SDP_02 Code Changes

Plain English Description

CMA_005A

September 2023

EirGrid SONI semo Single Electricity Market Operator

Contents

1. Introduction

There are a number of areas within scheduling and dispatch processes that require improvement to enable EirGrid and SONI to meet EU Clean Energy Package mandates and support the TSOs in achieving Ireland and Northern Ireland's renewables targets. To enhance and improve the technology and capability of the scheduling and dispatch processes, EirGrid and SONI have established the 'Scheduling and Dispatch Programme' (SDP). The SDP is made up of six initiatives:

- SDP_01 - Operation of Non-Priority Dispatch of Renewables
- SDP_02 - Energy Storage Power Station (ESPS) Integration
- SDP_03 – Fast Frequency Response (FFR)
- SDP_04 - Wind Dispatch Tool Improvements
- SDP_05 – Reserve Services Scheduling and Dispatch
- SDP_06 – Synchronous Condenser Scheduling and Dispatch

These initiatives will be delivered in two groups: Group 1 will include SDP_01, SDP_02 and SDP_04, and Group 2 will include SDP_03, SDP_05 and SDP_05.

The purpose of this document is to outline the modifications required to the Trading and Settlement Code and Grid Codes as a result of the SDP_02 initiative – ESPS integration. These modifications will then be progressed through the usual channels (Mods Committee for Trading and Settlement Code changes, Grid Code Review Panels and Joint Grid Code Review Panels for Grid Codes).

Note that this document is indicative only, the exact nature of the changes required may vary. The legal text of the proposed changes will be provided in the mod proposal forms in accordance with the existing mods procedures.

2. Trading and Settlement Code

Reference	Description of Change	Rationale for Change
B.9.1.3 The following kinds of Generator Unit shall not be registered as part of a Trading Site: (a) … Battery Storage Unit;	Battery storage units to be removed from this clause with the consequence that these units must be registered as part of a trading site.	To allow non-firm quantities to be settled for battery units as per other generator units reflecting the unit's Firm Access Quantity as set out in its Connection Agreement.
D.4.2.6 Complex Bid Offer Data shall comprise the following: …	Additional fields needed for battery storage units including: • Operational Minimum Storage Quantity (MWh) • Operational Maximum Storage Quantity (MWh)	The Storage Quantity fields will allow a warning to be provided to the control centre if PNs submitted by a participant for a battery unit cause the unit's storage level to fall outside of these operational limits.
D.4.2 Commercial Offer Data Requirements	Clause to be added mandating forecast minimum stable generation to be submitted as zero in every Imbalance Settlement Period for battery storage units.	This requirement will reflect the technical characteristics of battery units which can operate at output levels which traverse through zero.
D.5.1.4 A Participant shall submit additional Data Records in the Technical Offer Data in respect of each of its Pumped Storage Units. These additional Data Records shall be submitted in accordance with the provisions of Appendix I "Offer Data" and shall be as follows: …	May need to rename Pumped Storage Cycle Efficiency as Storage Cycle Efficiency. Storage Cycle Efficiency variable to be renamed as FCE_{ut}. Maximum Storage Quantity variable to be renamed as $QMAXL_{ut}$. Minimum Storage Quantity variable to be renamed as $QMINL_{ut}$.	Storage Cycle Efficiency may be combined for pumped storage and battery units, to be determined with vendors. Maximum Storage Quantity and Minimum Storage Quantity to be used for both pumped storage and battery units.
D.5.1.5 A Participant shall submit additional Data Records in the Technical Offer Data in respect of each of its Battery Storage Units. These additional Data Records shall be submitted in accordance with the provisions of Appendix I "Offer Data" and shall be as follows: …	Maximum Battery Storage Quantity and Minimum Battery Storage Quantity to be replaced with Maximum Storage Quantity and Minimum Storage Capacity. Battery Storage Capacity to be removed. May need to rename Battery Storage Efficiency as Storage Cycle Efficiency. Storage Cycle Efficiency variable to be renamed as FCE_{ut}.	Maximum Storage Quantity and Minimum Storage Quantity to be used for both pumped storage and battery units. Battery Storage Capacity not needed, equivalent to Registered Minimum Output which is also currently required to be submitted under TSC Appendix I. Storage Cycle Efficiency may be combined for pumped storage and battery units, to be determined with vendors.

