Notice of Market Rules Modification

Paper No.:	EMC/RCP/146/2025/RC390
Rule Reference:	Chap 5; Chap 6; App 6B; App 6D; App 6J; Chap 8; Mkt Ops Mkt Manual (Chap 6 Mkt Rules)
Proposer:	EMC, Market Administration
Date Received by EMC:	27 November 2024
Status:	Approved by EMA
Effective Date:	12 August 2025

The RCP previously supported the proposals in *RC383: Modelling of Energy Storage Systems* and *RC386: Incorporation of State-of-Charge in MCE modelling of ESS*.

While working on system changes to implement these changes, EMC discovered that further rule modifications are required.

This paper therefore proposes Market Rule and Market Manual modifications, related to:

- market clearing formulation of energy storage systems (ESS); and
- requirements for standing offers and offer variations by ESS.

The RCP discussed this proposal at its 146th meeting and the panel **unanimously supported** the proposed recommendations.

Date considered by Rules Change Panel:	13 March 2025
Date considered by EMC Board:	11 May 2025
Date considered by Energy Market Authority:	5 June 2025
Proposed rule modification:	See attached paper

Reasons for rejection/referral back to Rules Change Panel (if applicable):

PAPER NO.	:	**EMC/BD/Cir/2025/08**
RCP PAPER NO.	:	**EMC/RCP/146/2025/RC390**
SUBJECT	:	**MARKET CLEARING AND OFFERS FOR ENERGY STORAGE SYSTEMS**
FOR	:	**DECISION**
PREPARED BY	:	**LIM CHERN YUEN** **SENIOR ECONOMIST**
REVIEWED BY	:	**POA TIONG SIAW** **SVP, MARKET ADMINISTRATION**
DATE OF MEETING	:	**13 MARCH 2025**

Executive Summary

At the 139th RCP meeting, the RCP unanimously supported the proposals in *RC383: Modelling of Energy Storage Systems* and *RC386: Incorporation of State-of-Charge in MCE modelling of ESS*.

While working on system changes to implement these changes, EMC discovered that further rule modifications are required.

This paper therefore proposes Market Rule and Market Manual modifications, related to:

- market clearing formulation of energy storage systems (ESS); and
- requirements for standing offers and offer variations by ESS.

These modifications are intended to increase market clearing formulation accuracy for ESS and clarify requirements for ESS energy storage offers. They have been reviewed and endorsed by the Technical Working Group as requested by the RCP.

At the 146th RCP meeting held on 13th March 2025, the RCP **unanimously supported** EMC's recommendations.

The RCP recommends that the EMC Board:

a) **adopt** the proposed modifications as set out in Annex 1 and 2; and

b) **seek the EMA's approval** of proposed modifications as set out in Annex 1 and 2.

1. Introduction

This paper proposes to make various additions to rule changes previously supported by the RCP, related to the modelling of energy storage systems (ESS) in the Market Clearing Engine (MCE)[1].

2. Background

At the 139th RCP meeting, the RCP unanimously supported the proposals in *RC383: Modelling of Energy Storage Systems* and *RC386: Incorporation of State-of-Charge in MCE modelling of ESS*.

While working on system changes to implement these changes, EMC discovered that further rule modifications are required.

3. Analysis

There are two categories of modifications proposed, elaborated upon below:

3.1 Formulation Changes Related to Modelling of ESS in the MCE

Chapter 6 of the Market Rules, and its appendices, specify various aspects of market clearing (e.g., inputs, linear program, outputs).

3.1.1 Issues Identified

To facilitate accurate modelling of ESS in the MCE, the previous rule changes[2], as supported by the RCP and approved by the EMA are incomplete. EMC discovered several minor issues while working on system implementation.

3.1.2 Proposed Market Rule Modifications

In order to facilitate accurate modelling of ESS in the MCE, further market rule modifications are required. For example:

- Within Appendix 6B, initial state-of-charge (SoC) for each generation registered facility (GRF) that is an ESS as at the start of each dispatch period should be listed as an MCE input sent by PSO to EMC.
- Within Appendix 6D, ESS should be excluded from the current regulation eligibility check, where a generation registered facility must have the sum of energy offer quantities exceed a certain amount (i.e., its RegulationMin parameter) in order to be eligible to provide regulation.
- Within Appendix 6D, minor corrections to previously approved rule changes (e.g., subscripts, definition of sets/parameters/variables/functions, references to defined sets/parameters/variables/functions) are required.

[1] EMC/RCP/139/2023/RC383: Modelling of Energy Storage Systems, and EMC/RCP/139/2024/RC386: Incorporation of State-of-Charge in MCE Modelling of ESS

[2] Same as above footnote

3.2 Requirements for standing offers and offer variations by ESS

In order to be deemed valid as inputs to the MCE, current Market Manuals have specified requirements for offers submitted by registered facilities to EMC[3],. For example:

- Offers submitted need to be in a particular format (e.g., price values are in numerical form to two decimal places)
- Offers need to be validated according to specified quantitative rules (e.g., price values are within upper and lower limits).

3.4.1 Issues Identified

The existing Market Manual does not yet include requirements specific to energy storage offers submitted by ESS (e.g., data format for energy storage offers, energy storage offer validation rules).

3.4.2 Proposed Market Manual Modifications

The data format for energy storage offers should be provided (e.g., quantities to be expressed in MW to one decimal place, between -9,999,999,999.9 to 9,999,999,999.9).

In addition, there should be separate offer validation rules that apply specifically to energy storage offers (e.g., validate that the total charging quantity offered does not exceed the standing capability data maximum value for charging limit).

Also, minor modifications are required to the forms used by EMC to update standing capability data – adding data fields that are only applicable to ESS, while specifying that some existing data fields are not applicable to ESS.

4. Proposed Market Rule Modifications

Table 1 below provides a summary of proposed rule modifications. Detailed modifications are set out in Annex 1.

[3] Market Operations Market Manual – Standing Offers, Standing Bids, Offer Variations, Bid Variations and Standing Capability Data (Chapter 6 Market Rules)

TABLE 1: Summary of Proposed Market Rule Modifications

S/N	Chapter / Section	Proposed Modifications	Reasons for Modifications
1	Chapter 5, Section 11.2.1.1	Include energy storage offers	To apply this obligation on ESS dispatch coordinators as well
2	Chapter 6, Section 5.2B	Additional requirements for energy storage offers, in line with existing energy offers.	Constrain total offer quantities to be within maximum combined transfer limit as stated in energy storage offers.
3	Chapter 6, Section 5.3	Exclude energy storage facilities from the reserve offer requirement for a reserve proportion factor to be provided.	Exclude energy storage facilities from such reserve offer requirements
4	Appendix 6B, Section B.2	Include energy storage offers	Include energy storage offers as inputs for the MCE
5	Appendix 6B, Section B.6	List StartSoC as input data for the MCE	Require PSO to provide StartSoC data to EMC as inputs for the MCE
6	Appendix 6D, Section A: Definitions	Modification of existing or introduction of new sets, parameters, variables and functions.	To facilitate the changes made in subsequent sections of Appendix 6D
7	Appendix 6D, Section B: Pre-Processing	Amend fallback mechanism for StartGeneration and StartSoC for ESS; amend calculation of ExpectedStartGeneration, EnergyTransferEndMax and EnergyTransferEndMin for ESS; separate validation rules for ESS regulation offers; other minor modifications	Align with RC387 for fallback values of StartGeneration and StartSoC for ESS; align calculation of ExpectedStartGeneration, EnergyTransferEndMax and EnergyTransferEndMin between ESS and other GRFs; simplify validation rules for ESS regulation offers; other minor modifications
8	Appendix 6D, Section C: Linear Program	Minor corrections to modelling of ESS in the MCE (e.g., subscripts, inequality signs, defined sets)	Minor corrections to previously approved rule changes
9	Appendix 6D, Section D: Post-Processing	Include $EnergyStorageTransfer_{es,}$ and other minor corrections	Include ESS within formulae, and other minor corrections
10	Appendix 6J	List constraint violation penalties for ESS facilities	Treat constraint violation penalties for ESS similarly to those for other generation facilities
11	Chapter 8	Amend definition of offer variation	Include energy storage offers within the definition of offer variation

5. Proposed Market Manual Modifications

Table 2 below provides a summary of proposed modifications to the "Market Operations Market Manual – Standing Offers, Standing Bids, Offer Variations, Bid Variations and Standing Capability Data (Chapter 6 Market Rules)". Detailed modifications are set out in Annex 2.

TABLE 2: Summary of Proposed Market Manual Modifications

S/N	Chapter / Section	Proposed Modifications	Reasons for Modifications
1	Section 2.1	Augment the definition of a standing offer, to include energy storage offers as well	Clarify that standing offers include energy storage offers
2	Section 2.6	Include a data format for energy storage standing offers	Provide the data format for energy storage standing offers
3	Section 2.7	Separate validation rules for energy standing offers and energy storage standing offers	Specify validation rules that apply to energy storage standing offers
4	Section 3.1	Augment the definition of an offer variation, to include energy storage offers as well	Clarify that offer variations include energy storage offers
5	Section 3.6	Include a data format for energy storage offer variations	Provide the data format for energy storage offer variations
6	Section 4.5	Include data fields that are only applicable to ESS, while specifying that some existing data fields are not applicable to ESS	Differentiate between standing capability data requirements for ESS and other generators

6. Consultation

The proposed modifications were published for consultation on 7 February 2025. No comments were received.

7. Legal Review

The text of the proposed modifications has been vetted by EMC's internal legal counsel, whose opinion is that the proposed modifications to the Market Rules and the applicable Market Manual by way of the amendments in Annex 1 and 2:

1) reflect the intent of the proposals, as described in the analysis section of the paper; and
2) (subject to the amendments being adopted by the EMC Board and approved by the EMA) are effective upon them coming into force in accordance with the Market Rules.

This endorsement does not relate to whether the modifications to the Market Rules and the applicable Market Manual are effective from any operational, financial, tax or commercial perspective.

8. Conclusion

The proposed Market Rule and Market Manual modifications are intended to:

- increase market clearing formulation accuracy for ESS, and
- clarify requirements for ESS energy storage offers.

9. Technical Working Group (TWG) endorsement

On the request of the RCP, the 34th TWG meeting was convened on 18 Feb 2025 to review the proposed modifications. The TWG unanimously endorsed that the proposed Market Rule and Market Manual modifications achieve the aims stated in this paper.

10. RCP's Decision at the 146th RCP Meeting

At the 146th meeting, the RCP **unanimously supported** the proposed modifications as set out in Annex 1 and 2.

11. Recommendation

The RCP recommends that the EMC Board:

a. **adopt** the proposed modifications as set out in Annex 1 and 2; and

b. **seek the EMA's approval** of the proposed modifications as set out in Annex 1 and 2.

ANNEX 1: Proposed Market Rule Modifications

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
CHAPTER 5 – SYSTEM OPERATION	
11.2.1 A *dispatch coordinator* shall request approval from the *PSO* for the *synchronisation* of a *generation registered facility* where: 11.2.1.1 a valid and outstanding *energy offer*, *energy storage offer*, *reserve offer* or *regulation offer* has been submitted for that *generation registered facility*; or ……	To apply this obligation on ESS dispatch coordinators as well
CHAPTER 6 – MARKET OPERATION	
5.2B FORM OF ENERGY STORAGE OFFERS 5.2B.2 Each *energy storage offer* shall state: …… 5.2B.2.4 between 1 to 10 *price-quantity pairs* stated in increasing order of price where; a) *price-quantity pairs* in the range 1-5 represent offers to withdraw *energy* from the *transmission system* for the purpose of charging the *energy storage facility*. The quantity in each of these *price-quantity pairs* shall not be more than 0.0 MW; b) *price-quantity pairs* in the range 6-10 represent offers to provide ~~energy~~*energy* to the *transmission system* by means of discharging the *energy storage facility*. The quantity in each of these *price quantity pairs* shall not be less than 0.0 MW;	Formatting correction

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
…… 5.2B.2.6 the *energy* ramp-up rate and the *energy* ramp-down rate, which respectively imply the allowable ~~change~~increase and decrease in the output ~~or withdrawal~~ of the *energy storage facility* during the *dispatch period*. …… 5.2B.6 The total of the quantities in all the positive-quantity *price-quantity pairs* of an *energy storage offer* for a *dispatch period* shall not exceed: 5.2B.6.1 the maximum discharge limit, indicated in the relevant *energy storage facility's standing capability data* for that *dispatch period*; ~~or~~ 5.2B.6.2 the maximum discharging quantity that can be delivered in that *dispatch period* as reasonably estimated by its *dispatch coordinator*; or ~~.~~ 5.2B.6.3 the maximum combined transfer limit of that *energy storage facility* for *energy*, *reserve* and *regulation* stated in the *energy storage offer* under section 5.2B.2.5. 5.2B.7 The maximum combined transfer limit of the *energy storage facility* for *energy*, *reserve* and *regulation* stated in an *energy storage offer* under section 5.2B.2.5 shall be expressed in MW to one decimal place and not be less than 0.0MW. 5.2B.8 The *energy* ramp-up rate and the *energy* ramp-down rate stated in an *energy storage offer* shall each: 5.2B.8.1 be expressed in MW/minute to one decimal place; 5.2B.8.2 not be less than 0.0MW/minute; and	Correct description for ESS ramp-up rate and ramp-down rate Constrain total offered energy quantities to be within maximum combined transfer limit as stated in energy storage offers. Include format for ESS combined transfer limit Include constraints for energy storage offer ramp rates.

