

Public

GC0166: Introducing new Balancing Programme Parameters for Limited Duration Assets

Workgroup 12

Online Meeting via Teams

Welcome

Agenda

#	Topics to be discussed	Lead
1.	Workgroup Membership Expectations	Chair
2.	Timeline and Objectives	Chair
3.	Actions update	Proposer
4.	Any Other Business	Chair
5.	Next Steps	Chair

Expectations of a Workgroup Member

Contribute to the discussion

Be respectful of each other's opinions

Language and Conduct to be consistent with the values of equality and diversity

Do not share commercially sensitive information

Be prepared - Review Papers and Reports ahead of meetings

Complete actions in a timely manner

Keep to agreed scope

Email communications to/cc'ing the .box email

Your Roles

Help refine/develop the solution(s)

Bring forward alternatives as early as possible

Vote on whether or not to proceed with requests for Alternatives

Vote on whether the solution(s) better facilitate the Code Objectives

Timeline

Objectives

Review Worked Example

Workgroups	
GC0166 Workgroup 1	01/02/2024
GC0166 Workgroup 2	07/03/2024
GC0166 Workgroup 3	08/04/2024
GC0166 Workgroup 4	15/05/2024
GC0166 Workgroup 5	10/06/2024
GC0166 Workgroup 6	21/06/2024
GC0166 Workgroup 7	18/07/2024
GC0166 Workgroup 8	20/08/2024
GC0166 Workgroup 9	22/10/2024
GC0166 Workgroup 10	12/11/2024
GC0166 Workgroup Consultation	18/11/2024 - 06/12/2024
GC0166 Workgroup 11	20/01/2025
GC0166 Workgroup 12	04/03/2025
GC0166 Workgroup 13	01/04/2025
GC0166 Workgroup Report to Panel	23/04/2025
Post Workgroups	
GC0166 Code Administrator Consultation	06/05/2025 - 06/06/2025
GC0166 Draft Final Modification Report to Panel	18/06/2025
GC0166 Final Modification to Ofgem	08/07/2025
GC0166 Implementation Date	10 Business Days post Authority Decision

GC0166 Problem Statement

Focus of discussions:

Introduction of new parameters for limited duration assets (including Battery Energy Storage Systems (BESS)) to optimise dispatch and planning.

Address the challenges around how such assets are dispatched efficiently and how to best plan for use of such units

Query

Why does the worked example show all the way to SP8? Surely you only declare for the current BMWP?

Data submission covers the entire period a PN is submitted for. And the data, as for a PN, defaults at 11:00 each day. The reason for covering the entire period: To ensure assets with few changes do not have to submit data on a ongoing basis and only when they make a PN change or have a SoE limitation restricting ability to deliver a BOA for a 90 minute duration. To ensure, in the event of communication or system failure the BM can continue to operate until communications are restored, otherwise the BM would have no MDO/MDB data to continue sending instructions. To ensure units with no changes required on a typical day will have the data defaulted at 11:00 each day. To enable future improvements to enhance the accuracy of FSoE model which covers the entire period a PN is submitted for.

Worked Example

MDO/MDB submissions only

- 1- Calculate MDO/MDB for the entire data range a PN has been submitted. Data submitted in 1 min granularity. Indicating the Offer and Bid Volume, in MWh that can be delivered if a BOA were to be sent starting at that minute. A BOA can start at any minute within the BM Window and always ends at the BM Gate.
- 2- The MDO/MDB volume must be calculated so that the entire CCL (Capped Committed Level in [BETTA Despatch Instruction Guide](#)) can be met within the BM window and the first settlement period after the BM Window. CCL is the Capped Committed Level after a PN is adjusted by BOA.
- 3-Energy volumes required for ancillary service delivery must be taken in account when calculating MDO/MDB.
- 4- A BOA can be sent a second before the BM Gate moves and locks in the next settlement period. As such MDO/MDB must take account of the settlement period after the BM Window. It will not be acceptable for the declared PN not to be followed or for the declared PN to be capped by MEL and MIL once within the BM Window due to the state of energy being altered by a BOA that was accepted when the BOA did not exceed MDO/MDB.
- 5- MDO/MDB can be resubmitted within the BM Window: after a BOA is accepted or a PN Change in the first settlement period after the BM Window. The BM Unit no longer being able to achieve the previously stated value as a result of an unavoidable event. Examples of such an event include (but are not limited to) plant breakdowns, or events requiring a variation on safety grounds (relating to personnel or plant). Or The BM Unit fully utilising the energy reserved (or storage capacity for energy which was reserved) for delivery of System Ancillary Services or Commercial Ancillary Services.
- 6-MDO/MDB must be submitted for the same duration a PN is submitted. MDO/MDB will default at 11:00 each day.

