Scheduling & Dispatch Programme – SDP_06

Mod_01_25 V3

Modifications Meeting 128 – 9th April 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"

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Agenda

1. Scheduling & Dispatch Programme
2. Background
3. Mod_01_25 History
4. Actions from Modifications Meeting 127B
5. Modification Proposal
6. 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.

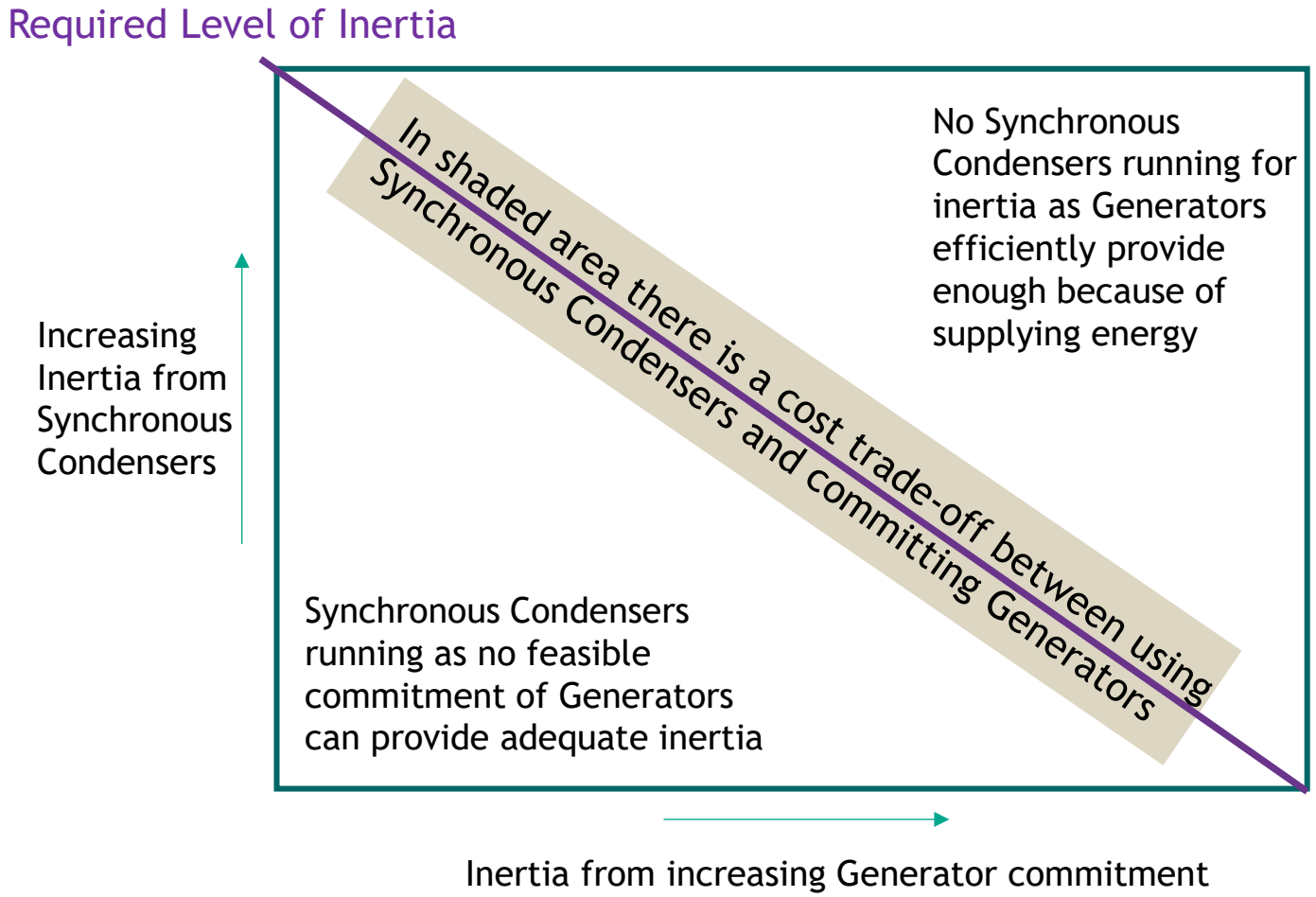
SDP_06 aims to:

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

Background

The Issue Driving this Mod (1/2)

- Actual commitment of generators and synchronous condensers is determined in Scheduling & Dispatch.
  - Commitment of units maintains minimum inertia levels.
  - Ideally this would reflect logic on right.
- Synchronous condensers are funded under DS3 / LCIS.
  - Scheduling systems lack a purpose-built model of synchronous condensers
  - The limits of the simplification used is driving the commitment of synchronous condensers inconsistent from logic and at an unnecessary cost to suppliers

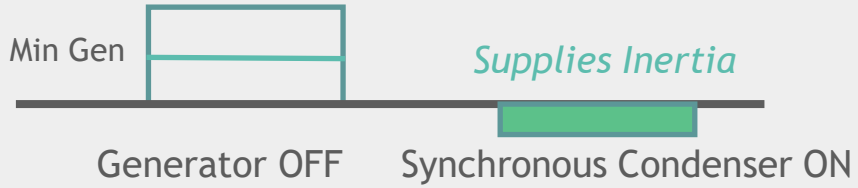


The Issue Driving this Mod (2/2)

The Ideal

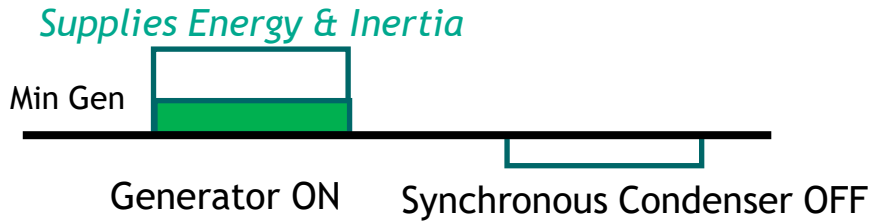
Scenario 1

Either not enough inertia from generators or (as shown) a Synchronous Condenser commitment preferrable to a generator commitment.

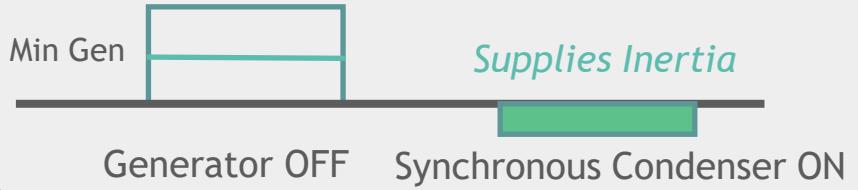


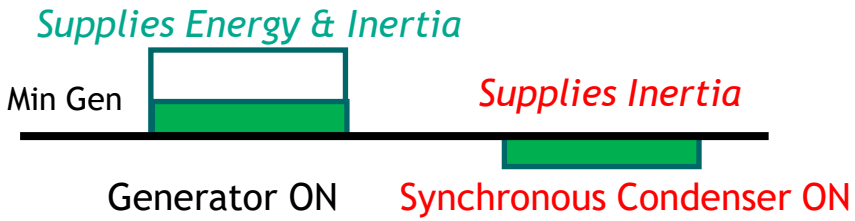
Scenario 2

Generators provide enough inertia as by-product of providing energy so Synchronous Condenser not needed.