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
5.2B.8.3 not exceed respectively the maximum ramp-up rate and maximum ramp-down rate indicated in the relevant *energy storage facility*'s *standing capability data*.	
5.3 FORM OF RESERVE OFFERS 5.3.2 Each *reserve offer* shall state: … 5.3.2.6 if the *reserve offer* is for a *generation registered facility* that is not an *energy storage facility*, a *reserve* proportion, which constraints the maximum *reserve* that may be scheduled from that *generation registered facility* to a specified ratio of its *energy* scheduled.	Exclude the requirement to include a reserve proportion within reserve offers for energy storage facilities.
5.3.8 For a *generation registered facility* that is not an *energy storage facility*, t~~T~~he *dispatch coordinator* shall state in a *reserve offer* the *reserve* proportion that minimises the likelihood of the *generation registered facility* being scheduled to provide more *reserve* than it can reliably provide at any given level of scheduled *energy*.	Exclude the requirement to include a reserve proportion within reserve offers for energy storage facilities.
5.3.9 For a *generation registered facility* that is not an *energy storage facility*, t~~T~~he *reserve* proportion stated in a *reserve offer* shall: 5.3.9.1 not be less than zero; and 5.3.9.2 not exceed the *reserve* proportion indicated in the relevant *generation registered facility*'s *standing capability data*.	Exclude the requirement to include a reserve proportion within reserve offers for energy storage facilities.
APPENDIX 6B – INPUT DATA FOR THE MARKET CLEARING ENGINE	

<table>
<tr><th>Proposed Market Rule Modifications
(deletions represented by strikethrough text and additions represented by double underlined text)</th><th>Reasons for Modification</th></tr>
<tr><td>B.2 MARKET PARTICIPANT DATA

B.2.1 All valid energy offers, valid energy storage offers and valid energy bids for registered facilities for that dispatch period.</td><td>Include energy storage offers as inputs for the MCE</td></tr>
<tr><td>B.6 GENERATOR DATA

B.6.3 Initial SoC for each generation registered facility that is an energy storage facility as at the start of the dispatch period as specified by the PSO in accordance with Appendix 6G.</td><td>Require PSO to provide StartSoC data to EMC as inputs for the MCE</td></tr>
<tr><td>APPENDIX 6D – MARKET CLEARING FORMULATION</td><td></td></tr>
<tr><td>SECTION A: DEFINITIONS</td><td></td></tr>
<tr><td>D.2 SETS

<table><tr><td>ARTIFICIALLINES</td><td>The set of dispatch network lines that have been artificially added to the dispatch network to model the connection of generation registered facilities, including energy storage facilities. It comprises the union of the sets ARTIFICIALLINES1, ARTIFICIALLINES2 and ARTIFICIALLINES3. A subset of LINES.</td></tr><tr><td>ENERGYSTORAGEOFFERBLOCKS_{es}</td><td>The set of price-quantity pairs for the energy storage offeres. Indexed by j.</td></tr><tr><td>SECURITYSTORAGETRANSFERGROUP_s</td><td>A subset of ENERGYSTORAGEOFFERS grouped together for the purpose of expressing security constraint s.</td></tr></table></td><td>Introduce new sets for energy storage facilities, facilitating changes made subsequently in Appendix 6D.</td></tr>
</table>

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)		Reasons for Modification
STORAGERESERVEOFFERS	The subset of RAWRESERVEOFFERS that have been submitted by the *dispatch coordinators* for *energy storage facilities*.	
D.3 PARAMETERS		Minor corrections, and to introduce new parameters for energy storage facilities, facilitating changes made subsequently in Appendix 6D.
$DownRampRate_g$ or $DownRampRate_{es}$ or $DownRampRate_p$	The maximum ramp-down rate of the *generation registered facility* that the *energy offer g* is for, the *energy storage facility* that the *energy storage offer es* is for, or the *LRF with REB* that the *energy bid p* is for, in MW/minute. Set from the values stated in valid *energy offers* referred to in section 5.2.2.6 of Chapter 6, in valid *energy storage offers* referred to in section ~~5.2B.2.8~~5.2B.2.6 of Chapter 6, or in valid *restricted energy bids* referred to in section 5.2A.2.6 of Chapter 6.	
$EnergyStorageBlockLimit_{es,j}$	The limit on the MW which can be scheduled from block *j* of $ENERGYSTORAGEOFFERBLOCKS_{es}$ for *energy storage offer es* in the set ENERGYSTORAGEOFFERS. Determined by the *price-quantity pairs* for valid *energy storage offers*. For the offers referred to in section 5.2B.2.4 of Chapter 6 for ~~*charging*~~charging the *energy storage facility* this limit will be negative, and for the offers referred to in section ~~5.2B.2.5~~5.2B.2.4 of Chapter 6 for ~~*discharging*~~discharging the *energy storage facility* this limit will be positive.	
$EnergyStorageOfferPrice_{es,j}$	The per MWh price assigned to *energy storage offer* es ∈ ENERGYSTORAGEOFFERS applicable to offer block *j* ∈	

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)		Reasons for Modification
	ENERGYSTORAGEOFFERBLOCKS$_{es}$. Set from the *price-quantity pairs* for valid *energy storage offers* referred to in section 5.2B.2.4 of Chapter 6.	
EnergyTransferEndMax$_{es}$	The maximum end of *dispatch period* MW output for the *energy storage facility* associated with *energy storage offer* es, given its forecast status at the beginning of the *dispatch period*. Calculated in accordance with section D.12A.	
EnergyTransferEndMin$_{es}$	The minimum end of *dispatch period* MW output for the *energy storage facility* associated with *energy storage offer* es, given its forecast status at the beginning of the *dispatch period*. Calculated in accordance with section D.12A.	
EndSoC$_{es}$	The forecast *SoC* level at the end of a given *dispatch period* of an *energy storage facility* associated with *energy storage offer es* for that *dispatch period*, which shall be determined in accordance with section D.25.	
ExpectedStartGeneration$_{es}$	The forecast generation level at the beginning of a given *dispatch period* of an *energy storage facility* associated with *energy storage offer es* for that *dispatch period*, which shall be determined in accordance with section D.12A.5.	
ExpectedStartSoC$_{es}$	The forecast *SoC* level at the beginning of a given *dispatch period* of an *energy storage facility* associated with *energy storage offer es* for that *dispatch period,* which shall be determined in accordance with sections D.12~~A.1~~B.1 to D.12~~A.4~~B.5.	
GenerationOfferPrice$_{g,j}$	The per ~~MW~~MWh price assigned to *energy offer* g ∈ ENERGYOFFERS applicable to offer block *j* ∈ GENERATIONOFFERBLOCKS$_g$. Set from the *price-quantity pairs* for valid *energy offers* referred to in section 5.2.2.4 of Chapter 6 or in the case of offers representing power flows	

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)		Reasons for Modification
	across the *intertie*, set by the *PSO* in accordance with section 2.3 of this Chapter.	
MaximumChargeLimit$_{es}$	The maximum rate, in MW, at which ~~*an*~~an *energy storage facility* can withdraw electrical *energy* from the *transmission system*. Received from the *PSO* in accordance with Appendix 6E section E.1A.1.2.	
OfferedCapacity$_{es}$	The maximum combined ~~energy storage transfer level~~transfer limit of the *energy storage facility* for *energy*, *reserve* and *regulation* stated in *energy storage offer es* under section ~~5.2B.2.7~~5.2B.2.5 of Chapter 6.	
RegulationMin$_{es}$	The minimum *energy* transfer level at which *automatic generator control* (*AGC*) or other signals acceptable to the *PSO* can operate the *energy storage facility* associated with *energy storage offer es* to provide *regulation* capability. Set from the *standing capability data* referred to in Appendix 6E section E.1A.1.10.	
ReserveGenerationMax$_{r}$	The maximum combined generation and *reserve* of the relevant class that can be provided by the *generation registered facility* or *energy storage facility* associated with *reserve offer r*. Calculated in accordance with section D.9A.7 and D.9A.7A.	
SecurityGroupStorageTransferWeight$_{s,es}$	The weighting attached to *energy storage offer es's dispatched* generation in *security constraint* s. Received from the *PSO* in accordance with section G.5.1 of Appendix 6G.	
SoCDischargeLimitMWh$_{es}$	The MWh limit on *energy* discharging for the *energy storage facility* associated with *energy storage offer es*. This limit is applied in order to ensure *energy storage facility* associated with *energy storage offer es* operates above MinSoC$_{es}$ given ExpectedStartSoC$_{es}$. Calculated in accordance with section D.12~~A.5~~B.6.	

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
<table><tr><td>SoCChargeLimitMWh$_{es}$</td><td>The MWh limit on *energy* charging for the *energy storage facility* associated with *energy storage offer es*. This limit is applied in order to ensure *energy storage facility* associated with *energy storage offer es* operates below MaxSoC$_{es}$ given ExpectedStartSoC$_{es}$. Calculated in accordance with section D.12~~A.6~~B.7.</td></tr><tr><td>StartGeneration$_{es}$</td><td>The forecast generation level at the beginning of a given *dispatch period* of a *generation registered facility* associated with *energy storage offer* es for that *dispatch period*. ~~Received from the *PSO* in accordance with section G.3.1 of Appendix 6G.~~ Calculated in accordance with sections D.12A.1 to D.12A.4.</td></tr><tr><td>UpRampRate$_{g}$, UpRampRate$_{es}$ or UpRampRate$_{p}$</td><td>The maximum ramp-up rate of the *generation registered facility* that the *energy offer g* is for, the *energy storage facility* that the *energy storage offer es* is for, or the *LRF with REB* that the *energy bid p* is for, in MW/minute. Set from the values stated in valid *energy offers* referred to in section 5.2.2.6 of Chapter 6, in valid *energy storage offers* referred to in section ~~5.2B.2.8~~5.2B.2.6 of Chapter 6, or in valid *restricted energy bids* referred to in section 5.2A.2.6 of Chapter 6.</td></tr></table>	
D.4 VARIABLES <table><tr><td>DeficitRegGen$_{l}$</td><td>The MW amount by which the constraint giving the lower bound of output for regulation capability is breached for the *generation registered facility* (including *energy storage facility*) associated with *regulation offer l*.</td></tr><tr><td>~~EnergyStorageBlock$_{es}$~~ EnergyStorageBlock$_{es,j}$</td><td>The MW scheduled in block *j* of *energy storage offer es*. This variable can be positive or negative, with a positive value indicating discharging and a negative value indicating charging.</td></tr></table>	Include energy storage facility within the defined variables, and other minor modifications.

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
<table><tr><td>EnergyStorageTransfer$_{es}$</td><td>The total MW transfer scheduled for *energy storage offer es*. This variable can be positive or negative, with a positive ~~values~~value indicating discharging and a negative ~~transfer~~value indicating charging.</td></tr><tr><td>ExcessRegGen$_{l}$</td><td>The MW amount by which the constraint giving the upper bound of output for regulation capability is exceeded for the *generation registered facility* (including *energy storage facility*) associated with *regulation offer l*.</td></tr><tr><td>ExcessResGen$_{r}$</td><td>The MW amount by which the constraint limiting the total simultaneous *dispatch* of generation, *regulation* and *reserve* (of the class to which *reserve offer r* belongs) from the same *generation registered facility* (including *energy storage facility*) is exceeded.</td></tr><tr><td>FacilityLineFlowViolation$_{es}$</td><td>The total MW violation of connection line flow constraints associated with the *energy storage facility* that *energy storage offer es* is for.</td></tr><tr><td>FacilityRegulationViolation$_{es}$</td><td>The total MW violation of the *regulation* constraints associated with the *energy storage facility* that *energy storage offer es* is for.</td></tr><tr><td>FacilityReserveViolation$_{es}$</td><td>The total MW violation of the *reserve* constraints associated with the *energy storage facility* that *energy storage offer es* is for.</td></tr></table>	
D.5 FUNCTIONS <table><tr><td>*(g(o), j(o)), (es(o), j'(o))*</td><td>References respectively each of the *price-quantity pairs* identified under section D.9C.5 belonging to TIEDENERGYOFFERBLOCKPAIR$_{o}$.</td></tr><tr><td>*(es(o), j(o)), (es'(o), j'(o))*</td><td>References respectively each of the *price-quantity pairs* identified under sections D.9C.6 and D.9C.7 belonging to TIEDENERGYOFFERBLOCKPAIR$_{o}$.</td></tr></table>	Introduce a new function, facilitating changes made subsequently in Appendix 6D.