The GC0166 Worked Example Spreadsheet is included in the Workgroup 12 papers shows a data submission example for :

- 1- No BOA and Zero PN
- 2- PN Submitted in Settlement Period 4
- 3- BOA accepted in Settlement period 1
- 4- Second BOA accepted in Settlement Period 1
- 5- Third BOA accepted in Settlement Period 2
- 6- PN changed in Settlement Period 4 to release volume within BM window.

Worked Example

Future State of Energy Model

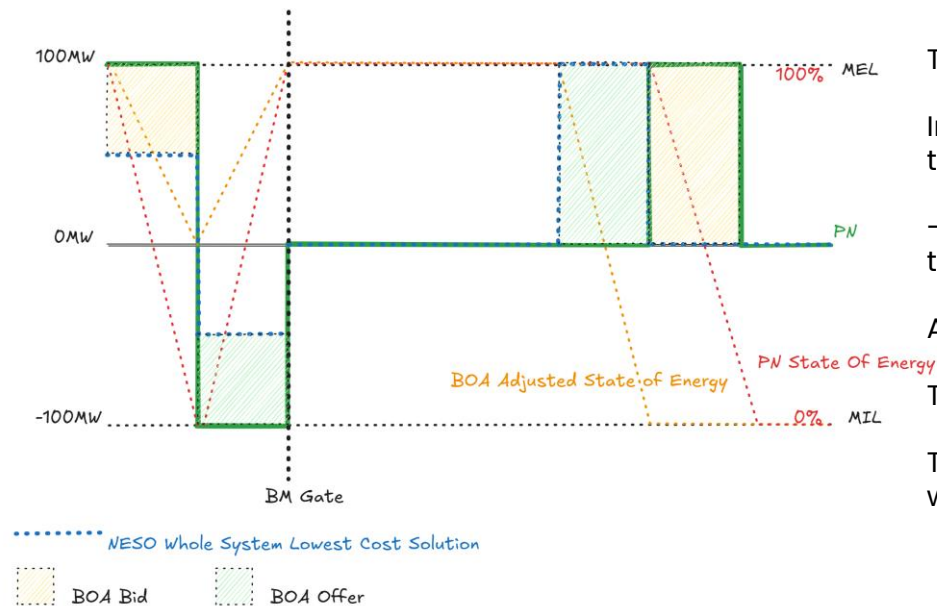
1- Submit the parameters required by FSOE model via Single Markets Platform.

- a) Import and Export Efficiency
- b) SoE Maximum and Minimum Limit
- c) Daily Cycle Limit

2- Submit real time SoE through SCADA (IEMS)

NESO will use the FSOE model to optimise the LDA within and beyond the BM Window.

As the FSoE Model will not be 100% accurate, the MDO/MDB submissions will be used to correct the model within the BM Window to ensure BOA instructions delivered by LDAs.



The FSoE model will keep a BMU within the declared Max/Min State of Energy Limits

In this example the unit has a 100MW PN depleting the state of energy completely within the first half of the BM Window. Indicated by the PN State of Energy.

-100MW PN in the second half of the BM Window leaving the unit with a full State of Energy at the end of the BM Window.

A 100MW PN several hours outside the BM Window leaving the unit fully depleted.

The FSoE Model calculated the cost optimal load point for this asset indicated by the blue dotted line.

To implement the optimiser output four BOAs would be required. And the State of Energy will remain within the State of Energy limits indicated as a percentage in this example between 0% and 100%

Open Concerns Summary

1. Redeclaration within Window/ lockout

Settlement period 4. The first settlement period after the BM Gate is included in the calculation of MDO/MDB. And if the PN is changed in SP4 the MDO/MDB can be resubmitted within the BM Window. This enables the BMU operator to release capacity for BOA consideration by changing the PN and resubmitting MDO/MDB within the BM Window and allow the further market activity which may become favourable as BOAs are accepted within the BM Window altering the previous State of Energy outside the BM Window.