F.2.1.4 The Market Operator shall determine whether a Battery Storage Generator Unit, u, is in Charging Mode for the purposes of the calculations in this Code as follows: …	Clause to be removed.	No longer need to differentiate between the treatment of battery units while charging or discharging under the Trading and Settlement Code following these changes.
F.2.4 Dispatch Data	Clause to be added similar to F.2.4.9 for $qMINOUT_{uh}(t)$, the Outturn Minimum Output Quantity as a function of time for Generator Unit, u, in period, h.	To allow Outturn Minimum Output to be used as a floor value in calculation of Accepted Offer Quantities, ensuring that a unit isn't compensated for volumes it is unable to import, mirroring the current use of Outturn Availability Quantity in calculation of Accepted Bid Quantities.
F.4.3.3, F.4.3.4, F.4.3.5 Application of Loss Adjustment Factors for Interconnectors	Battery storage units to be added to these clauses with the consequence that loss factors are applied in the same manner to these units as to interconnectors.	To ensure Loss Adjustment Factors are applied correctly for import and export on battery units.
F.5.3.3 Imbalance Component Payment or Charge calculation for Pumped Storage Unit or Battery Storage Unit	Battery Storage Units and Charging Mode to be removed from this clause with the consequence that the Imbalance Component Payment or Charge will be calculated as per any other generator (F.5.3.1) for battery storage units while importing and exporting.	The current text is based on legacy arrangements which recognised that the pumped storage units cannot control the exact level to which they consume power when dispatched to pump. Battery units are currently aligned with pumped storage units in the Trading and Settlement Code. Battery units can control the level to which they consume power when dispatched to charge, so this exemption is no longer required for these units. This change is required in order to comply with regulatory requirements for Balance Responsible Parties (under the EU's Clean Energy Package (CEP), Energy Balancing Guidelines (EBGL), and Imbalance Settlement Harmonisation Proposal methodology (ISHP)).

F.6.2.3, F.6.2.5, F.6.4.7, F.6.4.9, F.7.1.3, F.7.1.5 Calculation of Accepted Bid Offer Quantities, Without Trade Opposite TSO Accepted Bid Offer Quantities for Incs, and Price Only Accepted Bid Offer Quantities for Incs	Outturn Minimum Output Quantity, $qMINOUT_{uh}(t)$, to be included in these calculations, mirroring inclusion of QAVAILO in calculations in Accepted Bid Offers.	To allow Outturn Minimum Output to be used as a floor value in calculation of Accepted Offer Quantities, ensuring that a unit isn't compensated for volumes it is unable to import, mirroring the current use of Outturn Availability Quantity in calculation of Accepted Bid Quantities.
F.9.4.2 When a Pumped Storage Unit or Battery Storage, u, is in Pumping Mode or Charging Mode, as the case may be, for an Imbalance Settlement Period, γ, or any part thereof, the Market Operator shall calculate the Uninstructed Imbalance Charge (CUNIMBuγ) for that Pumped Storage Unit or Battery Storage Unit, u, in that Imbalance Settlement Period, γ, as having a value of zero.	Battery Storage Units and Charging Mode to be removed from this clause, with the consequence that the Uninstructed Imbalance Component Charge will be calculated as per any other generator (F.9) for battery storage units while importing and exporting.	The current text is based on legacy arrangements which recognised that the pumped storage units cannot control the exact level to which they consume power when dispatched to pump. Battery units are currently aligned with pumped storage units in the Trading and Settlement Code. Battery units can control the level to which they consume power when dispatched to charge, so this exemption is not required for these units.
F.13.2.2 Calculation of Testing Charge for Interconnectors	Battery storage units to be added to this clause with the consequence that the Testing Charge is calculated in the same manner for these units as for interconnectors.	To ensure the Testing Charge is calculated correctly for import and export on battery units.
Appendix I 2 Commercial Offer Data Elements	Additional fields needed for battery storage units including: • Operational Minimum Storage Quantity (MWh) • Operational Maximum Storage Quantity (MWh)	As above (see reference D.4.2.6).
Appendix I Table 1 Commercial Offer Data Elements	Additional fields needed for battery storage units including: • Operational Minimum Storage Quantity (MWh) • Operational Maximum Storage Quantity (MWh) New column needed for battery storage units.	New fields as above. New column needed to show particular COD requirements for battery units to include new fields.