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
<table><tr><td>*k(es)*</td><td>References the *dispatch network line k*∈ARTIFICIALLINES2 that connects the *energy storage facility* associated with *energy storage offer es* to the dispatch network.</td></tr><tr><td>*l(r)*</td><td>References the *regulation offer l* that has the same associated *generation registered facility* or *energy storage facility* as the *reserve offer r*.</td></tr><tr><td>*m(es)*</td><td>References the *market network node m* corresponding to the *energy storage offer es*.</td></tr><tr><td>*x(es,c)*</td><td>References the *reserve provider group* that *energy storage facility es* is associated with in respect of *reserve class c*.</td></tr></table>	
SECTION B: PRE-PROCESSING	
D.9C TIED OFFERS D.9C.5 If a *price-quantity pair (g,j)* of GENERATIONOFFERBLOCKS$_g$ and a *price-quantity pair* ~~*(es',j')*~~ *(es,j')* of ~~ENERGYSTORAGEOFFERBLOCKS$_{es'}$~~ ENERGYSTORAGEOFFERBLOCKS$_{es}$ meet the following condition, they shall be assigned to a set, TIEDENERGYOFFERBLOCKPAIR$_o$: GenerationOfferPrice$_{(g(o),j(o))}$ = ~~EnergyStorageOfferPrice$_{(es'(o),j'(o))}$~~ EnergyStorageOfferPrice$_{(es(o),j'(o))}$ {*g(o)*=*g*, ∈ENERGYOFFERS ~~*es'(o)=es'≠ es*,∈ENERGYTORAGEOFFERS~~ *es(o)=es*, ∈ENERGYSTORAGEOFFERS *j(o)=j*, ∈GENERATIONOFFERBLOCKS$_{g(o)}$ and ~~*j'(o)=j'*, ∈ENERGYSTORAGEOFFERBLOCKS$_{es'(o)}$} where EnergyStorageBlockLimit$_{es',j'}$ ~~≥ 0}~~ *j'(o)=j'*, ∈ENERGYSTORAGEOFFERBLOCKS$_{es(o)}$ where EnergyStorageBlockLimit$_{es,j'}$ >0}	Minor corrections (subscript es instead of es', > instead of ≥)

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
D.9C.6 If a *price-quantity pair (es,j)* of ENERGYSTORAGEOFFERBLOCKS$_{es}$ and a *price-quantity pair (es',j')* of ENERGYSTORAGEOFFERBLOCKS$_{es'}$ meet the following condition, they shall be assigned to a set, TIEDENERGYOFFERBLOCKPAIR$_o$: EnergyStorageOfferPrice $_{(es(o),j(o))}$ = EnergyStorageOfferPrice $_{(es'(o),j'(o))}$ {es*(o)*=*es*, ENERGYSTORAGEOFFERS, ~~*es'(o)=es'≠es*,∈ENERGYTORAGEOFFERS,~~ *es'(o)=es'≠es*,∈ENERGYSTORAGEOFFERS, ~~*j(o)=j*, ∈ENERGYSTORAGEOFFERBLOCKS$_{g(o)}$ where EnergyStorageBlockLimit$_{es,j}$ ≥ 0, and~~ *j(o)=j*, ∈ENERGYSTORAGEOFFERBLOCKS$_{es(o)}$ where EnergyStorageBlockLimit$_{es,j}$ > 0, and ~~*j'(o)=j'*,∈ENERGYSTORAGEOFFERBLOCKS$_{es'(o)}$ where EnergyStorageBlockLimit$_{es,j'}$ ≥ 0}~~ *j'(o)=j'*,∈ENERGYSTORAGEOFFERBLOCKS$_{es'(o)}$ where EnergyStorageBlockLimit$_{es',j'}$ > 0} D.9C.7 If a *price-quantity pair (es,j)* of ENERGYSTORAGEOFFERBLOCKS$_{es}$ and a *price-quantity pair (es',j')* of ENERGYSTORAGEOFFERBLOCKS$_{es'}$ meet the following condition, they shall be assigned to a set, TIEDENERGYOFFERBLOCKPAIR$_o$: EnergyStorageOfferPrice $_{(es(o),j(o))}$ = EnergyStorageOfferPrice $_{(es'(o),j'(o))}$ {es*(o)*=*es*,∈ENERGYSTORAGEOFFERS ~~*es'(o)=es'≠es*,∈ENERGYTORAGEOFFERS,~~ *es'(o)=es'≠es*,∈ENERGYSTORAGEOFFERS, ~~*j(o)=j*,∈ENERGYSTORAGEOFFERBLOCKS$_{g(o)}$ where EnergyStorageBlockLimit$_{es,j}$ ≤ 0 and~~ *j(o)=j*,∈ENERGYSTORAGEOFFERBLOCKS$_{es(o)}$ where EnergyStorageBlockLimit$_{es,j}$ < 0 and ~~*j'(o)=j'*,∈ENERGYSTORAGEOFFERBLOCKS$_{es'(o)}$ where EnergyStorageBlockLimit$_{es,j'}$ ≤ 0}~~ *j'(o)=j'*,∈ENERGYSTORAGEOFFERBLOCKS$_{es'(o)}$ where EnergyStorageBlockLimit$_{es',j'}$ < 0}	Minor correction (ENERGYSTORAGEOFFERS) Minor corrections (subscript es instead of g, > instead of ≥) Minor corrections (subscript es' instead of es, > instead of ≥) Minor correction (ENERGYSTORAGEOFFERS) Minor corrections (subscript es instead of g, < instead of ≤) Minor corrections (subscript es' instead of es, < instead of ≤)

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
D.12A <u>RAMPING CONSTRAINTS FOR ENERGY STORAGE FACILITY</u> D.12A.1 In the case where a *real-time dispatch schedule* is being produced, or where the *dispatch period* is the first *dispatch period* of the multiple *dispatch periods* involved in the calculation of a *short-term schedule,* then the values of StartGeneration$_{es}$ for each *energy storage facility* in the applicable *dispatch period* shall be the values received from the *PSO* in accordance with section G.3.1 of Appendix 6G. D.12A.1.1 In the event that a value of StartGeneration$_{es}$ for any *energy storage facility* is not updated by the *PSO* or provided to the *EMC* during the *dispatch period* for the time being when the calculation of the *real-time dispatch schedule* or the first *dispatch period* of the multiple *dispatch periods* involved in the calculation of a *short-term schedule* commences, the value of StartGeneration$_{es}$ for the *energy storage facility* shall be the same as the corresponding value of EnergyStorageTransfer$_{es}$ for the same *energy storage facility* in the *real-time dispatch schedule* for the *dispatch period* with respect to the time when the calculation of the *real-time dispatch schedule* <u>or *short-term schedule*</u> commences. ~~In the event that no such *real-time dispatch schedule* is available, then the *EMC* shall use a value of zero for StartGeneration$_{es}$ for the *energy storage facility*.~~ D.12A.1.2 <u>In the event that no such *real-time dispatch schedule* is available, the initial generation level of StartGeneration$_{es}$ for the *energy storage facility* shall be the same as the corresponding value of EnergyStorageTransfer$_{es}$ for the same *energy storage facility* in the latest available *short-term schedule* (based on normal *load* forecast) for the *dispatch period* with respect to the time when the calculation of the *real-time dispatch schedule* or the *short-term schedule* commences.</u> D.12A.1.3 <u>In the event that no such *short-term schedule* is available, the initial generation level of StartGeneration$_{es}$ for the *energy storage facility* shall be the same as the corresponding value of EnergyStorageTransfer$_{es}$ for the same *energy storage facility* in the latest available *pre-dispatch schedule* for the *dispatch period* with respect to the time when the calculation of the *real-time schedule* or the *short-term schedule* commences.</u>	Align with RC387 for fallback values of StartGeneration for energy storage facilities

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
D.12A.1.4 In the event that no such *pre-dispatch schedule* is available, then the *EMC* shall use a value of zero for StartGeneration$_{es}$ for the *energy storage facility.*	
D.12A.2 In the case where the *dispatch period* is the first *dispatch period* of the multiple *dispatch periods* involved in the calculation of the *pre-dispatch schedule*, then the values of StartGeneration$_{es}$ for each *energy storage facility* shall be the corresponding values of EnergyStorageTransfer$_{es}$ in the latest available *short-term schedule* (based on normal *load* forecast) for the *dispatch period* immediately preceding the first *dispatch period* of the *pre-dispatch schedule.* ~~*real-time dispatch schedule* for the *dispatch period* current at the time when the calculation of the *pre-dispatch schedule* commences, or, if this *real-time dispatch schedule* is not available, the *real-time dispatch schedule* for the *dispatch period* immediately preceding that which is current at the time when the calculation of the *pre-dispatch schedule* commences~~. D.12A.2.1 In the event that no such *short-term schedule* is available, then the values of StartGeneration$_{es}$ for the *energy storage facility* shall be the same as the corresponding value of EnergyStorageTransfer$_{es}$ for the same *energy storage facility* in the latest available *pre-dispatch schedule* for the *dispatch period* immediately preceding the first dispatch period of the *pre-dispatch schedule* to be calculated in D.12A.2. D.12A.2.2 In the event that no such *pre-dispatch schedule* is available, then the *EMC* shall use a value of zero for StartGeneration$_{es}$ for the *energy storage facility.*	Align with RC387 for fallback values of StartGeneration for energy storage facilities

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
D.12A.5 ExpectedStartGeneration$_{es}$ of a *generation registered facility* that is an *energy storage facility* associated with an *energy storage offer es* shall be determined in accordance with the following table: When the *energy storage facility's* StartGeneration$_{es}$ is greater than its PriorScheduledGeneration$_{es}$, its ExpectedStartGeneration$_{es}$ shall be the higher of: a) StartGeneration$_{es}$ – DownRampRate$_{es,t-1}$ × RampingTime; and b) PriorScheduledGeneration$_{es}$. When the *energy storage facility's* StartGeneration$_{es}$ is less than its PriorScheduledGeneration$_{es}$, its ExpectedStartGeneration$_{es}$ shall be the lower of: a) StartGeneration$_{es}$ + UpRampRate$_{es,t-1}$ × RampingTime; and b) PriorScheduledGeneration$_{es}$. When the *energy storage facility's* StartGeneration$_{es}$ is equal to its PriorScheduledGeneration$_{es}$, its ExpectedStartGeneration$_{es}$ shall be its PriorScheduledGeneration$_{es}$. For the purposes of this section D.12A.5 only, DownRampRate$_{es,t-1}$ and UpRampRate$_{es,t-1}$, for a given *energy storage facility* for a given *dispatch period t* to which its *energy storage offer es* relates, shall be determined using the respective values contained in its valid *energy storage offer* for the *dispatch period* immediately prior to *dispatch period t*.	Align the calculation of ExpectedStartGeneration between energy storage facilities and other generation registered facilities

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
~~D.12A.5 EnergyTransferEndMax$_{es}$ = StartGeneration$_{es}$ + (UpRampRate$_{es}$ / 60 × RemainingTime)~~ ~~{*es*∈ENERGYSTORAGEOFFERS}~~ ~~D.12A.6 EnergyTransferEndMin$_{es}$ = StartGenerationes$_{es}$ − (DownRampRate$_{es}$ / 60 × RemainingTime)~~ ~~{*es*∈ENERGYSTORAGEOFFERS }~~ D.12A.6 EnergyTransferEndMax$_{es}$ = ExpectedStartGeneration$_{es}$ + (UpRampRate$_{es}$ / 60 × RemainingTime) {*es*∈ENERGYSTORAGEOFFERS} D.12A.7 EnergyTransferEndMin$_{es}$ = ExpectedStartGenerationes$_{es}$ − (DownRampRate$_{es}$ / 60 × RemainingTime) {*es*∈ENERGYSTORAGEOFFERS }	Align the calculations for EnergyTransferEndMax and EnergyTransferEndMin between energy storage facilities and other generation registered facilities
D.12~~A~~B STATE-OF-CHARGE CONSTRAINTS D.12~~A~~B.1 In the case where a *real-time dispatch schedule* is being produced, or where the *dispatch period* is the first *dispatch period* of the multiple *dispatch periods* involved in the calculation of a *short-term schedule,* provided that a value of StartSoC$_{es}$ is updated by the *PSO* or provided to the *EMC* during the *dispatch period* for the time being when the calculation of the *real-time dispatch schedule* or the first *dispatch period* of the multiple *dispatch periods* involved in the calculation of a *short-term schedule* commences, the ExpectedStartSoC$_{es}$ of an *energy storage facility* associated with an *energy storage offer* es shall be determined in accordance with the following table:	Correct numbering and amend the fallback value for ExpectedStartSoC of energy storage facilities, to align with wording introduced in RC387