The Reality





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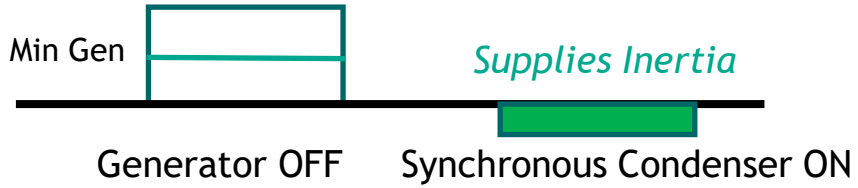

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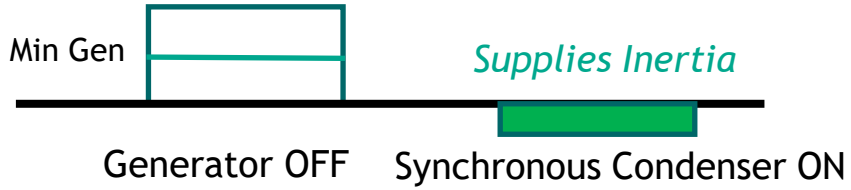

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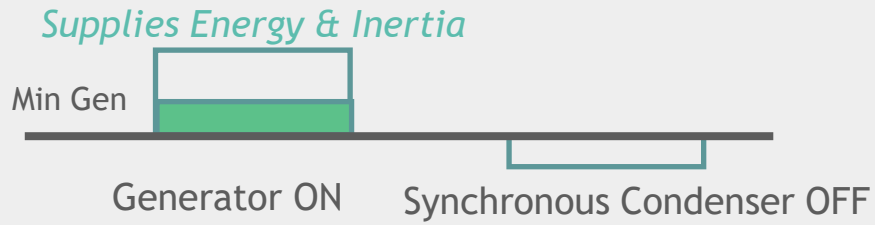

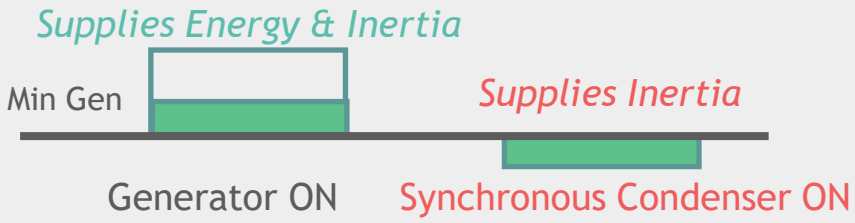

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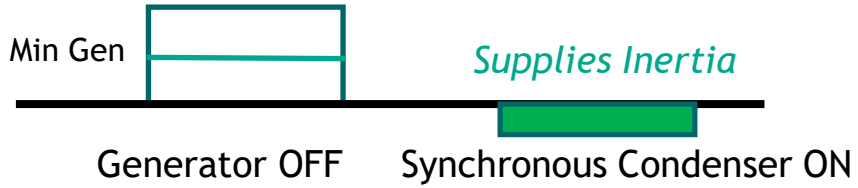

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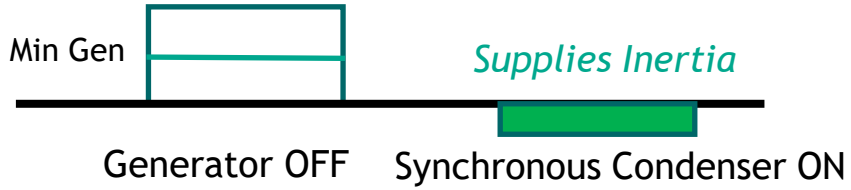

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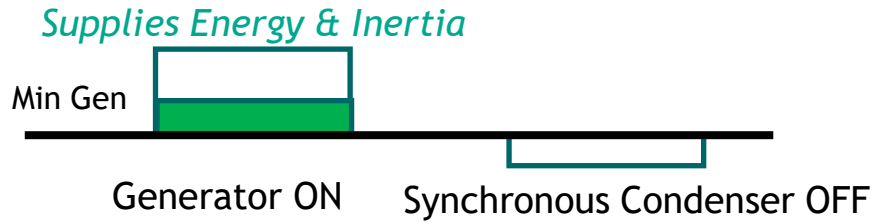

