

WELCOME



GC0166: Introducing new Balancing Programme Parameters for Limited Duration Assets

Workgroup 4 – 15 May 2024

Online Meeting via Teams

Agenda

Topics to be discussed	Lead
Introductions	Chair
Objectives, Timeline and Terms of Reference	Chair
Review Actions Log	All
Overview of Legal Text	Steve Baker, ESO
Update on BSC Changes	Steve Baker, ESO
Workgroup Feedback on Action 11	Bernie Dolan, ESO
Draft Workgroup Consultation Questions	Chair
Any Other Business	Chair
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

Workgroup Membership

Name	Company	Role	Sector
Steve Baker	National Grid ESO	Proposer	System Operator
Chris McLeod	Habitat Energy	Workgroup Member	Non-Physical Trader, VLP
Damian Jackman	Field Energy	Workgroup Member	Battery Systems Development/Construction/Operator
Davide Miriello	Enel X	Workgroup Member	Supplier
Eli Treuherz	Arenko Group	Workgroup Member	Generator
Giorgio Balestrieri	Tesla	Workgroup Member	Generator
Graz Macdonald	Waters Wye & Associates	Workgroup Member	Consultant
Hooman Andami	Elmya Energy	Workgroup Member	Generator
Isaac Gutierrez	ScottishPower Renewables	Workgroup Member	Generator
Jamie Clark	Conrad Energy	Workgroup Member	Generator
Jasper Vermandere	YUSO	Workgroup Member	Trader Optimiser
Kamila Nugumanova	Drax Group	Workgroup Member	Generator
Lauren Jauss	RWE Supply & Trading GmbH	Workgroup Member	Generator and Supplier
Maria Popova	Centrica	Workgroup Member	More than one
Oluwabukola Daniel	EDF Renewables	Workgroup Member	Generator
Peter Errington	Flexitricity Ltd	Workgroup Member	Generator
Richard Devenport	Shell	Workgroup Member	Supplier
Robert Longden	Cornwall Insight/Eneco Energy Trade BV	Workgroup Member	Generator
Mark Steger	EDF Energy (UK)	Workgroup Member	
Shantanu Jha	Zenobe	Workgroup Member	Generator
Simon Lord	Engie	Workgroup Member	Generator
Stephen Knight	SSE	Workgroup Member	Generator
Luke McCartney	Ofgem	Authority Representative	Authority



Objectives, Timeline and Terms of Reference

Milly Lewis – ESO Code Administrator

Timeline for GC0166

Milestone	Date	Milestone	Date
Modification presented to Panel	14 December 2023	Code Administrator Consultation (1 Month)	01 October 2024 to 01 November 2024
Workgroup Nominations (15 Working Days)	18 December 2023 to 18 January 2024	Draft Final Modification Report (DFMR) issued to Panel (5 working days)	20 November 2024
Workgroup 1 Workgroup 2 Workgroup 3 Workgroup 4 Workgroup 5 To discuss the proposal, analysis required and begin refining the solution.	01 February 2024 7 March 2024 08 April 2024 15 May 2024 10 June 2024	Panel undertake DFMR recommendation vote	29 November 2024
Workgroup Consultation (15 working days)	12 April 2024 to 03 May 2024	Final Modification Report issued to Panel to check votes recorded correctly	02 December 2024 – 09 December 2024
Workgroup 6 Workgroup 7 Workgroup 8 To review the Workgroup Consultation responses and to finalise the solution	18 July 2024 20 August 2024 10 September 2024	Final Modification Report issued to Ofgem	10 December 2024
Workgroup report issued to Panel (5 working days)	18 September 2024	Ofgem decision	Early March 2025
Panel sign off that Workgroup Report has met its Terms of Reference	27 September 2024	Implementation Date	End of March 2025