2. FSoE risks in terms of data that could change considerably.

The FSoE model will be applied across all LDAs. Currently NESO experience very large errors even at 60mins lead time as no FSoE model exist. Once implemented it is expected the error across hundreds of LDAs will not be significant compared to the general volatility of the market, demand requirement changes and renewable generation volatility. The Optimiser will be run frequently covering the entire period a PN is available for to establish the volume of LDAs that will be deployed across the entire system vs non-LDA commitments. This only becomes final once BOAs are issued within the BM window. With 27000MW of LDA capacity possible by 2030 NESO clearly require a FSoE model. Without a model the Optimiser runs outside the BM Window will become meaningless if 27000MW capacity is not accounted for.

3. For BMUs of longer duration- default value

The solution aims to enable accurate and cost optimal Optimiser runs within and outside the BM Window.

Two options exist.

- a) Create a definition of which units must submit MDO/MDB and FSoE parameters.
- b) All BMUs submit MDO/MDB and FSoE parameters.

Currently NESO's position is that all BMUs submit MDO/MDB and a unit that is not normally unable to deliver any BOA sent between MEL and MIL simply enter MDO/MDB values stating this and this will default each day so the provider will only have to submit these values once. It would however become useful when we model Gas Turbine Scaling etc .

Legal Text: Glossary & Definitions (1)

GRID CODE SECTION	CODE REQUIREMENTS	DETAILS POST-CONSULTATION
Glossary & Definitions	New definition: Balancing Mechanism Window Period	Has the meaning set out in the BSC .
Glossary & Definitions	New definition: Bid Acceptance	An acceptance by a BM Unit of a Bid-Offer Acceptance to decrease its Export onto, or increase its Import from the National Electricity Transmission System .
Glossary & Definitions	New definition: Export	Has the meaning set out in the BSC .
Glossary & Definitions	New definition: Future State of Energy (FSoE)	For a given point in time, a forecast that The Company will produce using data provided under BC1.A.11.1 of the total quantity of energy (measured in MWh) which is stored in an Electricity Storage Module .
Glossary & Definitions	New definition: Import	Has the meaning set out in the BSC .
Glossary & Definitions	New definition: Maximum Delivery Offer (MDO)	As defined in BC1.A.1.5 Dynamic Parameters .
Glossary & Definitions	New definition: Maximum Delivery Bid (MDB)	As defined in BC1.A.1.5 Dynamic Parameters .
Glossary & Definitions	New definition: Offer Acceptance	An acceptance by a BM Unit of a Bid-Offer Acceptance to increase its Export onto or decrease its Import from the National Electricity Transmission System .

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Glossary & Definitions	New definition: Bid Acceptance	An acceptance by a BM Unit of a Bid-Offer Acceptance to decrease its Export onto, or increase its Import from the National Electricity Transmission System .
Glossary & Definitions	New definition: Energy Constrained BM Unit	Any BM Unit which for any reason, apart from Plant failure, would not be able to fulfil a Bid-Offer Acceptance to declared MEL or MIL within the Balancing Mechanism Window Period .
Glossary & Definitions	New definition: Export	Has the meaning set out in the BSC .
Glossary & Definitions	New definition: Future State of Energy (FSOE)	For each Electricity Storage Module , the Future State of Energy is a series of MWh figures and associated times, which is calculated by The Company using the data provided under BC 1.A.11.1, making up an estimated profile of the energy stored in that Electricity Storage Module .
Glossary & Definitions	New definition: Import	Has the meaning set out in the BSC .
Glossary & Definitions	New definition: Maximum Delivery Offer (MDO)	As defined in BC1.A.1.5 Dynamic Parameters .
Glossary & Definitions	New definition: Maximum Delivery Bid (MDB)	As defined in BC1.A.1.5 Dynamic Parameters .
Glossary & Definitions	New definition: Offer Acceptance	An acceptance by a BM Unit of a Bid-Offer Acceptance to increase its Export onto or decrease its Import from the National Electricity Transmission System .