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
When the *energy storage facility* is discharging (i.e., $PriorScheduledGeneration_{es} > 0$), $ExpectedStartSoC_{es} = StartSoC_{es} - \frac{PriorScheduledGeneration_{es} \times \frac{RampingTime}{60}}{DischargingEfficiency_{es} \times MaxCapacity_{es}}$ ~~$ExpectedStartSoC_{es}$ shall be further capped within the range $[MinSoC_{es}, MaxSoC_{es}]$.~~	Cap of $[MinSoC_{es}, MaxSoC_{es}]$ shifted to D.12B.5, so that the cap applies to $ExpectedStartSoC_{es}$ as determined in sections D.12B.1 through to D.12B.4.
When the *energy storage facility* is charging or idle (i.e., $PriorScheduledGeneration_{es} \leq 0$), $ExpectedStartSoC_{es} = StartSoC_{es} - \frac{PriorScheduledGeneration_{es} \times \frac{RampingTime}{60} \times ChargingEfficiency_{es}}{MaxCapacity_{es}}$ ~~$ExpectedStartSoC_{es}$ shall be further capped within the range $[MinSoC_{es}, MaxSoC_{es}]$.~~	
D.12~~A~~B.1.1 In the event that a value of $StartSoC_{es}$ is not updated by the *PSO* or provided to the *EMC* during the *dispatch period* for the time being when the calculation of the *real-time dispatch schedule* or the first *dispatch period* of the multiple *dispatch periods* involved in the calculation of a *short-term schedule* commences, the values of $ExpectedStartSoC_{es}$ for each *energy storage facility* shall be the same as the corresponding value of $EndSoC_{es}$ for the same *energy storage facility* in the *real-time dispatch schedule* for the *dispatch period* with respect to the time when the calculation of the *real-time dispatch schedule* or the *short-term schedule* commences.	
D.12~~A~~B.1.2 In the event that no such *real-time dispatch schedule* is available, the values of $ExpectedStartSoC_{es}$ for each *energy storage facility* shall be the same as the corresponding value of $EndSoC_{es}$ for the same *energy storage facility* in the *short-term schedule* (based on	

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)		Reasons for Modification
	normal *load* forecast) for the *dispatch period* with respect to the time when the calculation of the *real-time dispatch schedule* or the *short-term schedule* commences.	
D.12~~A~~B.1.3	In the event that no such *short-term schedule* is available, the values of ExpectedStartSoC$_{es}$ for each *energy storage facility* shall be the same as the corresponding value of EndSoC$_{es}$ for the same *energy storage facility* in the *pre-dispatch schedule* for the *dispatch period* with respect to the time when the calculation of the ~~*pre-dispatch schedule*~~ *real-time dispatch schedule* or the *short-term schedule* commences.	
D.12~~A~~B.1.4	In the event that no such *pre-dispatch schedule* is available, then the values of ExpectedStartSoC$_{es}$ for each *energy storage facility* shall equal to MinSoC$_{es}$.	

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
D.12~~A~~B.2 In the case where the *dispatch period* is the first *dispatch period* of the multiple *dispatch periods* involved in the calculation of the *pre-dispatch schedule*, then the values of ExpectedStartSoC$_{es}$ for each *energy storage facility* shall be the corresponding values of EndSoC$_{es}$ in the latest available *short-term schedule* (based on normal *load* forecast) for the *dispatch period* immediately preceding the first *dispatch period* of the *pre-dispatch schedule* ~~*short-term schedule* (based on normal *load* forecast) for the *dispatch period* current at the time when the calculation of the *pre-dispatch schedule* commences~~. D.12~~A~~B.2.1 In the event that no such *short-term schedule* is available, then the values of ExpectedStartSoC$_{es}$ for each *energy storage facility* shall be the same as the corresponding value of EndSoC$_{es}$ for the same *energy storage facility* in the latest available *pre-dispatch schedule* for the *dispatch period* immediately preceding the first *dispatch period* of the *pre-dispatch schedule* to be calculated in D.12B.2 ~~that which is current at the time when the calculation of the *pre-dispatch schedule* commences~~. D.12~~A~~B.2.2 In the event that no such *pre-dispatch schedule* is available, then the values of ExpectedStartSoC$_{es}$ for each *energy storage facility* shall equal to MinSoC$_{es}$.	Correct numbering and amend the fallback value for StartSoC of energy storage facilities, to align the wording introduced in RC387

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
D.12~~A~~B.3 In the case where the *dispatch period* is the first *dispatch period* of the multiple *dispatch periods* involved in the calculation of the *market outlook scenario*, the values of ExpectedStartSoC$_{es}$ for each *energy storage facility* shall be the same as the corresponding values of EndSoC$_{es}$ for the same *energy storage facility* in the most recently released *pre-dispatch schedule* with a *nodal load forecast* corresponding to the *market outlook scenario* being calculated, and shall be taken from the *dispatch period* in such *pre-dispatch schedule* immediately preceding the first *dispatch period* required in the calculation of the *market outlook scenario*, provided that such *pre-dispatch schedule* contains the appropriate *dispatch period*. D.12~~A~~B .3.1 If such *pre-dispatch schedule* does not contain the appropriate *dispatch period*, then the values of ExpectedStartSoC$_{es}$ for such *energy storage facility* shall equal to MinSoC$_{es}$. D.12~~A~~B.4 In the case where the *dispatch period* is involved in the calculation of a *short-term schedule,* a *pre-dispatch schedule* or a *market outlook scenario*, and is not the *first dispatch period* of the multiple *dispatch periods* involved in the calculation of the *short-term schedule, pre-dispatch schedule* or a *market outlook scenario*, the values of ExpectedStartSoC$_{es}$ for each *energy storage facility* shall be the corresponding values of EndSoC$_{es}$ for the immediately preceding *dispatch period* in the *short-term schedule*, *pre-dispatch schedule* or *market outlook scenario* respectively. D.12B.5 Values of ExpectedStartSoC$_{es}$ determined in accordance with sections D.12B.1 to D.12B.4 shall be further capped within the range [MinSoC$_{es}$, MaxSoC$_{es}$]. D.12~~A.5~~B.6 SoCDischargeLimitMWh$_{es}$ = (ExpectedStartSoC~~es~~$_{es}$ − MinSoC~~es~~$_{es}$) × MaxCapacity~~es~~$_{es}$ {*es*∈ENERGYSTORAGEOFFERS} D.12~~A.6~~B.7 SoCChargeLimitMWh$_{es}$ = (MaxSoC$_{es}$ − ExpectedStartSoC$_{es}$) × MaxCapacity$_{es}$ {*es*∈ENERGYSTORAGEOFFERS}	Correct numbering and formatting, with addition of D.12.B.5 to cap ExpectedStartSoC$_{es}$ within [MinSoC$_{es}$, MaxSoC$_{es}$].

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
D.13A <u>REGULATION RANGE CONSTRAINTS</u> D.13A.1 A valid *regulation offer* for a *generation registered facility* <u>that is not an *energy storage facility*</u> for a *dispatch period* shall only be used in the linear program if: …… <u>D.13A.2 A valid *regulation offer* for a *generation registered facility* that is an *energy storage facility* for a *dispatch period* shall only be used in the linear program if a valid *energy storage offer* exists for that *generation registered facility* for that *dispatch period*.</u>	Simplify ESS regulation offer validation checks
SECTION C: LINEAR PROGRAM	
<u>D.15 CONSTRAINTS ON ENERGY GENERATION AND PURCHASES</u> D.15.4.2 Energy Storage Block Constraint for Charging $\text{EnergyStorageBlockLimit}_{es,j} \leq \text{EnergyStorageBlock}_{es,j} \leq 0$ $\{j,es \mid j \in \text{ENERGYSTORAGEOFFERBLOCKS}_{es} \text{ where } \text{EnergyStorageBlockLimit}_{es,j} \leqq \leqq 0\}$	Correction of inequality sign
<u>D.17 RISK AND OPERATING RESERVE</u> D.17.1 Risk D.17.1.1 Generator Risk Constraint: ~~$\text{Risk}_{c} \geq \text{RiskAdjustmentFactor}_{c} \times \text{RawCalculatedRisk}_{c}$~~ <u>$\text{Risk}_{c} \geq \text{RiskAdjustmentFactor}_{c} \times \text{RawCalculatedRisk}_{g,c}$</u>	Correction of subscripts (g,c instead of c).

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
Where: ~~$\text{RawCalculatedRisk}_c = \text{Generation}_g - \text{PowerSystemResponse}_{g,c}$~~ $\underline{\text{RawCalculatedRisk}_{g,c} = \text{Generation}_g - \text{PowerSystemResponse}_{g,c}}$ $+\text{EstReserveEffectiveness}_{r(g,c)} \times \text{RawReserve}_{r(g,c)}$ $+ \sum_{h \epsilon \text{SECONDARYRISKGENERATORS}, h \neq g} (\text{Generation}_h + \text{EstReserveEffectiveness}_{r(h,c)} \times \text{RawReserve}_{r(h,c)})$ D.17.1.1A Energy Storage Risk Constraint: $\text{Risk}_c \geq \text{RiskAdjustmentFactor}_c \times \text{RawCalculatedRisk}_{es,c}$ Where: ~~$\text{RawCalculatedRisk}_c = \text{EnergyStorageTransfer}_{es} - \text{PowerSystemResponse}_c$~~ ~~$+\text{EstReserveEffectiveness}_{r(es,c)} \times \text{RawReserve}_{r(es,c)}$~~ $\underline{\text{RawCalculatedRisk}_{es,c} = \text{EnergyStorageTransfer}_{es} - \text{PowerSystemResponse}_c}$ $\underline{+\text{EstReserveEffectiveness}_{r(es,c)} \times \text{RawReserve}_{r(es,c)}}$ $\underline{+ \sum_{h \epsilon \text{SECONDARYRISKGENERATORS}} (\text{Generation}_h + \text{EstReserveEffectiveness}_{r(h,c)} \times \text{RawReserve}_{r(h,c)})}$ and $\text{PowerSystemResponse}_c = \text{EstIntertieContribution} \times \text{AcceptableFreqDeviation}_c$ ~~$\times \text{EstLoadDamping}_c$~~	Correction of subscripts (es,c instead of c), and enhancing consistency in calculation of RawCalculatedRisk between ESS and other generators. Correction of formula

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
$\underline{\times \text{EstLoadDamping}_c \times \text{TotalPurchase}}$ $-\text{EstGTOutputDamping}_c \times \sum_{i \in \text{DAMPINGGENERATORS}} \text{Generation}_i$ $\{es,c \mid es \in \text{ENERGYSTORAGEOFFERS},\ c \in \text{RESERVECLASSES}\}$	
D.17.2 Supply of ~~Contingency~~ Reserve	Correction of section title to cover both primary reserve and contingency reserve
D.18 REGULATION D.18.1.3 Mixed Integer Program Based Regulation Max Constraint: $\text{Generation}_{g(l)} + \text{Regulation}_l - \text{ExcessRegGen}_l - \text{InfinitePositiveValue} \times (1 - \text{RegulationEligibilitySwitch}_l \leq \text{RegulationMax}_{g(l)}$ $\{\sout{l \in \text{REGULATIONOFFERS}}\}$ $\underline{\{l \in \text{GENREGULATIONOFFERS}\}}$ D.18.1.4 Mixed Integer Program Based Regulation Min Constraint: $\text{Generation}_{g(l)} - \text{Regulation}_l + \text{DeficitRegGen}_l + \text{InfinitePositiveValue} \times (1 - \text{RegulationEligibilitySwitch}_l \geq \text{RegulationMin}_{g(l)}$ $\{\sout{l \in \text{REGULATIONOFFERS}}\}$ $\underline{\{l \in \text{GENREGULATIONOFFERS}\}}$ D.18.1.5 Mixed Integer Program Based Zero Regulation Constraint:	Correction of references to defined set GENREGULATIONOFFERS