Workgroup Terms 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

Actions

Action number	Workgroup Raised	Owner	Action	Comment	Due by	Status
4	WG2	SB	Expectation and scope of GC0166 in relation to newly built or yet to be built Pump Storage not covered by the existing Pump Storage Grid Code defined term and any potential unfair treatment this may cause,	ESO are aiming for MDO/ MDB to be technology-neutral and based just on capability.	WG3	Proposed to Close
7	WG3	ML	Clarify which Company business areas Workgroup members are representing.	Not applicable as will be technology neutral	WG4	Proposed to Close
8	WG3	SB/BD	Clarify whether GC0096 and point on pumped storage was this a point in time or not a point in time.	DP's should not be asset-specific as the BM is a market and whilst we are looking at limited duration assets this is a commercial arrangement and all parties should submit behaviours irrespectively. The participants should provide the capacity they are able to support- if this is an unlimited capacity within the BM window they will need to submit a default value (to be agreed by the WG).	WG4	Proposed to Close
9	WG3	SB/BD	Liaise with ESO legal on whether MDO & MDB definitions should in the Glossary & Definitions or BC2. Current precedent within BC2 has some definitions within should they be moved to the G & D or vice versa.	Legal suggest to enter the DPs in Glossary and Definitions "as defined in BC1.A.1.5 where they would be listed with other DPs for consistency	WG4	Proposed to Close
10	WG3	ML	Pros & Cons of using a commercial or a technical parameter to added to the Workgroup consultation.	Included awaiting further Workgroup debate following the conclusion of Action 11 and potential Workgroup Consultation question	WG4	Proposed to Close
11	WG3	RD, CM, ET, SL, BD	Example of various scenarios and good practise capturing trade off in terms of time variations. Real life code examples.	BD/ Manos created scenarios and held call on 08 May 2024 with the small group. To discuss further with the Workgroup on 15 May 2024.	WG4	Proposed to Close
12	WG3	SB/BD	References in BC1 compliance	The only further information was provided by SL which was instructions based on DPs	WG4	Ongoing
13	WG3	ML	Update timeline as agreed by Workgroup for Grid Code Panel approval.	Agreed and Workgroup Meetings 6- 8 to go into the diaries	WG4	Proposed to Close



Overview of Legal Text

Steve Baker – ESO

Legal Text Draft Changes

GRID CODE SECTION	CODE REQUIREMENTS	DETAILS	COMMENTS-
Glossary & Definitions	New definition: Future State of Charge (FSoC)	The volume of energy (MWh) under which an Electricity Storage Module is depleted to zero.	
Glossary & Definitions	New definition: Maximum Delivery Offer (MDO)	As defined in BC1.A.1.5 Dynamic Parameters	Further to speaking with Legal, refer to new DPs in GD and refer to definition in BC1.A.1.5 for consistency with other DPs
Glossary & Definitions	New definition: Maximum Delivery Bid (MDB)	As defined in BC1.A.1.5 Dynamic Parameters	as above
Glossary & Definitions	Data Validation, Consistency and Defaulting Rules	The rules relating to validity and consistency of data, and default data to be applied, in relation to data submitted under the Balancing Codes, to be applied by The Company under the Grid Code as set out in the document “Data Validation, Consistency and Defaulting Rules” - Issue 8, dated 25th January 2012 . The document is available on the National Grid website or upon request from The Company.	Version needs updating! Housekeeping Issue 9 also includes details of EDT* & EDL* which of course never happened. Ben Carter has recently produced a new draft for version 10 which has these bits stripped out. This is due for review. Decision needed whether v10 will be issued soon or later with the storage parameters added. SCR initials on the 2016 version...