Appendix I Table 2 Technical Offer Data Elements	Updates needed to which fields apply to battery storage units. Battery Storage Capacity, Maximum Battery Storage Quantity, Minimum Battery Storage Quantity to be removed. May need to combine Pumped Storage Cycle Efficiency with Battery Storage Efficiency.	As above (see reference D.5.1.5). Updates required to show particular TOD requirements for battery units to reflect technical characteristics.
Appendix O 10 Capture Input Data	Battery Storage Capacity to be removed.	Not needed, equivalent to Registered Minimum Output.
Appendix O Table 1 Instruction Codes and Instruction Combination Codes for Dispatch Instructions issued by the System Operator	Battery Storage Units to be removed from PGEN, PUMP, SCT, SCP descriptions.	Battery units will not receive these instruction types.
Appendix O Table 2 Instruction Codes and Instruction Combination Codes as used for Physical Notification Instruction Profile	Battery Storage Units to be removed from PGEN description. Need to reword language on Target Instruction Level above or below Minimum Stable Generation in SYNC description.	Battery units will not receive PGEN instruction types. Language must take into account negative output range for battery units. Exact nature of Target Instruction Level to be issued with SYNC instructions to battery units to be determined.
Appendix O Table 3 Instruction Codes and Instruction Combination Codes for Pseudo Dispatch Instructions	Need to reword language in the PSYN description on Target Instruction Level above or below Minimum Stable Generation. Need to reword language on FPN rising from zero in POFF description.	Language must take into account negative output range for battery units. Exact nature of Target Instruction Level to be issued with SYNC instructions to battery units to be determined. Language must take into account negative output range for battery units.
Appendix O 25. A Dispatch Instruction having a GOOP Instruction Code and having a SCP Instruction Combination Code may precede a Dispatch Instruction having a GOOP Instruction Code and a PUMP Instruction Combination Code. Validation rules for Pumped Storage Units and Battery Storage Units are detailed in Table 9.	Battery Storage Units to be removed from this clause.	Battery units will not receive GOOP dispatch instructions.

Appendix O 28. The ramp up trajectory of a Generator Unit is a piecewise linear curve that describes the theoretical Output of a Generator Unit over time from Registered Minimum Stable Generation to the Maximum Generation for the Generator Unit determined by: …	Update needed to outline that ramp up trajectory will also apply from Registered Minimum Output up to zero for Battery Storage Units.	Update needed to account for negative output range for battery units.
Appendix O 29. The ramp down trajectory of a Generator Unit is a piecewise linear curve that describes the theoretical Output of a Generator Unit over time from the Maximum Generation for the Generator Unit to Registered Minimum Stable Generation determined by: …	Update needed to outline that ramp down trajectory will also apply from zero down to Registered Minimum Output for Battery Storage Units.	Update needed to account for negative output range for battery units.
Appendix O Table 8 Instruction Profiling Validation Rules for Generator Units that are not Pumped Storage Units or Battery Storage Units	Battery Storage Units to be removed from the title of this table with the consequence that they will be covered by this table. Need to reword language on SYNC with a Target Instruction Level below Minimum Stable Generation. New rows needed to cover: • SYNC from < 0, • DESY from < 0 to > 0, • DESY from < 0 to < 0, • DESY from > 0 to < 0.	Battery units will be covered by this table as they will not receive the GOOP dispatch instructions outlined in table 9. Language must take into account negative output range for battery units. Exact nature of Target Instruction Level to be issued with SYNC instructions to battery units to be determined. New rows needed to cover negative output range for battery units.
Appendix O Table 9 Instruction Profiling Validation Rules for Pumped Storage Units and Battery Storage Units	Battery Storage Units, Battery Storage Capacity to be removed from title and body of table.	GOOP dispatch instructions will not be issued to battery units. Instruction profiling validation rules for battery units will be covered in Table 8.
Appendix O 37. (a) In the case of a Dispatch Instruction having a GOOP Instruction Code and PUMP Instruction Combination Code, the Instructed Quantity for a Pumped Storage Unit or Battery Storage Unit will remain at the specified Target Instruction Level	• Battery Storage Units to be removed from this clause.	GOOP dispatch instructions will not be issued to battery units.