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
$\text{Regulation}_l - \text{InfinitePositiveValue} \times \text{RegulationEligibilitySwitch}_l \leq 0$ {~~$l \in$ REGULATIONOFFERS~~} { $l \in$ GENREGULATIONOFFERS}	
D.18.1.7 Energy Storage Regulation Min Constraint: ~~$\text{EnergyStorageTransfer}_{es(l)} - \text{Regulation}_l - \text{DeficitRegGen}_l \geq \text{RegulationMin}_{es(l)}$~~ $\text{EnergyStorageTransfer}_{es(l)} - \text{Regulation}_l + \text{DeficitRegGen}_l \geq \text{RegulationMin}_{es(l)}$ { $l \in$ STORAGEREGULATIONOFFERS}	Correction of constraint
D.19 RAMPING D.19.1.2A Energy Storage Down Ramp Constraint: $\text{EnergyStorageTransfer}_{es} + \text{ExcessDownRamp}_{es} \leqq \geqq \text{EnergyTransferEndMin}_{es}$ {$es \in$ENERGYSTORAGEOFFERS}	Correction of inequality sign
D.19.2.3 Regulation Ramp Constraint: $\text{Regulation}_l + \text{RegulationResponseRatio} \times (\text{Generation}_{g(l)} - \text{ExpectedStartGeneration}_{g(l)} - \text{ExcessRegRamp}_l \leq \text{MaxResponse}_l$ ~~{$l \in$REGULATIONOFFERS, where RegulationResponsePeriod > CombinedRampThreshold}~~ {$l \in$GENREGULATIONOFFERS, where RegulationResponsePeriod > CombinedRampThreshold}	Correction of reference to defined set GENREGULATIONOFFERS

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
D.19A **STATE-OF-CHARGE** D.19A.1 Combined Reserves Energy Regulation Minimum SoC Constraint: $\frac{\sout{\text{EnergyStorageDischarging}_{es} + \text{Regulation}_{es} + \text{RawReserve}_{\sout{r(es,Primary)}} \times \frac{\sout{\text{PriResSustainTime}}}{\sout{\text{DispatchPeriod}}} + \text{RawReserve}_{\sout{r(es,Contingency)}} \times \frac{\sout{\text{DispatchPeriod-PriResSustainTime}}}{\sout{\text{DispatchPeriod}}}}}{\sout{\text{DischargingEfficiency}_{es}}}$ $\frac{\text{EnergyStorageDischarging}_{es} + \text{Regulation}_{l(es)} + \text{RawReserve}_{r(es,Primary)} \times \frac{\text{PriResSustainTime}}{\text{DispatchPeriod}} + \text{RawReserve}_{r(es,Contingency)} \times \frac{\text{DispatchPeriod-PriResSustainTime}}{\text{DispatchPeriod}}}{\text{DischargingEfficiency}_{es}}$ $-\text{EnergyStorageCharging}_{es} \times \text{ChargingEfficiency}_{es}$ $-\text{ExcessDischarging}_{es}$ $\leq \frac{\text{SoCDischargeLimitMWh}_{es}}{\text{DispatchPeriod}/3600}$ {es∈ENERGYSTORAGEOFFERS}	Correction of Regulation subscript from *es* to *l(es)*
D.19A.2 Combined Primary Reserve Energy Regulation Minimum SoC Constraint: $\frac{\sout{\text{EnergyStorageDischarging}_{es} + \text{Regulation}_{es} + \text{RawReserve}_{\sout{r(es,Primary)}}}}{\sout{\text{DischargingEfficiency}_{es}}}$ $\frac{\text{EnergyStorageDischarging}_{es} + \text{Regulation}_{l(es)} + \text{RawReserve}_{r(es,Primary)}}{\text{DischargingEfficiency}_{es}}$ $-\text{EnergyStorageCharging}_{es} \times \text{ChargingEfficiency}_{es}$	Correction of Regulation subscript from *es* to *l(es)*

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
$-\text{ExcessPrimaryDischarging}_{es}$ $\leq \frac{\text{SoCDischargeLimitMWh}_{es}}{\text{PriResSustainTime}/3600}$ {es∈ENERGYSTORAGEOFFERS}	
D.19A.3 Combined Contingency Reserve Energy Regulation Minimum SoC Constraint: ~~$\frac{\text{EnergyStorageDischarging}_{es} + \text{Regulation}_{es} + \text{RawReserve}_{r(es,Contingency)}}{\text{DischargingEfficiency}_{es}}$~~ $\frac{\text{EnergyStorageDischarging}_{es} + \text{Regulation}_{l(es)} + \text{RawReserve}_{r(es,Contingency)}}{\text{DischargingEfficiency}_{es}}$ $-\text{EnergyStorageCharging}_{es} \times \text{ChargingEfficiency}_{es}$ $-\text{ExcessContingencyDischarging}_{es}$ $\leq \frac{\text{SoCDischargeLimitMWh}_{es}}{\text{ConResSustainTime}/3600}$ {es∈ENERGYSTORAGEOFFERS}	Correction of Regulation subscript from *es* to *l(es)*
D.19A.4 Combined Energy Regulation Maximum SoC Constraint: ~~$(\text{EnergyStorageCharging}_{es} + \text{Regulation}_{es}) \times \text{ChargingEfficiency}_{es}$~~ $\left(\text{EnergyStorageCharging}_{es} + \text{Regulation}_{l(es)}\right) \times \text{ChargingEfficiency}_{es}$	Correction of Regulation subscript from *es* to *l(es)*

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
$$-\frac{\text{EnergyStorageDischarging}_{es}}{\text{DischargingEfficiency}_{es}}$$ $$-\text{ExcessCharging}_{es}$$ $$\leq \frac{\text{SoCChargeLimitMWh}_{es}}{\text{DispatchPeriod}/3600}$$ {es∈ENERGYSTORAGEOFFERS}	
D.20 GENERIC AND MULTI-UNIT CONSTRAINTS D.20.1 Generic constraint D.20.1.1 Generic Security Constraints $$\sum_{k\in\text{SECURITYLINESGROUP}_s} \text{SecurityGroupLineWeight}_{s,k}\times\text{LineFlow}_k + \sum_{n\in\text{SECURITYNODESGROUP}_s} \text{SecurityGroupNodeWeight}_{s,n}\times\text{NodeNetInjection}_n + \sum_{g\in\text{SECURITYGENERATIONGROUP}_s} \text{SecurityGroupGenerationWeight}_{s,g}\times\text{Generation}_g + \sum_{es\in\text{SECURITYSTORAGETRANSFERGROUP}_s} \text{SecurityGroupStorageTransferWeight}_{s,es}\times\text{EnergyStorageTransfer}_{es} + \text{DeficitSecurity}_s \geq \text{GenericSecurityLimit}_s$$	Include energy storage transfer in generic security constraints

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
{s ∈ SECURITYCONSTRAINTS}	
D.20A TIE-BREAKING CONSTRAINTS D.20A.1 Energy Tie-Breaking Constraints: $\frac{\text{GenerationBlock}_{(g(o),j(o))}}{\text{GenerationBlockMax}_{(g(o),j(o))}} - \frac{\text{GenerationBlock}_{(g'(o),j'(o))}}{\text{GenerationBlockMax}_{(g'(o),j'(o))}} = \text{EnergyTieBreakSlack1}_o - \text{EnergyTieBreakSlack2}_o$ {$o \in$ TIEDENERGYOFFERBLOCKPAIRS, where g(o), g'(o) $\in$ ENERGYOFFERS} ~~$\frac{\text{GenerationBlock}_{g(o),j(o))}}{\text{GenerationBlockMax}_{(g(o),j(o))}} - \frac{\text{Energy StorageBlock}_{(es'(o),j'(o))}}{\text{EnergyStorageBlockLimit}_{(es'(o),j'(o))}} = \text{EnergyTieBreakSlack1}_o - \text{EnergyTieBreakSlack2}_o$~~ ~~{o∈TIEDENERGYOFFERBLOCKPAIRS, where g(o)∈ENERGYOFFERS, es'(o)∈ENERGYSTORAGEOFFERS,EnergyStorageBlockLimit$_{es'} \geq 0$}~~ $\frac{\text{GenerationBlock}_{g(o),j(o))}}{\text{GenerationBlockMax}_{g(o),j(o))}} - \frac{\text{Energy StorageBlock}_{(es(o),j'(o))}}{\text{EnergyStorageBlockLimit}_{(es(o),j'(o))}} = \text{EnergyTieBreakSlack1}_o - \text{EnergyTieBreakSlack2}_o$ {o∈TIEDENERGYOFFERBLOCKPAIRS, where	Minor corrections (subscript es instead of es', > instead of ≥)

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
g(o)∈ENERGYOFFERS, es(o)∈ENERGYSTORAGEOFFERS,$\text{EnergyStorageBlockLimit}_{es,j}$>0} $\frac{\text{Energy StorageBlock}_{es(o),j(o))}}{\text{EnergyStorageBlockLimit}_{(es(o),j(o))}} - \frac{\text{Energy StorageBlock}_{(es'(o),j'(o))}}{\text{EnergyStorageBlockLimit}_{(es'(o),j'(o))}}$ $= \text{EnergyTieBreakSlack1}_o - \text{EnergyTieBreakSlack2}_o$ ~~{o∈TIEDENERGYOFFERBLOCKPAIRS~~ ~~where es(o)∈ENERGYSTORAGEOFFERS, es'(o)∈ENERGYSTORAGEOFFER}~~ {o∈TIEDENERGYOFFERBLOCKPAIRS, where es(o), es'(o)∈ENERGYSTORAGEOFFERS}	Correction of reference (ENERGYSTORAGEOFFERS instead of ENERGYSTORAGEOFFER), and combining es(o) and es'(o)
D.21 VIOLATION GROUP CONSTRAINTS D.21.5B Energy Storage Facility Constraint $\sum_{j \in \text{VIOLATIONGROUPBLOCKSFAC}_{y(es)}} \text{ViolationGroupBlock}_{y(es),j}$ $\geq \text{FacilityRampViolation}_{es} + \text{FacilityReserveViolation}_{es} + \text{FacilityRegulationViolation}_{es}$ $+\text{FacilitySoCViolation}_{es} + \text{FacilityLineFlowViolation}_{es}$ {es∈ENERGYSTORAGEOFFERS} …… D.21.5B.2 Energy Storage Facility Reserve Constraint	Inclusion of ESS SoC and facility line flow violation in energy storage facility constraint

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
$$\text{FacilityReserveViolation}_{es} = \sum_{c \in RESERVECLASSES} \text{ExcessRes}\sout{erve}\text{Gen}_{r(es,c)}$$ {es∈ENERGYSTORAGEOFFERS}	Correction of reference to defined variable ExcessResGen
……	
~~D.21.5.6 Energy Storage Facility State-of-Charge Constraint:~~	Correction of numbering
D.21.5B.4 Energy Storage Facility State-of-Charge Constraint: $$\text{FacilitySoCViolation}_{es} = \text{ExcessDischarging}_{es} + \text{ExcessPrimaryDischarging}_{es} + \text{ExcessContingencyDischarging}_{es} + \text{ExcessCharging}_{es}$$ {es∈ENERGYSTORAGEOFFERS}	
D.21.5B.5 Energy Storage Facility Line Flow Constraint $$\underline{\text{FacilityLineFlowViolation}_{es}} = \underline{\sum_{k \in ARTIFICIALLINE2} \text{ExcessLineFlowForward}_{k(es)}} + \underline{\sum_{k \in ARTIFICIALLINE2} \text{ExcessLineFlowReverse}_{k(es)}} + \underline{\sum_{k \in ARTIFICIALLINE2} \text{DeficitWLineFlow}_{k(es)}} + \underline{\sum_{k \in ARTIFICIALLINE2} \text{ExcessWLineFlow}_{k(es)}}$$	Calculation of facility line flow violation as applied to ESS

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
{es∈ENERGYSTORAGEOFFERS}	
SECTION D: POST-PROCESSING	
D.23 QUANTITY FORMATION D.23.1 *Energy* quantities scheduled from each *generation registered facility* are given by the values of the $Generation_g$ and $EnergyStorageTransfer_{es}$ variables.	Include ESS within scheduled energy quantities
D.24 PRICE FORMATION D.24.1 The *market energy price* or *MEP* for each *market network node* shall be calculated as follows: For *generation registered facilities* that are not *multi-unit facilities*, and for *generation settlement facilities* that are not *pseudo generation settlement facilities*, represented as *synchronised* in the *dispatch network data* or connected to the dispatch network in accordance with section D.6.5 in the *dispatch period*, ~~and for *generation registered facilities* that are *energy storage facilities* with $EnergyStorageTransfer_{es} > 0$,~~ the *market energy price* shall be calculated as follows: ……	The calculation of market energy price should include all ESS nodes, not just ESS nodes where the ESS is discharging.