Legal Text: Balancing Codes (2)

GRID CODE SECTION	CODE REQUIREMENTS	DETAILS POST-CONSULTATION
Balancing Code 1	<p>APPENDIX 1 – BM UNIT DATA</p> <p>BC1.A.1.5 Dynamic Parameters</p> <p>Delete Maximum Delivery Volume (MDV),</p>	<p>• Maximum Delivery Volume (MDV), expressed in MWh, being the maximum number of MWh of Offer (or Bid if MDV is negative) that a particular BM Unit may deliver within the associated Maximum Delivery Period (MDP), expressed in minutes, being the maximum period over which the MDV applies.</p>
Balancing Code 1	<p>APPENDIX 1 – BM UNIT DATA</p> <p>BC1.A.1.5 Dynamic Parameters</p> <p>Insert new Parameters for Short Duration assets</p>	<p>• Maximum Delivery Offer (MDO), being the maximum volume of Offer Acceptance by a BM Unit which can be instructed by The Company through Bid-Offer Acceptances (BOA) to the BM Unit, within a Balancing Mechanism Window Period, excluding the volume of energy required to satisfy System Ancillary Services and/or Commercial Ancillary Services.</p> <p>Proposed to be updated to: • Maximum Delivery Offer (MDO), being the maximum volume of Offer Acceptance by a BM Unit which can be instructed by The Company through Bid-Offer Acceptances (BOA) to the BM Unit, such that within the current Balancing Mechanism Window Period, unit CL can be adhered to, and Commercial or System Ancillary Services can be delivered.</p>
Balancing Code 1	<p>APPENDIX 1 – BM UNIT DATA</p> <p>BC1.A.1.5 Dynamic Parameters</p> <p>Insert new Parameters for Short Duration assets</p>	<p>• Maximum Delivery Bid (MDB), being the maximum volume of Bid Acceptance by a BM Unit which can be instructed by The Company through Bid-Offer Acceptances (BOA) to the BM Unit within a Balancing Mechanism Window Period, excluding the volume of energy required to satisfy System Ancillary Services and/or Commercial Ancillary Services.</p> <p>Proposed to be updated to: • Maximum Delivery Bid (MDB), being the maximum volume of Bid Acceptance by a BM Unit which can be instructed by The Company through Bid-Offer Acceptances (BOA) to the BM Unit, such that within the current Balancing Mechanism Window Period, unit CL can be adhered to, and Commercial or System Ancillary Services can be delivered.</p>
Balancing Code 1	<p>APPENDIX 1 – BM UNIT DATA</p> <p>Add BC1.A.II section on Battery SoC Modelling</p>	<p>BC1.A.II Electricity Storage Module Future State of Energy (FSoE) Modelling</p> <p>BC1.A.II.1 Generators in respect of Electricity Storage Modules must provide asset specific relevant data when requested by The Company based on bilateral discussions to allow for modelling of Future State of Energy (FSoE) and the limits of operation that an Electricity Storage Module must obey.</p> <p>BC1.A.II.2 These models will be used for planning purposes beyond the end of the BM Window to the end of the time when interim data is available to The Company. The model must allow The Company to simulate the effect of a Bid Offer Acceptance and a Physical Notification on the FSoE. The requirements for Ancillary and Commercial Services within the model will be derived by The Company from auction data. The models are expected to have an accuracy of less than 10% up to four hours ahead and less than 20% between four hours and 33 hours ahead.</p>
Balancing Code 2	<p>BC2.5.3.4</p> <p>Add section for Revisions to Maximum Delivery Offer and Maximum Delivery Bid for a BM Unit</p>	<p>BC2.5.3.4 Revisions to Maximum Delivery Offer and Maximum Delivery Bid for a BM Unit may only be made following Gate Closure for a Settlement Period in the event of:</p> <p>(a)– The BM Unit no longer being able to achieve the previously stated value as a result of an unavoidable event. Examples of such an event include (but are not limited to) plant breakdowns, or events requiring a variation on safety grounds (relating to personnel or plant); or</p> <p>(b)– The Company issuing a Bid-Offer Acceptance (BOA) in respect of the BM Unit; or</p> <p>(c)– The BM Unit fully utilising the energy reserved (or storage capacity for energy which was reserved) for delivery of System Ancillary Services or Commercial Ancillary Services; or</p> <p>(d)– Submission of a change to a Physical Notification for the BM Unit under BC1.4.2(a) which covers the Settlement Period after the Balancing Mechanism Window Period.</p>