until a DESY Instruction Code is issued at which time the Instructed Quantity will go instantaneously to 0MW.		
Appendix O 40. The Dispatch Quantity (QDuγ) for Pumped Storage Units in Pumping Mode and Battery Storage in Charging Mode shall be calculated as set out in Paragraph 39.	Battery Storage Units in Charging Mode to be removed from this clause.	No longer need to differentiate between battery unit while charging and discharging under the Trading and Settlement Code. QD will be calculated as per paragraph 39.
Glossary Battery Storage Capacity	To be removed.	Not needed, equivalent to Registered Minimum Output.
Glossary Battery Storage Efficiency	May be removed.	Storage Cycle Efficiency fields may be combined for pumped storage and battery units, to be determined with vendor.
Glossary Battery Storage Unit	Reference to Storage Mode and Generating Mode to be removed.	Not needed.
Glossary Charging Mode	To be removed.	No longer need to be able to differentiate treatment of battery units while charging and discharging under the Trading and Settlement Code.
Glossary Generating Mode	Battery Storage Unit to be removed from this definition.	No longer need to be able to differentiate treatment of battery units while charging and discharging under the Trading and Settlement Code.
Glossary Maximum Battery Storage Quantity	To be removed.	Maximum Storage Quantity will be used for both pumped storage and battery units.
Glossary Maximum Storage Quantity	To be reworded to include Battery Storage Units.	Maximum Storage Quantity will be used for both pumped storage and battery units.
Glossary Minimum Battery Storage Quantity	To be removed.	Minimum Storage Quantity will be used for both pumped storage and battery units.
Glossary Minimum Storage Quantity	To be reworded to include Battery Storage Units.	Minimum Storage Quantity will be used for both pumped storage and battery units.
Glossary Pumped Storage Cycle Efficiency	May be removed.	Storage Cycle Efficiency fields may be combined for pumped storage and battery units, to be determined with vendor.

Glossary Storage Mode	To be removed.	No longer need to be able to differentiate treatment of battery units while charging and discharging under the Trading and Settlement Code.
Glossary	Add definition of Operational Minimum Storage Quantity	Update needed to reflect new COD requirements.
Glossary	Add definition of Operational Maximum Storage Quantity	Update needed to reflect new COD requirements.
Glossary	Add definition of $qMINOUT_{uh}(t)$, the Outturn Minimum Output Quantity as a function of time for Generator Unit, u, in period, h.	Update needed to allow for new settlement logic.
Glossary	May need to add definition of Storage Cycle Efficiency.	Storage Cycle Efficiency fields may be combined for pumped storage and battery units, to be determined with vendor.
Agreed Procedure 1: Registration 2.3. Units as Part of Trading Sites Each Generator Unit (excluding Pumped Storage Units, Battery Storage Units, Interconnector Residual Capacity Units, Interconnector Error Units, Assetless Units), including Trading Units and Demand Side Units shall be registered as part of a Trading Site. The following rules apply to registering Units as part of Trading Sites:	Battery Storage Units to be removed from this clause with the consequence that these units must be registered as part of a trading site.	To allow non-firm quantities to be settled for battery units as per other generator units reflecting the unit's Firm Access Quantity as set out in its Connection Agreement.
Agreed Procedure 4: Transaction Submission and Validation Appendix 2 Business Data Contained in Each Element Table 9 Business Data per Element	Maximum Storage Capacity and Minimum Storage Capacity to be changed to Maximum Storage Quantity and Minimum Storage Quantity, both in MWh. Battery Storage Units to be removed from Spin Generation Cost, Spin Pump Cost and Pumping Capacity definitions. Pumped Storage Cycle Efficiency may be replaced with Storage Cycle Efficiency covering pumped storage and battery units.	Update needed to reflect naming convention elsewhere in the Trading and Settlement Code. Spin Generation Cost, Spin Pump Cost and Pumping Capacity will not apply to battery units. Storage Cycle Efficiency fields may be combined for pumped storage and battery units, to be determined with vendor. PNs for battery units can be negative, similar to pumped storage.