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
D.24.1.3 For *pseudo generation settlement facilities*, the *market energy price* shall be calculated as follows: ~~$MEP^{m(g)} = \frac{\sum_{g \in ENERGYOFFERS} (Generation_g \times MEP^{m(g)})}{\sum_{g \in ENERGYOFFERS} Generation_g}$~~ $$\underline{MEP} = \frac{\sum_{g \in ENERGYOFFERS} (Generation_g \times MEP^{m(g)}) + \sum_{es \in ENERGYSTORAGEOFFERS} (EnergyStorageTransfer_{es} \times MEP^{m(es)})}{\sum_{g \in ENERGYOFFERS} Generation_g + \sum_{es \in ENERGYSTORAGEOFFERS} EnergyStorageTransfer_{es}}$$ where: $MEP^{m(g)}$ <u>or $MEP^{m(es)}$</u> is the *market energy price* for *market network node m* corresponding to the *generation registered facility* that *energy offer g* <u>or *energy storage offer es*</u> is for<u>,</u> calculated in sections D.24.1.1 or D.24.1.2 after it has been modified in accordance with section D.24.5 for *dispatch periods* where the *temporary price cap* is not in effect, or in accordance with section D.24.5A for *dispatch periods* where the *temporary price cap* is in effect.	Remove of superscript m(g) from the left hand side of the equation, and include energy storage facilities in the right hand side of the equation
D.25 **<u>ADDITIONAL OUTPUTS</u>** D.25.1.2 the total generation scheduled at each *generation registered facility*: $Generation_g$ $\{g \in ENERGYOFFERS\}$ <u>$EnergyStorageTransfer_{es}$</u> <u>$\{es \in ENERGYSTORAGEOFFERS\}$</u>	Include ESS within total generation scheduled

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
and in aggregate, $$\sum_{\substack{g \in ENERGYOFFERS \\ g \notin INTERTIEENERGYBIDS}} Generation_g$$ $$+ \sum_{es \in ENERGYSTORAGEOFFERS} EnergyStorageTransfer_{es}$$ expressed in MW;	
D.25.1.14 the estimated end-of-period SoC in accordance with the following formulae: ~~$EndSoC_{es} = ExpectedStartSoC_{es} - \frac{EnergyStorageDischarging_{es}}{DischargingEfficiency_{es} \times MaxCapacity_{es}} + \frac{EnergyStorageCharging_{es} \times ChargingEfficiency_{es}}{MaxCapacity_{es}}$~~ $$EndSoC_{es} = ExpectedStartSoC_{es} - \frac{EnergyStorageDischarging_{es} \times \frac{DispatchPeriod}{3600}}{DischargingEfficiency_{es} \times MaxCapacity_{es}} + \frac{EnergyStorageCharging_{es} \times ChargingEfficiency_{es} \times \frac{DispatchPeriod}{3600}}{MaxCapacity_{es}}$$ $$\{es \in ENERGYSTORAGEOFFERS\}$$	Correction of formula units

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
APPENDIX 6J – PRICE LIMITS AND CONSTRAINT VIOLATION PENALTIES	
J.3 MAPPING OF VIOLATION PENALTIES TO VARIABLES USED IN THE MARKET CLEARING ENGINE	

Variable used in MCE formulation	Violation Penalty Block Prices	Violation Penalty Block Quantities
$ExcessRawReserve_r$ $ExcessResGen_r$ $ExcessResGenSegment1_r$ $ExcessResGenSegment2_r$ $ExcessResGenSegment3_r$ $ExcessResRamp_r$ $ExcessResPropRamp_r$ $ExcessRegGen_l$ $DeficitRegGen_l$ $ExcessRegRamp_l$ $ExcessUpRamp_g$ $ExcessDownRamp_g$ $ExcessUpRamp_p$ $ExcessDownRamp_p$ $DeficitMulti_s$	20 * VoLL	10,000 MW

Treat constraint violation penalties for ESS similarly to those for other generation facilities

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
$ExcessMulti_s$ $ExcessLineFlowForward_k$ $ExcessLineFlowReverse_k$ $DeficitWLineFlow_k$ $ExcessWLineFlow_k$ where {k ∈ ARTIFICIALLINES1∪ ARTIFICIALLINES2} $DeficitMSL_g$ $ExcessMSL_g$ $\underline{ExcessUpRamp_{es}}$ $\underline{ExcessDownRamp_{es}}$ $\underline{ExcessDischarging_{es}}$ $\underline{ExcessPrimaryDischarging_{es}}$ $\underline{ExcessContingencyDischarging_{es}}$ $\underline{ExcessCharging_{es}}$	
CHAPTER 8 – DEFINITIONS	
1.1.xxx *energy storage facility* means a facility that can withdraw *energy* from the *transmission system*, ~~and~~ store it for production of *electricity* and inject ~~onto~~into the *transmission system* at a later time;	Minor edit

Proposed Market Rule Modifications (deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
1.1.xxx *offer variation* means an *energy offer*, an *energy storage offer*, a *reserve offer* or a *regulation offer* submitted to the *EMC* for a *generation registered facility* or *import registered facility* or a *reserve offer* submitted to the *EMC* for a *load registered facility* that varies the terms of a previous *energy offer*, *energy storage offer*, *reserve offer* or *regulation offer* (as the case may be) submitted to the *EMC* for that *generation registered facility*, *import registered facility* or *load registered facility* for the same *dispatch period*;	To include energy storage offers within the definition of offer variation

Annex 2: Proposed Market Manual Modifications

Existing Market Manual (26 Jan 2022)	Proposed Market Manual Modifications (Deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
MARKET OPERATIONS MARKET MANUAL – Standing Offers, Standing Bids, Offer Variations, Bid Variations and Standing Capability Data (Chapter 6 Market Rules)	**MARKET OPERATIONS MARKET MANUAL** – Standing Offers, Standing Bids, Offer Variations, Bid Variations and Standing Capability Data (Chapter 6 Market Rules)	

Existing Market Manual (26 Jan 2022)	Proposed Market Manual Modifications (Deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
2 Standing offers and standing bids **2.1 What is a "standing offer" and a "standing bid"?** A *standing offer* refers to (i) an *energy offer*, a *reserve offer* or a *regulation offer* required to be submitted to the *EMC* in respect of a *generation registered facility,* (ii) an *energy offer* required to be submitted to the *EMC* in respect of an *import registered facility*, or (iii) a *reserve offer* required to be submitted to the *EMC* in respect of a *load registered facility* that is registered to provide *reserve*.	**2 Standing offers and standing bids** **2.1 What is a "standing offer" and a "standing bid"?** A *standing offer* refers to (i) an *energy offer*~~, a *reserve offer* or a *regulation offer*~~ required to be submitted to the *EMC* in respect of a *generation registered facility* that is not an *energy storage facility*, (ii) an *energy storage offer* required to be submitted to the *EMC* in respect of a *generation registered facility* that is an *energy storage facility*, (iii) an *energy offer* required to be submitted to the *EMC* in respect of an *import registered facility*, (iv) a *reserve offer* or a *regulation offer* required to be submitted to the *EMC* in respect of a *generation registered facility*, or (v) a *reserve offer* required to be submitted to the *EMC* in respect of a *load registered facility* that is registered to provide *reserve*.	Clarify that standing offers include energy storage offers

Existing Market Manual (26 Jan 2022)	Proposed Market Manual Modifications (Deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
2.6 Required form of a standing offer and standing bid …… There are three types of *standing offers*: • *energy standing offer*; • *reserve standing offer*; and • *regulation standing offer*. There are two classes of *reserve standing offer*[4]: • primary *reserve*; and • contingency *reserve*. The *reserve standing offer* may be submitted for either a *generation registered facility* or a *load registered facility* that is registered to provide *reserve*. The following tables show the CSV file and data formats for *energy standing offers*, *standing bids*, *reserve standing offers* and *regulation standing offers*.	**2.6 Required form of a standing offer and standing bid** …… There are ~~three~~ four types of *standing offers*: • *energy standing offer*; • *energy storage standing offer;* • *reserve standing offer*; and • *regulation standing offer*. There are two classes of *reserve standing offer*[5]: • primary *reserve*; and • contingency *reserve*. The *reserve standing offer* may be submitted for either a *generation registered facility* or a *load registered facility* that is registered to provide *reserve*. The following tables show the CSV file and data formats for *energy standing offers*, *energy storage standing offers, standing bids*, *reserve standing offers* and *regulation standing offers*.	Specify that standing offers include energy storage standing offers

[4] As referred to in section A.2 of Appendix 5A of the *market rules*.

[5] As referred to in section A.2 of Appendix 5A of the *market rules*.

<table>
<tr><th>Existing Market Manual
(26 Jan 2022)</th><th>Proposed Market Manual Modifications
(Deletions represented by strikethrough text and additions represented by double underlined text)</th><th>Reasons for Modification</th></tr>
<tr><td>[New Table]</td><td>

Table 2 CSV file and data format of energy storage standing offers

Item No	Field	Data Format	Remarks
1	Participant	Alphanumeric	
2	Type	Alphanumeric	The value must be: EGO
3	Unit	Alphanumeric	
4	Day	Mon to Sun	
5	Period	1 to 48	
6	Ramp Up	0 to 999999999999.9	This value is expressed in MW/minute.
7	Ramp Down	0 to 999999999999.9	This value is expressed in MW/minute.
8	Capacity[6]	0 to 9999999999.9	This value is expressed in MW.
9	Band 1: Price	-99999999999.99 to 99999999999.99	*Energy storage standing offers* requires 10 *price-quantity pairs*[7]. Prices are expressed in $/MWh.
10	Band 1: Quantity	-9999999999.9 to 9999999999.9	Quantities are expressed in MW.
11	External Reference	Alphanumeric	(Optional) Free text allowing a reference or comment to be supplied for this particular *offer* or *bid*.

</td><td>Provide the data format for energy storage standing offers</td></tr>
</table>

[6] "Capacity" refers to the maximum combined transfer limit referred to in section 5.2B.2.5 of Chapter 6 of the *market rules*.

[7] For *energy storage standing offers* for a *generation registered facility* that is an *energy storage facility*:

(i) subject to section 5.2B.2.4 of Chapter 6 of the *market rules*, the quantity (if any) in the *price-quantity pairs in the range 1-5* shall not be more than 0.0MW; and

(ii) the quantity (if any) in the price-quantity pairs in the range 6-10 shall not be less than 0.0MW.

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Existing Market Manual (26 Jan 2022)	Proposed Market Manual Modifications (Deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
Table 2 CSV file and data formats of all classes of reserve standing offers	**Table ~~2~~3 CSV file and data formats of all classes of reserve standing offers**	Renumbered table and minor modification to footnote

Item No	Field	Data Format	Remarks
1	Participant	Alphanumeric	
2	Type	Alphanumeric	The value must be: RVO[8]
3	Unit	Alphanumeric	
4	Day	Mon to Sun	
5	Period	1 to 48	
6	Reserve Proportion[9]	0 to 99.999	*Dispatch coordinators* of *generation registered facilities* must take special note of section 5.3.8 of Chapter 6 of the *market rules* when specifying the *reserve* proportion.
7	Reserve Class	PRI / CON[10]	
8	Band 1: Price	0 to 99999999999.99	A *reserve standing offer* for any *reserve class* requires 1 to 5 *price-quantity pairs.* Prices are expressed in $/MWh. Quantities are expressed in MW.
9	Band 1: Quantity	0 to 9999999999.9	
10	External Reference	Alphanumeric	(Optional) Free text allowing a reference or comment to be supplied for this particular *offer*.

Item No	Field	Data Format	Remarks
1	Participant	Alphanumeric	
2	Type	Alphanumeric	The value must be: RVO[11]
3	Unit	Alphanumeric	
4	Day	Mon to Sun	
5	Period	1 to 48	
6	Reserve Proportion[12]	0 to 99.999	*Dispatch coordinators* of *generation registered facilities* must take special note of section 5.3.8 of Chapter 6 of the *market rules* when specifying the *reserve* proportion.
7	Reserve Class	PRI / CON[13]	
8	Band 1: Price	0 to 99999999999.99	A *reserve standing offer* for any *reserve class* requires 1 to 5 *price-quantity pairs.* Prices are expressed in $/MWh. Quantities are expressed in MW.
9	Band 1: Quantity	0 to 9999999999.9	
10	External Reference	Alphanumeric	(Optional) Free text allowing a reference or comment to be supplied for this particular *offer*.

[8] "RVO" refers to *reserve offer*.

[9] This field is not applicable for *standing offers* in respect of *load registered facilities*.

[10] PRI – primary *reserve*; CON – contingency *reserve*.

[11] "RVO" refers to *reserve offer*.

[12] This field is not applicable for *standing offers* in respect of *load registered facilities* and *generation registered facilities* that are *energy storage facilities*.

[13] PRI – primary *reserve*; CON – contingency *reserve*.