Legal Text: Balancing Codes (2)

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Balancing Code 1	<p>APPENDIX 1 – BM UNIT DATA</p> <p>BC1.A.1.5 Dynamic Parameters</p> <p>Insert new Parameters for Short Duration assets</p>	<p>• Maximum Delivery Offer (MDO), being the maximum volume of Offer Acceptance by a BM Unit which can be instructed by The Company through Bid-Offer Acceptances (BOA) to the BM Unit, within a Balancing Mechanism Window Period, excluding the volume of energy required to satisfy System Ancillary Services and/or Commercial Ancillary Services.</p> <p>Proposed to be updated to: • Maximum Delivery Offer (MDO), being a series of MWh figures and associated times making up the profile of the maximum volume of Offer Acceptance by a BM Unit which can be instructed by The Company through Bid-Offer Acceptances (BOA) to the BM Unit, such that within the current Balancing Mechanism Window Period, the BM Unit Committed Level can be adhered to and contracted Ancillary Services can be delivered.</p>
Balancing Code 1	<p>APPENDIX 1 – BM UNIT DATA</p> <p>BC1.A.1.5 Dynamic Parameters</p> <p>Insert new Parameters for Short Duration assets</p>	<p>• Maximum Delivery Bid (MDB), being the maximum volume of Bid Acceptance by a BM Unit which can be instructed by The Company through Bid-Offer Acceptances (BOA) to the BM Unit within a Balancing Mechanism Window Period, excluding the volume of energy required to satisfy System Ancillary Services and/or Commercial Ancillary Services.</p> <p>Proposed to be updated to: • Maximum Delivery Bid (MDB), being a series of MWh figures and associated times making up the profile of the maximum volume of Bid Acceptance by a BM Unit which can be instructed by The Company through Bid-Offer Acceptances (BOA) to the BM Unit, such that within the current Balancing Mechanism Window Period, the BM Unit Committed Level can be adhered to, and contracted Ancillary Services can be delivered.</p>
Balancing Code 1	<p>APPENDIX 1 – BM UNIT DATA</p> <p>Add BC1.A.11 section on Battery SoC Modelling</p>	<p>BC1.A.11 Electricity Storage Module Future State of Energy (FSoE) Modelling</p> <p>BC1.A.11.1 Generators in respect of Electricity Storage Modules must provide asset specific relevant data when requested by The Company based on bilateral discussions to allow for modelling of Future State of Energy (FSoE) and the limits of operation that an Electricity Storage Module must obey.</p> <p>BC1.A.11.2 These models will be used for planning purposes beyond the end of the BM Window to the end of the time when interim data is available to The Company. The model must allow The Company to simulate the effect of a Bid Offer Acceptance and a Physical Notification on the FSoE. The requirements for Ancillary and Commercial Services within the model will be derived by The Company from auction data. The models are expected to have an accuracy of less than 10% up to four hours ahead and less than 20% between four hours and 33 hours ahead.</p>
	<p>BC2.5.3.4</p> <p>Add section for Revisions to Maximum Delivery Offer and</p>	<p>BC2.5.3.4 Revisions to Maximum Delivery Offer and Maximum Delivery Bid for a BM Unit may only be made following Gate Closure for a Settlement Period in the event of:</p> <p>(a)– The BM Unit no longer being able to achieve the previously stated value as a result of an unavoidable event. Examples of such an event include (but are not limited to) plant breakdowns, or events requiring a variation on safety grounds (relating to personnel or plant); or</p> <p>(b)– The Company issuing a Bid-Offer Acceptance (BOA) in respect of the BM Unit; or</p> <p>(c)– The BM Unit fully utilising the energy reserved (or storage capacity for energy which was reserved) for delivery of System Ancillary Services or Commercial Ancillary Services; or</p> <p>(d)– Submission of a change to a Physical Notification for the BM Unit under BC1.4.2(a) which covers the Settlement Period after the</p>