	Battery Storage Units to be included with Pumped Storage Units in exemptions in From MW and To MW descriptions. Operational Maximum Storage Quantity and Operational Minimum Storage Quantity to be added to COD data.	New fields or updates to existing fields needed to reflect new COD requirements for battery units.

3. EirGrid Grid Code

Reference	Description of Change	Rationale for Change
Throughout Grid Code	References to Energy Storage Power Station Demand to be removed throughout.	Energy Storage Power Station will cover both generation and demand.
SDC1.4.7.7 a) … The TSO may issue Dispatch Instructions in respect of any CDGU and/or Aggregated Generating Unit, Controllable PPM, Pumped Storage Plant Demand, Energy Storage Power Station Demand or Aggregated Generating Unit which has not declared an Availability or Demand Side Unit MW Availability of 0 MW in an Availability Notice. Users with CDGUs and/or Aggregated Generating Units, Controllable PPM, Pumped Storage Plant Demand or Energy Storage Power Station Demand shall ensure that their units are able to be Synchronised, or in the case of Pumped Storage Plant Demand, used at the times Scheduled, but only if so Dispatched by the TSO by issue of a Dispatch Instruction. Users shall, as part of a revision to the Technical Parameters, indicate to the TSO the latest time at which a Dispatch Instruction is required to meet the scheduled Synchronising time or in the case of Pumped Storage Plant Demand or Energy Storage Power Station Demand, the Scheduled relevant effective time.	Reword needed to outline that Dispatch Instructions can be issued to ESPS units with an availability of 0 MW when on and fully charged to dispatch the unit in its charging range.	Language must take into account negative output range for battery units.
SDC1 – Appendix A Part 1. Technical Parameters	ESPS Demand column to be removed. Updates needed to fields which apply to ESPS units (under dispatchable PPM).	ESPS (under dispatchable PPM) will cover generation and demand. Updates required to show particular TOD requirements

	Charging Capacity to be removed. Cycle Efficiency to renamed as Storage Cycle Efficiency. Maximum and Minimum Charge Capacity to be removed. Maximum and Minimum Storage Capacity to be renamed as Maximum and Minimum Storage Quantity. Target Charge Level to be removed.	for battery units to reflect technical characteristics. Charging Capacity not needed, equivalent to Registered Minimum Output. Storage Cycle Efficiency field to be used for pumped storage and battery units. Maximum Storage Quantity and Minimum Storage Quantity to be used for both pumped storage and battery units. Target Charge Level field not needed.
Glossary Charging Capacity	To be removed.	No longer needed, will be covered by maximum storage quantity.
Glossary Energy Storage Power Station Demand	To be removed.	Energy Storage Power Station will cover both generation and demand.
Glossary Forecast Minimum Output Profile	ESPS units to be added to this definition.	Battery units will also have a varying Forecast Minimum Output Profile.
Glossary Maximum Charge Capacity	To be removed.	To be replaced with Maximum Storage Quantity.
Glossary Maximum Storage Capacity	To be renamed as Maximum Storage Quantity.	To ensure consistency across codes and systems.
Glossary Minimum Charge Capacity	To be removed.	To be replaced with Minimum Storage Quantity.
Glossary Minimum Storage Capacity	To be renamed as Minimum Storage Quantity.	To ensure consistency across codes and systems.
Glossary Ramp Down Rate	Update needed to outline that ramp down rates will also apply from zero down to Registered Minimum Output for ESPS Units.	Update needed to account for negative output range for battery units.
Glossary Ramp Up Rate	Update needed to outline that ramp up rates will also apply from Registered Minimum Output up to zero for ESPS Units.	Update needed to account for negative output range for battery units.