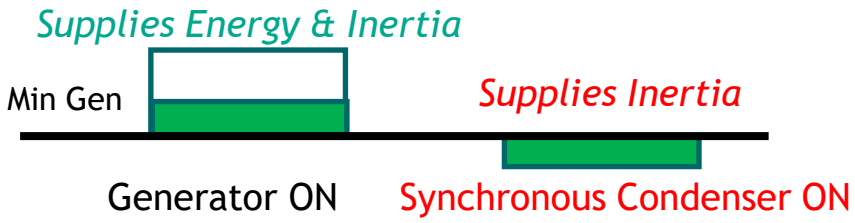

Dispatch systems currently cannot commit a load. Thus, a Synchronous Condenser is currently represented as a high inertia 1MW generator. Synchronous Condensers are bidding with negative Inc prices so the cost minimising optimisation wants to schedule it always.

The current situation leads to an inefficient outcome where by Synchronous Condensers are being scheduled when there is no requirement for them to provide inertia. This has led to an unnecessary increase in total system cost (Production and System Services). This issue is likely to worsen as the number of Synchronous Condensers increases.

Background - Mod_13_19

- The aim of Mod_13_19 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.

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Mod_01_25 History

Mod_01_25 History

1 Modifications Meeting 127

- → Took place on Wednesday 5th February
- → New Modification Proposal Mod_01_25 was presented but no vote was taken
- → Agreed to arrange industry call and Extraordinary Modifications Meeting

2 Industry Call

- → Took place on Wednesday 26th February
- → Changes from Mod_01_25 V1 to V2 were presented
- → Actions from Modifications Meeting 127 were discussed and further actions were established

3 Modifications Meeting 127B (Extraordinary meeting)

- → Took place on Wednesday 12th March
- → Changes from Mod_01_25 V2 to V3 were presented
- → Actions from Industry Call on 26th February were discussed and further actions were established
- → No vote was taken, modification deferred to Meeting 128 on 9th April

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Actions from Modifications Meeting 127B

Actions from Modifications Meeting 127B

Proposer to provide more detail on the impact this Modification will have on Dispatch Down and Constraints

- As part of analysis on the benefits of LCIS, the TSOs looked at the cost/carbon savings of reducing the minimum number of conventional units ON from 8 to 5 for the year 2026 for different fuel and carbon prices as well as different levels of renewable energy sources installed.
- Synchronous condensers providing inertia allows for the minimum number of conventional units to be reduced in this manner.
- As well as the cost and carbon savings, reducing from 8 to 5 also brings additional benefits such as:
  - Facilitating higher levels of renewables by reducing dispatch down of renewables;
  - Enhancing security of supply;
  - Further carbon reductions from a wider sectoral perspective (e.g. oil and gas for heating and transport are further reduced)

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Actions from Modifications Meeting 127B

Proposer to consider other program streams such as Layered Procurement Framework (LPF) and Future Arrangements for System Services (FASS) as a whole

- The Scheduling and Dispatch Programme team regularly connects with the Future Arrangements for System Services team to ensure that there is no misalignment between the programmes
- As per SEMC decision paper SEM-24-066, DASSA will initially procure reserve services.
- The TSOs will shortly conduct an initial consultation on the definition and procurement of non-reserve services for FASS go-live in December 2026.
- The TSOs must ensure that mechanisms continue to remain in place to procure non-reserve services to meet system needs. While the procurement mechanisms for FASS go-live will be subject to the outcome of the upcoming consultation and a SEMC decision, they will consider the technologies capable of providing the services, including synchronous condensers for inertia and reactive power, and the appropriate contracts and payments for the provision of same.
- The TSOs do not consider the proposals relating to FPNs in Mod_01_25 to be a barrier to entry for synchronous condensers to participate in future commercial arrangements for inertia and reactive power.

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Modification Proposal

T&SC Modification

1. Registration / Definitions
2. Data Submission (PNs, COD, TOD)
3. Instruction Profiling
4. DS3 System Services

T&SC Modification – Registration / Definitions

Registration criteria for Synchronous Condenser Units has been defined in TSC Chapter B.