Legal Text Draft Changes

GRID CODE SECTION	CODE REQUIREMENTS	DETAILS	COMMENTS-
Balancing Code 1	APPENDIX 1 - BM UNIT DATA BC1.A.1.5 Dynamic Parameters Delete Maximum Delivery Volume (MDV),	<ul style="list-style-type: none"> 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- 	No longer relevant
Balancing Code 1		<ul style="list-style-type: none"> Maximum Delivery Offer (MDO), being the maximum energy that a BM Unit can deliver following a Bid Offer Acceptance (BOA) issued by The Company to a BM Unit subject to the energy required to satisfy System Ancillary Services and/or Commercial Ancillary Services such as response and reserve commitments to The Company. 	<p>Further to speaking with Legal, refer to new DPs in GD and refer to definition in BC1.A.1.5 for consistency with other DPs</p> <p>Definition has been reworked for discussion on WG#4</p>
Balancing Code 1	APPENDIX 1 - BM UNIT DATA BC1.A.1.5 Dynamic Parameters Insert new Parameters for Short Duration assets	<ul style="list-style-type: none"> Maximum Delivery Offer (MDO), being the maximum energy that a BM Unit can receive following a Bid Offer Acceptance (BOA) issued by The Company to a BM Unit subject to the energy required to satisfy System Ancillary Services and/or Commercial Ancillary Services such as response and reserve commitments to The Company. 	as above
Balancing Code 1	APPENDIX 1 - BM UNIT DATA Add BC1.A.11 section on Battery SoC Modelling	<p>BC1.A.11 Electricity Storage Module Future State of Charge (FSoc) Modelling.</p> <p>BC1.A.11.1 Generators in respect of Electricity Storage Modules must provide relevant data to allow for modelling of Future State of Charge and the limits of operation of an Electricity Storage Module must obey.</p> <p>BC1.A.11.2 As a minimum Generators in respect of Electricity Storage Modules must provide Import and Export efficiency and Electricity Storage Module State of Charge limits resulting from commercial contracts and other technical limitations. Whenever Future State of Charge limits change, Generators in respect of Electricity Storage Modules must supply future limits for the ensuing 24 hours.</p> <p>BC1.A.11.3 [means of communication to be inserted/ defined].</p>	<p>Q- does this better belong in Planning Code?</p> <p>Need a phrase/ definition for Battery definition- check what we have/ whats needed</p> <p>Additional text needed for Means of communication needs to be inserted..... (portal) BC1.A.11.3</p>



Update on BSC Changes

Steve Baker – ESO

BSC Changes

The BSC wont progress until we have an agreed approach approved by Panel- will follow close behind SD in liaison with Elexon to discuss the changes.

Elexon advised that the Grid Code should be approved before the BSC started and we advocated that the BSC change follows behind the Grid Code change as close as is practical as its a low risk change and a high priority for industry... so anticipate they will support this.

We are reserved about sharing the timeline up front as its not been validated by Elexon.

Speaking to ESO IT about IT impacts.



Feedback on Action 11

Workgroup

Summary of discussion

- The attached examples were shared with the sub-group on 27 April
- Simon kindly provided feedback by a number of emails
- Richard also provided an email response and met with Richard on 2 May
- Met with Simon, Chris, Eli, Giorgio, Manos and Steve on 8 May

Summary of discussion points - 1

MDO/MDV and dynamic parameters

- Discussion centred on the inclusion of details relating to dynamic response in the values of MDO/MDV
- Did including these details mean that MDO/MDV could not be considered as dynamic parameters?
 - Dynamic parameters should give the physical state of the BMU
 - Did including details of MWh that must be “sterilised” for response go against this principle?
 - Another view was that from a pragmatic point of view sending two streams of data to the ESO and expecting the desk to handle this was impractical
- **ESO View**
 - ESO will seek legal guidance
 - ESO will also check with Ofgem if they have a view
 - If MDO/MDV are not dynamic parameters they will be moved to another part of the Grid Code (likely to be sections that are similar to covering Bid-Offer Data and Physical Notifications)

Summary of discussion points - 2

Redeclaration of MDO/MDV

- The view put forward by the ESO was that MDO/MDV could only be redeclared after Gate Closure after the issuing of a BOA or if the asset has problems
- Discussion centred on whether this possible and, at the same time, for a BMU to guarantee its declared Physical Notifications
- It was pointed out that in Case 2 (see below) the BMU would have to declare its MDO/MDV at SP47 (one hour earlier) for SP1
- **ESO View**
 - In order to act on reliable information inside the BM Window must know PNs and MDO/MDV with certainty

Summary of discussion points – 3

Should MIL/MEL be lowered when BMU is offering dynamic response?

