and security of supply of electricity.

Implication of not implementing the Modification Proposal

(State the possible outcomes should the Modification Proposal not be implemented)

The Scheduling & Dispatch Programme aims to enhance scheduling and dispatch processes in Ireland and Northern Ireland and facilitate low carbon grid technologies such as synchronous condensers. Over the coming years, more synchronous condensers will become operational and if this modification is not implemented, the current limitations and workarounds described for synchronous condenser units will remain in place.

Working Group *(State if Working Group considered necessary to develop proposal)*	**Impacts** *(Indicate the impacts on systems, resources, processes and/or procedures; also indicate impacts on any other Market Code such as Capacity Market Code, Grid Code, Exchange Rules etc.)*
N/A	Impact Assessment on Market System changes to be provided by the vendor.

Please return this form to Secretariat by email to balancingmodifications@sem-o.com