- TSC B.7.2.2, B.9.6.1 and B.9.6.2

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 Synchronous Condenser Units

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;

T&SC Modification – Registration / Definitions

Definition of **'Synchronous Condenser Unit'** outlined in the TSC Glossary. The definitions of 'Generator Unit', 'Fuel Type' and 'Synchronisation' have also been updated.

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: (a) 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; (b) 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.

T&SC Modification – Data Submission (PNs)

Synchronous Condenser Units shall **not** submit **Physical Notifications (PNs)**

- TSC D.7.1 and Appendix I Paragraph 15

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.

PHYSICAL NOTIFICATION DATA

Physical Notification Data Submission

15. 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.

T&SC Modification – Data Submission (COD - 1/2)

Appendix I (Table 1 – Commercial Offer Data Elements) has been updated to outline the elements of Commercial Offer Data relevant for Synchronous Condenser Units.

- The following elements of COD **are not required** as Synchronous Condenser Units are not settled in the Balancing Market:
  - Simple Inc/Dec Prices
  - Complex Inc/Dec Prices
  - No Load Costs
  - Start Up Costs
  - Shut Down Costs
  - Energy Limit

- The following elements of COD **are required**:
  - Forecast Availability Profile (=0)
  - Forecast Minimum Output Profile (<=0)
  - Forecast Minimum Stable Generation Profile (=0)

Data Element	Energy Limited Unit	Demand Side Unit	Synchronous Condenser Unit	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	Yes	Yes
Forecast Minimum Output Profile (MW)	Yes	Yes	Yes	Yes
Forecast Minimum Stable Generation Profile (MW)	Yes	Yes	Yes	Yes

T&SC Modification – Data Submission (COD - 2/2)

Commercial Offer Data details are outlined in the following sections of the TSC:

- TSC D.4.2.11A, D.4.2.12, D.4.2.15, D.4.3.4, D.4.4.1

D.4.2 Commercial Offer Data Requirements

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.

T&SC Modification – Data Submission (TOD)

Technical Offer Data Elements required for Synchronous Condenser Units are outlined in **TSC Appendix I - Offer Data (Table 2 – Technical Offer Data Elements)**

	Validation Technical Offer Data	Validation Registration Data	Synchronous Condenser Unit
Minimum On Time (hours)	Yes		Yes
Minimum Off Time (hours)	Yes		Yes
Maximum On Time (hours)	Yes		Yes
Synchronous Start Up Time Hot (hours)	Yes		Yes
Synchronous Start Up Time Warm (hours)	Yes		Yes
Synchronous Start Up Time Cold (hours)	Yes		Yes
Ramp Down Rate 1 (MW / minute)	Yes		Yes
Ramp Up Rate 1 (MW / minute)	Yes		Yes
Start of Restricted Range 1 (MW)	Yes		Yes
End of Restricted Range 1 (MW)	Yes		Yes
Block Load Flag (True or False)	Yes		Yes
Registered Minimum Stable Generation (MW)	Yes		Yes
Registered Minimum Output (MW)		Yes	Yes

T&SC Modification – Instruction Profiling

Appendix O outlines that Dispatch Instructions for synchronous condensers shall not be utilised in Imbalance Pricing or Imbalance Settlement **Instruction Profiling** calculations.

Appendix O: Instruction Profiling Calculation

6. 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

Note: 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.

T&SC Modification – ‘DS3 System Services’

References to ‘DS3 System Services’ have been changed to ‘System Services’ throughout the **TSC**, **Appendices** and **Glossary** as the ‘System Services Provider Flag’ will continue to be used and it is recognised that the terminology could be rendered obsolete in the future.

Areas impacted:

- TSC F.2.8, F.5.3.2, F.12.2.3, F.19.2.2, F.19.4.2, F.20.3.2, Glossary and Appendix K
- 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.

Questions?