- Discussion centred on Case 4 (please see below)
- One view was that MEL should be reduced to 40MW in the example given (to reflect that 10MW must be held back for the dynamic response)
- **ESO View**
 - The legal definition of MIL/MEL in section BC1.A.1.3.1 states that these parameters are “maximum” values indicating the example is correct and MEL should be 50 MW

Summary of discussion points - 4

Granularity of MDO/MDV points

- If MDO/MDV is allowed to be declared at minute intervals it may add little value and we should consider having a single value for each in each settlement period
- **ESO View**
 - We will check with IT and other teams but minute level granularity does give the best physical representation



GC0166 Work Group – Action 11
Slides sent for discussion to sub-
group

Technical versus Commercial

- Are Maximum Deliverable Offer (MDO)/Maximum Deliverable Bid (MDB) technical or commercial parameters?
- Ofgem gave the following direction in an open letter [Information submitted by generators into the BM \(ofgem.gov.uk\)](https://www.ofgem.gov.uk/information-submitted-by-generators-into-the-bm)

We expect the dynamic parameters that generators submit in the BM to reflect the true operating characteristics of their plant, and the definitions of these parameters, as set out in the Grid Code.

- The ESO believes MDO/MDB to be dynamic parameters so that after gate closure the only reason to redeclare is due to a technical fault or if the ESO issues an instruction that changes the state of charge
- MDO/MDB will replace Maximum Delivery Volume (MDV) and Maximum Delivery Period (MDP) which are defined within the Grid Code as dynamic parameters (please see section BC1.A.1.5)
- The values of MDO/MDB should reflect all available energy but only curtailed by the energy required to provide other services to the ESO for security reasons (such as response or reserve)
- As the “balancer of last resort” the ESO requires all available resources to balance the system

Does MDO/MDB apply to all asset types?

- There has been discussion about which asset types should submit MDO/MDB
- To simplify this our proposal is to say that MDO/MDB will apply to all BMUs (not asset type specific)
- The old parameters Maximum Delivery Volume and Maximum Delivery Period also applied to all BMUs
- A BMU that is not truly limited in energy can submit a single large value and this will then be defaulted every day
- By following this recommendation all BMUs will be treated in the same way
- It means the ESO does not have to register and use additional information to determine if a BMU has MDO/MDB applied to it
- It also future proofs this parameter for new technologies
- It means that aggregators with multiple assettypes can be treated in a consistent way