Existing Market Manual (26 Jan 2022)	Proposed Market Manual Modifications (Deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
Table 3 CSV file and data formats of regulation standing offers	**Table ~~3~~4 CSV file and data formats of regulation standing offers**	Renumbered table

2.7 Rules for validation of standing offers and standing bids ……	**2.7 Rules for validation of standing offers and standing bids** ……	Specify that validation rule 2 applies to energy storage offers as well
Rule 2: Validate that the ramp rates for *energy offers* and *energy bids* are not greater than the relevant *standing capability data* maximum values This rule only relates to *energy offers* and *energy bids*. There are no ramp rate validations for *reserve offers* or *regulation offers*. For an *energy offer*, the *energy* ramp-up and *energy* ramp-down values in the *energy offer* must be less than or equal to the maximum *energy* ramp-up and maximum *energy* ramp-down rates of the *registered facility* respectively. Each of the *energy* ramp-up and *energy* ramp-down values in the *energy offer* must be expressed in MW/minute up to one decimal place and must not be less than 0.0MW/minute. **Example 1: Invalid** Assume Facility A's *standing capability data* specifies that its maximum *energy* ramp-up rate is 10MW/minute and its maximum *energy* ramp-down rate is 15 MW/minute. Facility A's *energy offer* would be invalid if: Max_ramp_up Max_ramp_down 15.0 10.0 **Example 2: Valid**	**Rule 2: Validate that the ramp rates for *energy offers*, *energy storage offers* and *energy bids* are not greater than the relevant *standing capability data* maximum values** This rule only relates to *energy offers*, *energy storage offers* and *energy bids*. There are no ramp rate validations for *reserve offers* or *regulation offers*. For an *energy offer* (or an *energy storage offer*), the *energy* ramp-up and *energy* ramp-down values in the *energy offer* (or *energy storage offer*) must be less than or equal to the maximum *energy* ramp-up and maximum *energy* ramp-down rates of the *registered facility* respectively. Each of the *energy* ramp-up and *energy* ramp-down values in the *energy offer* (or *energy storage offer*) must be expressed in MW/minute up to one decimal place and must not be less than 0.0MW/minute. **Example 1: Invalid** Assume Facility A's *standing capability data* specifies that its maximum *energy* ramp-up rate is 10MW/minute and its maximum *energy* ramp-down rate is 15 MW/minute. Facility A's *energy offer* would be invalid if: Max_ramp_up Max_ramp_down 15.0 10.0	

Assume Facility A's *standing capability data* specifies that its maximum *energy* ramp-up rate is 10MW/minute and its maximum *energy* ramp-down rate is 15 MW/minute. Facility A's *energy offer* would be valid if: Max_ramp_up Max_ramp_down 7.0 10.0 For an *energy bid*, the *energy* ramp-up and *energy* ramp-down values in the *energy bid* must be less than or equal to the maximum *energy* ramp-up and maximum *energy* ramp-down rates of the *registered facility* respectively. Each of the *energy* ramp-up and *energy* ramp-down values in the *energy bid* must be expressed in MW/minute up to three decimal places and must not be less than 0.000MW/minute. **Example 3: Invalid** Assume Load Facility B's *standing capability data* specifies that its maximum *energy* ramp-up rate is 10MW/minute and its maximum *energy* ramp-down rate is 15 MW/minute. Load Facility B's *energy bid* would be invalid if: Max_ramp_up Max_ramp_down 15.000 10.000 **Example 4: Valid** Assume Load Facility B's *standing capability data* specifies that its maximum *energy* ramp-up rate is 10MW/minute and its maximum *energy* ramp-down rate is 15MW/minute.	**Example 2: Valid** Assume Facility A's *standing capability data* specifies that its maximum *energy* ramp-up rate is 10MW/minute and its maximum *energy* ramp-down rate is 15 MW/minute. Facility A's *energy offer* would be valid if: Max_ramp_up Max_ramp_down 7.0 10.0 For an *energy bid*, the *energy* ramp-up and *energy* ramp-down values in the *energy bid* must be less than or equal to the maximum *energy* ramp-up and maximum *energy* ramp-down rates of the *registered facility* respectively. Each of the *energy* ramp-up and *energy* ramp-down values in the *energy bid* must be expressed in MW/minute up to three decimal places and must not be less than 0.000MW/minute. **Example 3: Invalid** Assume Load Facility B's *standing capability data* specifies that its maximum *energy* ramp-up rate is 10MW/minute and its maximum *energy* ramp-down rate is 15 MW/minute. Load Facility B's *energy bid* would be invalid if: Max_ramp_up Max_ramp_down 15.000 10.000 **Example 4: Valid** Assume Load Facility B's *standing capability data* specifies that its maximum *energy* ramp-up rate is	

Existing Market Manual (26 Jan 2022)	Proposed Market Manual Modifications (Deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
Load Facility B's *energy bid* would be valid if: Max_ramp_up Max_ramp_down 7.000 10.000	10MW/minute and its maximum *energy* ramp-down rate is 15MW/minute. Load Facility B's *energy bid* would be valid if: Max_ramp_up Max_ramp_down 7.000 10.000	

[New validation rule]	**Rule 3A: Validate that the total charging/discharging quantity offered does not exceed the *standing capability data* maximum values for *charging/discharging limit*** • For an *energy storage offer*, the total of the absolute value of the quantities in all negative-quantity *price-quantity pairs* of *energy offered* for a *dispatch period* must not exceed: – the *registered facility's* maximum *charge limit* indicated in its *standing capability data* for that *dispatch period*; and – the *registered facility's* stated maximum combined transfer limit for *energy*, *reserve* and *regulation* for that *dispatch period*. **Example 1: Invalid** Facility A's maximum *charge limit* indicated in its *standing capability data* is 10MW. Facility A's stated maximum combined transfer limit for *energy*, *reserve* and *regulation* is 8MW. Facility A's *energy offer* would be invalid if: Quantity 1 Quantity 2 Quantity 3 … -5.0 -3.0 -2.0 **Example 2: Valid** Facility A's maximum *charge limit* indicated in its *standing capability data* is 10MW. Facility A's stated maximum combined transfer limit for *energy*, *reserve* and *regulation* is 8MW. Facility A's *energy offer* would be valid if:	Introduce validation rule that applies to energy storage standing offers

	Quantity_1 Quantity_2 Quantity_3 … -5.0 -1.0 -1.0 • For an *energy storage offer*, the total quantities in all positive-quantity *price-quantity pairs* of *energy* offered for a *dispatch period* must not exceed: – the *registered facility's* maximum dis*charge limit* indicated in its *standing capability data* for that *dispatch period*; and – the *registered facility's* stated maximum combined transfer limit for *energy*, *reserve* and *regulation* for that *dispatch period*. **Example 3: Invalid** Facility A's maximum *discharge limit* indicated in its *standing capability data* is 10MW. Facility A's stated maximum combined transfer limit for *energy*, *reserve* and *regulation* is 8MW. Facility A's *energy offer* would be invalid if: Quantity_6 Quantity_7 Quantity_8 … 5.0 3.0 2.0 **Example 4: Valid** Facility A's maximum *discharge limit* indicated in its *standing capability data* is 10MW. Facility A's stated maximum combined transfer limit for *energy*, *reserve* and *regulation* is 8MW. Facility A's *energy offer* would be valid if: Quantity_6 Quantity_7 Quantity_8 … 5.0 1.0 1.0	

Existing Market Manual (26 Jan 2022)	Proposed Market Manual Modifications (Deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
Rule 5: Validate that prices are increasing or decreasing as appropriate • For each *offer*, all *price-quantity pairs* must be stated in increasing order of price (i.e. the price in each *price-quantity pair* must be greater than the price in the preceding *price-quantity pair*). ……	**Rule 5: Validate that prices are increasing or decreasing as appropriate** • For each *offer*, all *price-quantity pairs* <u>with non-zero quantity</u> must be stated in increasing order of price (i.e.<u>,</u> the price in each *price-quantity pair* with <u>non-zero quantity</u> must be greater than the price in the preceding *price-quantity pair* <u>with non-zero quantity</u>). • <u>If the quantity in a *price-quantity pair* is 0.0MW, the corresponding price shall be $0.00/MWh.</u> ……	Clarify validation rule 5 as applied to standing offers (including for energy storage standing offers).
Rule 6: Validate that non-zero prices are attached to non-zero quantities	**Rule 6: Validate that ~~non-~~zero prices are attached to ~~non-~~zero quantities**	Correction of rule title

Existing Market Manual (26 Jan 2022)	Proposed Market Manual Modifications (Deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
Rule 7: Validate that quantity values are within market boundaries All *offered or bidden* quantities must lie within the market boundaries. • The quantity value of each *price-quantity pair* shall be validated against lower and upper limits for quantity. At present, the *market rules* only define a lower limit of zero for quantities. The upper limit is constrained by the maximum quantities that are validated in Rule 3 or Rule 4. • The quantity value of each *price-quantity pair* shall be expressed up to one decimal place only, in accordance with the *market rules*.	**Rule 7: Validate that quantity values are within market boundaries** All *offered or bidden* quantities must lie within the market boundaries. • The quantity value of each *price-quantity pair* shall be validated against lower and upper limits for quantity. At present, the *market rules* ~~only define a lower limit of zero for quantities~~ define lower limits for offer quantities as per Sections 5.2.5 and 5.2B.2.4 of Chapter 6. The upper limit is constrained by the maximum quantities that are validated in Rule 3, 3A or Rule 4. • The quantity value of each *price-quantity pair* shall be expressed up to one decimal place only, in accordance with the *market rules*.	Allow for non-zero lower limit for energy storage offer quantities, and upper limit for energy storage offers as per Rule 3A.
Rule 8: Validate that price values are within market boundaries All *offered* or *bidden* prices must be within the market boundaries. • For *energy*, the upper and lower limits on *energy* prices are EnergyPriceMax and EnergyPriceMin respectively. ……	**Rule 8: Validate that price values are within market boundaries** All *offered* or *bidden* prices must be within the market boundaries. • For *energy offers* and *energy storage offers*, the upper and lower limits on *energy* prices are EnergyPriceMax and EnergyPriceMin respectively. ……	Specify energy price limits for energy storage offers

Existing Market Manual (26 Jan 2022)	Proposed Market Manual Modifications (Deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
Rule 11: Validate that the *reserve* proportion is within the *standing capability data* limits The *reserve* proportion must be stated for *reserve offers* made for each *generation registered facility.* The *reserve* proportion stated in each *reserve offer* must be within the *standing capability data* limits of the *generation registered facility*. For *reserve offers* made for a *generation registered facility*, the *reserve* proportion must not be less than zero and must not exceed the *reserve* proportion defined in the *standing capability data* of the *generation registered facility*. This Rule 11 does not apply to *reserve offers* made for *load registered facilities*.	**Rule 11: Validate that the *reserve* proportion is within the *standing capability data* limits** The *reserve* proportion must be stated for *reserve offers* made for each *generation registered facility* that is not an *energy storage facility*. The *reserve* proportion stated in each *reserve offer* must be within the *standing capability data* limits of the *generation registered facility*. For *reserve offers* made for a *generation registered facility* that is not an *energy storage facility*, the *reserve* proportion must not be less than zero and must not exceed the *reserve* proportion defined in the *standing capability data* of the *generation registered facility*. This Rule 11 does not apply to *reserve offers* made for *load registered facilities* and *generation registered facilities* that are *energy storage facilities*.	Clarify that validation rule 11 does not apply to energy storage facilities.

Existing Market Manual (26 Jan 2022)	Proposed Market Manual Modifications (Deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
3 Offer variations and bid variations **3.1 What is an "offer variation" and a "bid variation"?** *Offer variation* refers to (i) an *energy offer*, a *reserve offer* or a *regulation offer* submitted to the *EMC* in respect of a *generation registered facility,* (ii) an *energy offer* submitted to the *EMC* in respect of an *import registered facility*, or (iii) a *reserve offer* submitted to the *EMC* in respect of a *load registered facility* that varies the terms of a previous *energy offer*, *reserve offer* or *regulation offer*, as the case may be, submitted to the EMC in respect of that *generation registered facility*, *import registered facility* or *load registered facility* that is registered to provide *reserve* for the same *dispatch period*.	**3 Offer variations and bid variations** **3.1 What is an "offer variation" and a "bid variation"?** An *o~~O~~ffer variation* refers to (i) an *energy offer*~~, a *reserve offer* or a *regulation offer*~~ submitted to the *EMC* in respect of a *generation registered facility* that is not an *energy storage facility*, (ii) an *energy storage offer* submitted to the *EMC* in respect of a *generation registered facility* that is an *energy storage facility*, (iii) an *energy offer* submitted to the *EMC* in respect of an *import registered facility*, (iv) a *reserve offer* or a *regulation offer* submitted to the *EMC* in respect of a *generation registered facility*, or (v) a *reserve offer* submitted to the *EMC* in respect of a *load registered facility* that varies the terms of a previous *energy offer*, *reserve offer* or *regulation offer*, as the case may be, submitted to the EMC in respect of that *generation registered facility*, *import registered facility* or *load registered facility* that is registered to provide *reserve* for the same *dispatch period*.	Clarify that offer variations include energy storage offers

Existing Market Manual (26 Jan 2022)	Proposed Market Manual Modifications (Deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
3.5 Triggers for mandatory offer variation and bid variation submission An *offer variation* or a *bid variation* must be submitted by the *dispatch coordinator* of a *registered facility* to the *EMC* when any of the following conditions arise: (1) The quantity currently *offered* in a valid *offer* for a *registered facility* exceeds the quantity that the *registered facility's dispatch coordinator* reasonably expects to be available from the *registered facility* by more than the greater of: ……	**3.5 Triggers for mandatory offer variation and bid variation submission** An *offer variation* or a *bid variation* must be submitted by the *dispatch coordinator* of a *registered facility* to the *EMC* when any of the following conditions arise: (1) The quantity[14] currently *offered* in a valid *offer* for a *registered facility* exceeds the quantity[15] that the *registered facility's dispatch coordinator* reasonably expects to be available from the *registered facility* by more than the greater of: ……	Added two footnotes that apply to ESS charging

[14] In the case of an energy storage offer to charge, 'quantity' refers to the total of the absolute value of the quantities in all negative-quantity price-quantity pairs of the current valid energy storage offer.