Glossary Ramp-down Capability	Update needed to outline that ramp down will also apply from zero down to Registered Minimum Output for ESPS Units.	Update needed to account for negative output range for battery units.
Glossary Ramp-up Capability	Update needed to outline that ramp up will also apply from Registered Minimum Output up to zero for ESPS Units.	Update needed to account for negative output range for battery units.
Glossary Target Charge Level Percentage	To be removed.	Not needed for battery units, not currently defined in the TSC.
Glossary Target Charge Levels	To be removed.	Not needed for battery units.
Glossary	Storage Cycle Efficiency definition may need to be added.	Storage Cycle Efficiency not currently defined.

4. SONI Grid Code

Reference	Description of Change	Rationale for Change
Throughout Grid Code	References to Energy Storage Power Station Demand to be removed throughout.	Energy Storage Power Station will cover both generation and demand.
Glossary Charging Capacity	Charging Capacity to be removed.	No longer needed, will be covered by maximum storage quantity.
Glossary Energy Storage Power Station Demand	To be removed.	Energy Storage Power Station will cover both generation and demand.
Glossary Maximum Charge Capacity	To be removed.	To be replaced with Maximum Storage Quantity.
Glossary Maximum Storage Capacity	To be renamed as Maximum Storage Quantity.	Maximum Charge Capacity and Maximum Storage Capacity to be combined and renamed as Maximum Storage Quantity.
Glossary Minimum Charge Capacity	To be removed.	To be replaced with Minimum Storage Quantity.
Glossary Minimum Storage Capacity	To be renamed as Minimum Storage Quantity.	Minimum Charge Capacity and Minimum Storage Capacity to be combined and renamed as Minimum Storage Quantity.
Glossary Ramp Down Rate	Update needed to outline that ramp down rates will also apply from zero down to Registered Minimum Output for ESPS Units.	Update needed to account for negative output range for battery units.
Glossary Ramp Up Rate	Update needed to outline that ramp up rates will also apply from Registered Minimum Output up to zero for ESPS Units.	Update needed to account for negative output range for battery units.
Glossary	Storage Cycle Efficiency definition may need to be added.	Storage Cycle Efficiency not currently defined.
SDC1.4.7.7 a) … The TSO may issue Dispatch Instructions in respect of any CDGU and/or Aggregated Generating Unit, Controllable PPM, Pumped Storage	Reword needed to outline that Dispatch Instructions can be issued to ESPS units with an availability of 0 MW when on and fully	Language must take into account negative output range for battery units.

Plant Demand, Energy Storage Power Station Demand or Aggregated Generating Unit which has not declared an Availability or Demand Side Unit MW Availability of 0 MW in an Availability Notice. Users with CDGUs and/or Aggregated Generating Units, Controllable PPM, Pumped Storage Plant Demand or Energy Storage Power Station Demand shall ensure that their units are able to be Synchronised, or in the case of Pumped Storage Plant Demand, used at the times Scheduled, but only if so Dispatched by the TSO by issue of a Dispatch Instruction. Users shall, as part of a revision to the Technical Parameters, indicate to the TSO the latest time at which a Dispatch Instruction is required to meet the scheduled Synchronising time or in the case of Pumped Storage Plant Demand or Energy Storage Power Station Demand, the Scheduled relevant effective time.	charged to dispatch the unit in its charging range.	
SDC1 – Appendix A Part 1. Technical Parameters	ESPS Demand column to be removed. Updates needed to fields which apply to ESPS units (under dispatchable PPM). Charging Capacity to be removed. Cycle Efficiency to renamed as Storage Cycle Efficiency. Maximum and Minimum Charge Capacity to be removed. Maximum and Minimum Storage Capacity to be renamed as Maximum and Minimum Storage Quantity. Target Charge Level to be removed.	ESPS (under dispatchable PPM) will cover generation and demand. Updates required to show particular TOD requirements for battery units to reflect technical characteristics. Charging Capacity not needed, equivalent to Registered Minimum Output. Storage Cycle Efficiency field to be used for pumped storage and battery units. Maximum Storage Quantity and Minimum Storage Quantity to be used for both pumped storage and battery units. Target Charge Level field not needed.
Data Registration Code Schedule 2	As above (SDC1 – Appendix A – Part 1)	As above (SDC1 – Appendix A – Part 1)

Generation Planning Parameters, Response Capability Data and SDC1 Data Par 2 – 2 Technical Parameters		