Proposals for planning timescales

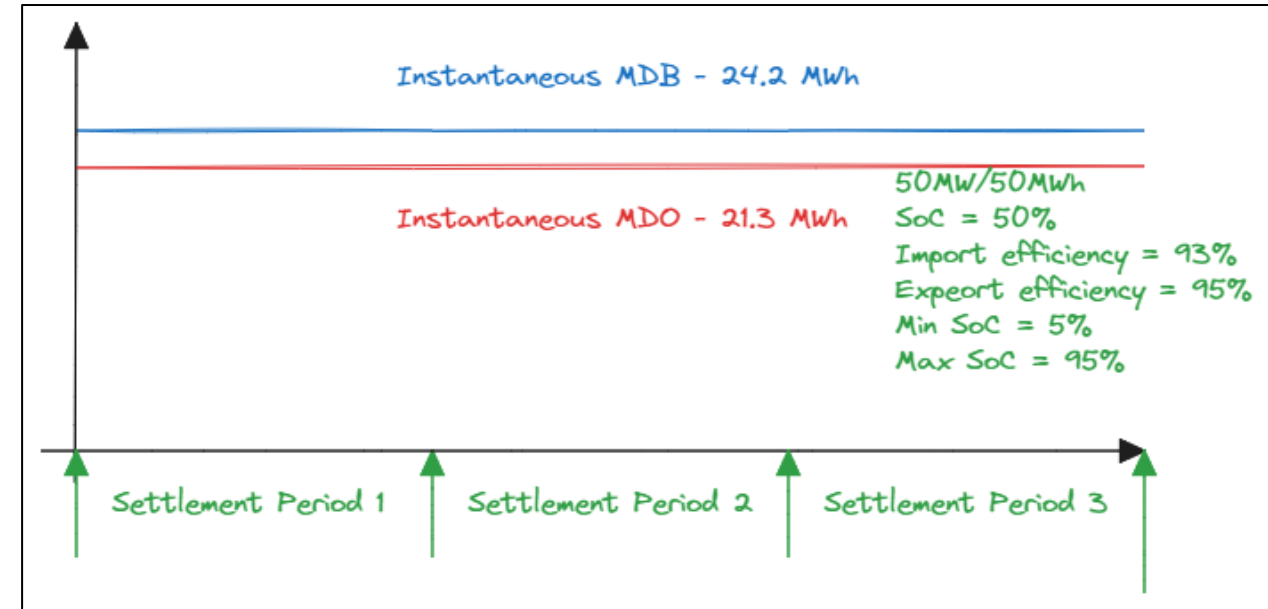
- Outside of the BM window we are proposing a simple asset specific model
- If the ESO issues an instruction to a LDA it changes the available energy
- Inside the BM Window a BMU should tell the ESO how much energy is available – the ESO should not try to derive this
- Outside the BM Window the ESO would want to model different scenarios for planning purposes and so a simple model of the asset should suffice
- The ESO can accept that such modelling is not exact because at this time we are estimating future reserves etc and there are always multiple sources of ambiguity

Detailed considerations with MDO/MDB within the BM Window (after Gate Closure)

- Maximum Deliverable Offer (MDO)/Maximum Deliverable Bid (MDB) will be time varying to account for the need to indicate a change in these values as we come up to periods when less energy is available for Bids or Offers due to the need to provide other system services (for example, if the unit was expected to provide dynamic response, Dx)
- It will be assumed by the ESO that a Limited Duration Asset (LDA) can deliver a Bid Offer Acceptance (BOA), obeying the declared ramp rates and the declared Maximum Export Limit (MEL) or Maximum Import Limit (MIL), such that the energy under the BOA matches the declared MDO/MDB from where the BOA starts
- It will further be assumed that if a BOA is issued for a MW less than MIL or MEL then the length of the BOA can be increased so that the energy under the BOA is within MDO or MDB
- So, if the BOA starts to ramp from its Physical Notification (PN) at the time t1 and returns the Balancing Mechanism Unit (BMU) to its PN at t2 the energy under this BOA will be equal or less than the MDO or MDB (depending on whether it is an offer or bid) at the time t1
- After the acceptance of a BOA the BMU will redeclare its MDO/MDB

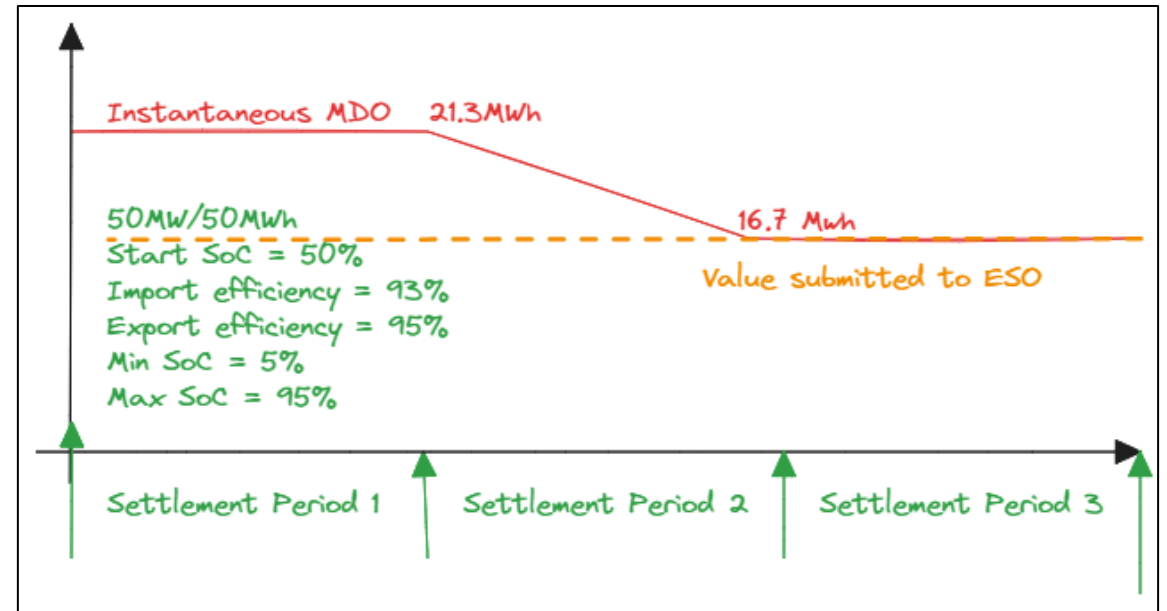
Case 1 - (PN = 0, no DR contracts)