Queries Update

Action Update

GC0166 Actions Review

Action Number	Workgroup Raised	Owner	Action	Due by	Status	Latest
32	WG11	SB	Clarify the code implementation and enactment timelines and provide an indicative schedule.	Status	Propose to Close	NESO will publish an appropriate timeline (6 or 12 month as appropriate) to enact MDO/MDB after the GC0166 legal text solution is approved and inserted into the GC.
33	WG11	HK/JH	NESO to provide written assurance alongside the proposal to Ofgem that the solution proposed will meet the requirements of the original submission.	Status	Propose to Close	Revised Modelling addresses this point- this has been circulated to Workgroup members including Ofgem. We believe that the proposed solution will meet the requirements of the original submission. Address challenges around how assets are dispatched efficiently and how to best plan for use of such units
34	WG11	HK/JH	Clarify multiple BMU's with single source of energy, single BMU with multiple sources of energy and single source of energy with Hybrid aggregated BMU	Status	Propose to Close	NESO to treat multiple BMUs with a single source of energy as individual units
35	WG11	HK/JH	Consider FSoE risks in terms of could no data be better than data that could change considerably.	Status	Propose to Close	See Open Concerns #2
36	WG11	SB	Extend the scenario diagrams to include period 4 to ensure clarity on responsibilities and permitted actions	Status	Propose to Close	Modelling sent to Workgroup on 24/02 Worked Example is in this pack
37	WG11	HK/JH	Consider impact on all asset types and how this could be managed through exemptions or otherwise.	Status	Propose to Close	For BMUs of longer duration- default value facility provided
38	WG11	HK/JH	Consult with the NESO market monitoring and compliance teams to ensure that the proposed solution for MDO/MDB parameters does not lead to unintended market consequences or breaches.	Status	Propose to Close	Done whilst creating Worked Example
39		HK/JH	Define defaulting rules for MDO/MDB parameters.		Propose to Close	Defaulting rules are specified in the Data Validation, Consistency and Defaulting Rules . Considered whilst creating Worked Example
40	WG11	SB	Review and refine the legal text to include definitions for limited storage, the use of FSoE, and defaulting rules.	Status	Propose to Close	Spoke to Legal re: use of (FSoE) and suggested insertion as per Legal Text slide (1). Definitions for Limited storage to be considered when data is available. See Action 39 re Defaulting Rules
41	WG11	HK/JH/ SB	Legal Text - consider the impact of including a statement that committed FPNs should be excluded from the calculation of MDO and MDB.	Status	Propose to Close	See tweaks suggested in: new definitions: Future State of Energy (FSoE) Maximum Delivery Offer (MDO), Maximum Delivery Bid (MDB)

AOB

GC0166 Terms of Reference

Workgroup Term of Reference

a) Implementation and costs;

b) Review draft legal text should it have been provided. If legal text is not submitted within the Grid Code Modification Proposal the Workgroup should be instructed to assist in the developing of the legal text;

c) Consider whether any further Industry experts or stakeholders should be invited to participate within the Workgroup to ensure that all potentially affected stakeholders have the opportunity to be represented in the Workgroup. Demonstrate what has been done to cover this clearly in the report; and

d) Consider EBR implications

e) Liaise with other industry groups regarding related information that Network Operators may require

Next Steps and Close

Timeline

Objectives

Review Worked Example

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GC0166 Workgroup 9	22/10/2024
GC0166 Workgroup 10	12/11/2024
GC0166 Workgroup Consultation	18/11/2024 - 06/12/2024
GC0166 Workgroup 11	20/01/2025
GC0166 Workgroup 12	04/03/2025
GC0166 Workgroup 13	19/03/2025
GC0166 Workgroup 13	01/04/2025
GC0166 Workgroup 14	22/04/2025
GC0166 Workgroup Report to Panel	23/04/2025
Post Workgroups	
GC0166 Code Administrator Consultation	06/05/2025 - 06/06/2025
GC0166 Draft Final Modification Report to Panel	18/06/2025
GC0166 Final Modification to Ofgem	08/07/2025
GC0166 Implementation Date	10 Business Days post Authority Decision