[15] In the case of an energy storage offer to charge, 'quantity' refers to the charging capability that the registered facility's dispatch coordinator reasonably expects the registered facility is able to perform.

Existing Market Manual (26 Jan 2022)	Proposed Market Manual Modifications (Deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
3.6 Required form of an offer variation and bid variation …… There are three types of *offer variation* types: • *offer variation* for *energy*; • *offer variation* for *reserve*; and • *offer variation* for *regulation*. The difference between a *standing offer* (or *standing bid*) and an *offer variation* (or *bid variation*) is that the latter shall only be applied to a specific *dispatch period*. The "day" field in the *standing offer* or *standing bid* submission is therefore replaced by a "date" field in the case of an *offer variation* or *bid variation*. The following tables show the CSV file and data formats for an *offer variation* for each of *energy, reserve* and *regulation*, and a *bid variation.* ……	**3.6 Required form of an offer variation and bid variation** …… There are ~~three~~four types of *offer variation* types: • *offer variation* for *energy offers*; • *offer variation for energy storage offers;* • *offer variation* for *reserve offers*; and • *offer variation* for *regulation offers*. The difference between a *standing offer* (or *standing bid*) and an *offer variation* (or *bid variation*) is that the latter shall only be applied to a specific *dispatch period*. The "day" field in the *standing offer* or *standing bid* submission is therefore replaced by a "date" field in the case of an *offer variation* or *bid variation*. The following tables show the CSV file and data formats for an *offer variation* for each of *energy offers*, *energy storage offers, reserve offers* and *regulation offers*, and a *bid variation.*	Specify that offer variations include energy storage offers
Table 4 CSV file and data formats of energy offer variations and bid variations	**Table 45 CSV file and data formats of energy offer variations and bid variations**	Renumbered table

<table>
<tr><th>Existing Market Manual
(26 Jan 2022)</th><th>Proposed Market Manual Modifications
(Deletions represented by strikethrough text and additions represented by double underlined text)</th><th>Reasons for Modification</th></tr>
<tr><td>[New Table]</td><td><u>Table 6 CSV file and data formats of energy storage offer variations</u>
<table>
<tr><th><u>Item No</u></th><th><u>Field</u></th><th><u>Data Format</u></th><th><u>Remarks</u></th></tr>
<tr><td><u>1</u></td><td><u>Participant</u></td><td><u>Alphanumeric</u></td><td></td></tr>
<tr><td><u>2</u></td><td><u>Type</u></td><td><u>Alphanumeric</u></td><td><u>The value must be: EGO</u></td></tr>
<tr><td><u>3</u></td><td><u>Unit</u></td><td><u>Alphanumeric</u></td><td></td></tr>
<tr><td><u>4</u></td><td><u>Date</u></td><td><u>dd/mm/yyyy</u></td><td></td></tr>
<tr><td><u>5</u></td><td><u>Period</u></td><td><u>1 to 48</u></td><td></td></tr>
<tr><td><u>6</u></td><td><u>Ramp Up</u></td><td><u>0 to 999999999999.9</u></td><td><u>This value is expressed in MW/minute.</u></td></tr>
<tr><td><u>7</u></td><td><u>Ramp Down</u></td><td><u>0 to 999999999999.9</u></td><td><u>This value is expressed in MW/minute.</u></td></tr>
<tr><td><u>8</u></td><td><u>Capacity[16]</u></td><td><u>0 to 9999999999.9</u></td><td><u>This value is expressed in MW.</u></td></tr>
<tr><td><u>9</u></td><td><u>Band 1: Price</u></td><td><u>-99999999999.99 to 99999999999.99</u></td><td rowspan="2"><u>An energy storage offer variation requires 1 to 10 price-quantity pairs[17].</u>
<u>Prices are expressed in $/MWh.</u>
<u>Quantities are expressed in MW.</u></td></tr>
<tr><td><u>10</u></td><td><u>Band 1: Quantity</u></td><td><u>-9999999999.9 to 9999999999.9</u></td></tr>
<tr><td><u>11</u></td><td><u>External Reference</u></td><td><u>Alphanumeric</u></td><td><u>(Optional) Free text allowing a reference or comment to be supplie for this particular offer or bid.</u></td></tr>
</table></td><td>Provide the data format for energy storage offer variations</td></tr>
</table>

[16] "Capacity" refers to the maximum combined transfer limit referred to in section 5.2B.2.5 of Chapter 6 of the *market rules*.

[17] For an *energy storage offer variation* for a *generation registered facility* that is an *energy storage facility*:

(i) subject to section 5.2B.2.4 of Chapter 6 of the *market rules*, the quantity (if any) in the *price-quantity pairs in the range 1-5* shall not be more than 0.0MW; and

(ii) the quantity (if any) in the price-quantity pairs in the range 6-10 shall not be less than 0.0MW.

Existing Market Manual (26 Jan 2022)	Proposed Market Manual Modifications (Deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
Table 5 CSV file and data formats of all classes of reserve offer variations	**Table ~~5~~7 CSV file and data formats of all classes of reserve offer variations**	Renumbered table and minor modification to footnote

Item No	Field	Data Format	Remarks
1	Participant	Alphanumeric	
2	Type	Alphanumeric	The value must be: RVO[18]
3	Unit	Alphanumeric	
4	Date	dd/mm/yyyy	
5	Period	1 to 48	
6	Reserve Proportion[19]	0 to 99.999	*Dispatch coordinators* of *generation registered facilities* must take special note of section 5.3.8 of Chapter 6 of the *market rules* when specifying the *reserve* proportion.
7	Reserve Class	PRI / CON[20]	
8	Band 1: Price	0 to 99999999999.99	A *reserve offer variation* for any *reserve class* requires 1 to 5 *price-quantity bands.* Prices are expressed in $/MWh. Quantities are expressed in MW.
9	Band 1: Quantity	0 to 9999999999.9	
10	External Reference	Alphanumeric	(Optional) Free text allowing a reference or comment to be supplied for this particular offer.

Item No	Field	Data Format	Remarks
1	Participant	Alphanumeric	
2	Type	Alphanumeric	The value must be: RVO[21]
3	Unit	Alphanumeric	
4	Date	dd/mm/yyyy	
5	Period	1 to 48	
6	Reserve Proportion[22]	0 to 99.999	*Dispatch coordinators* of *generation registered facilities* must take special note of section 5.3.8 of Chapter 6 of the *market rules* when specifying the *reserve* proportion.
7	Reserve Class	PRI / CON[23]	
8	Band 1: Price	0 to 99999999999.99	A *reserve offer variation* for any *reserve class* requires 1 to 5 *price-quantity bands.* Prices are expressed in $/MWh. Quantities are expressed in MW.
9	Band 1: Quantity	0 to 9999999999.9	
10	External Reference	Alphanumeric	(Optional) Free text allowing a reference or comment to be supplied for this particular offer.

[18] "RVO" refers to *reserve offer*.

[19] This field is not applicable for *offer variations* in respect of *load registered facilities and generation registered facilities that are energy storage facilities*.

[20] PRI – primary *reserve*; CON – contingency *reserve*.

[21] "RVO" refers to *reserve offer*.

[22] This field is not applicable for *offer variations* in respect of *load registered facilities* and generation registered facilities that are energy storage facilities.

[23] PRI – primary *reserve*; CON – contingency *reserve*.

Existing Market Manual (26 Jan 2022)	Proposed Market Manual Modifications (Deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
4.5 Forms used by the EMC to update standing capability data, network model data and system requirement data into the market clearing engine	**4.5 Forms used by the EMC to update standing capability data, network model data and system requirement data into the market clearing engine**	

Existing Market Manual (26 Jan 2022)	Proposed Market Manual Modifications (Deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification
4.5.1 Ancillary service provider (reserve) form	**4.5.1 Ancillary service provider (reserve) form**	Added footnote to specify some fields to not apply to ESS

Ancillary Provider Details

Field Names on Data Admin Screen	DATA	Unit
ANCILLARY TYPE		N/A
FACILITY		N/A
ANCILLARY GROUP		N/A
MAX. RATING		MW
RSRV GENERATION MAX		MW
RESPONSE DELAY		Sec
RSV. PROPORTION		N/A
LOW LOAD		MW
LOW LOAD RESERVE		MW
MEDIUM LOAD RESERVE		MW
HIGH LOAD RESERVE		MW

Ancillary Provider Details

Field Names on Data Admin Screen	DATA	Unit
ANCILLARY TYPE		N/A
FACILITY		N/A
ANCILLARY GROUP		N/A
MAX. RATING		MW
RSRV GENERATION MAX		MW
RESPONSE DELAY		Sec
RSV. PROPORTION[24]		N/A
LOW LOAD[24]		MW
LOW LOAD RESERVE[24]		MW
MEDIUM LOAD RESERVE[24]		MW
HIGH LOAD RESERVE[24]		MW

[24] Not applicable if FACILITY is an ESS

4.5.10 Generation Registered Facility and Import Registered Facility form

Facility Details		
Field Names on Data Admin Screen	**DATA**	**Unit**
FACILITY TYPE	UNIT	N/A
UNIT TYPE	REGISTERED	N/A
B1		N/A
B2		N/A
B3		N/A
FACILITY NAME		N/A
GENERATION TYPE	CCGT / ST / GT / IGS / Battery / Import / OTHERS	N/A
GENERATION SUB TYPE	SINGLE / MULTI-GENERATING UNIT	N/A
INTERTIE INDICATOR	Y / N	N/A
NODE NAME		N/A
MAXIMUM RATING		MW
NORMAL RAMP DOWN		MW/m
REGULATED RAMP DOWN		MW/m
NORMAL RAMP UP		MW/m
REGULATED RAMP UP		MW/m
PRIMARY RISK	Y / N	N/A
SECONDARY RISK	Y / N	N/A
FAILURE PROBABILITY		%
DAMPING GENERATOR	Y / N	N/A
PENALTY NAME		N/A
MINIMUM STABLE LOAD LEVEL TO BE REGISTERED FOR MODELLING		MW

4.5.10 Generation Registered Facility and Import Registered Facility form

Facility Details		
Field Names on Data Admin Screen	**DATA**	**Unit**
FACILITY TYPE	UNIT	N/A
UNIT TYPE	REGISTERED	N/A
B1		N/A
B2		N/A
B3		N/A
FACILITY NAME		N/A
GENERATION TYPE	CCGT / ST / GT / IGS / ~~Battery~~ESS / Import / OTHERS	N/A
GENERATION SUB TYPE	SINGLE / MULTI-GENERATING UNIT	N/A
INTERTIE INDICATOR	Y / N	N/A
NODE NAME		N/A
MAXIMUM RATING		MW
NORMAL RAMP DOWN		MW/m
REGULATED RAMP DOWN		MW/m
NORMAL RAMP UP		MW/m
REGULATED RAMP UP		MW/m
PRIMARY RISK	Y / N	N/A
SECONDARY RISK	Y / N	N/A
FAILURE PROBABILITY		%
DAMPING GENERATOR	Y / N	N/A
PENALTY NAME		N/A
MINIMUM STABLE LOAD LEVEL TO BE REGISTERED FOR MODELLING		MW
MAXIMUM CAPACITY[25]		MWh
MAXIMUM CHARGE LIMIT[25]		MW
MAXIMUM DISCHARGE LIMIT[25]		MW

Addition of new fields (with footnote) only applicable to ESS

Existing Market Manual (26 Jan 2022)	Proposed Market Manual Modifications (Deletions represented by strikethrough text and additions represented by double underlined text)	Reasons for Modification

CHARGING EFFICIENCY[25]		N/A
DISCHARGING EFFICIENCY[25]		N/A
MAXIMUM STATE OF CHARGE[25]		%
MINIMUM STATE OF CHARGE[25]		%

[25] Applicable if GENERATION TYPE is ESS