- The instantaneous values of MDB and MDO are expected to be modelled by the BMU and would be derived from State of Charge at given instance
- In this case the MDB and MDO declared to the ESO will be the same as the instantaneous values
- (Note we are showing MDB as positive but it may be better to be a negative number)
- Assuming high ramp rates the ESO could issue a BOA at any time in these three settlement periods with the following
 - An offer, 50MW, 25 mins flat top, energy = 20.8MWh
 - An offer, 25MW, 51 mins flat top, energy = 21.2MWh
 - A bid, -50MW, 29 mins flat top, energy = 24.1MWh



Case 2 - (positive PN, no Dx contracts)

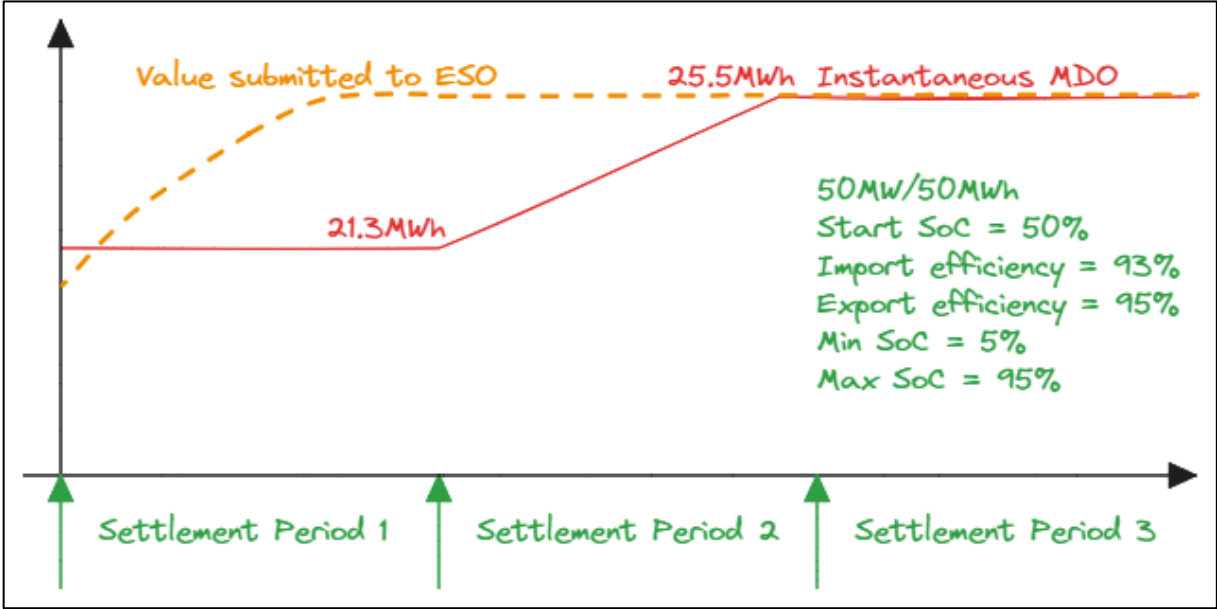
- In this case the MDO declared to the ESO must be the lowest value within the BM Window
- So, for MDO, the BMU would declare 16.7MWh for all three settlement periods (assuming PN ramps at 2MW/min, stops at 20MW for 5 mins, then ramps down at 2MW/min)



Case 3 - (negative PN, no Dx contracts)

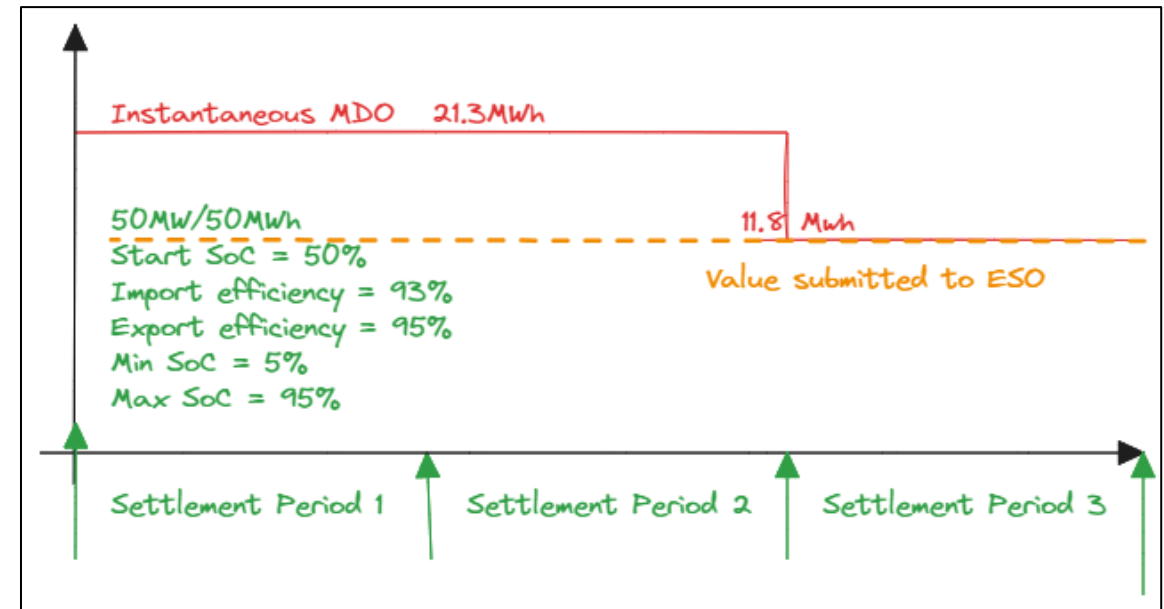
- In this case the MDO declared to the ESO can increase in value within the BM Window
- So, for MDO, the BMU would declare a value that increases from 20.8MWh to 25MWh (assuming PN ramps down at 2MW/min, stops at -20MW for 5 mins, then ramps up at 2MW/min)

Time	Declared MDO	Instantaneous MDO
23:00	20.8	21.3
23:10	21.6	21.3
23:15	24.1	21.3
23:30	25.0	21.3
23:45	25.0	24.4
24:00	25.5	25.5



Case 4 - (0 PN, Dx service starting in SP3)

- In this case the BMU is expected to provide a Dx service
- DR is given in EFA blocks so this graph shows the case where we are coming up to the start of the Dx period
- The BMU declares how much capacity it must hold back for, in this case, a 10MW DC low contract
- We expect the MEL for the unit to stay as 50MW but the ESO should be aware that the max BOA that can be issued during SP3 is MEL – Contract Quantity (in this case 50MW – 10MW = 40MW)
- There may be instances where the LDA uses all capacity to satisfy its Dx contract. In this case the BMU will redeclare its PNs and MDO in later SPs (as governed by gate closure)



Physical form of MDO/MDB

- This will be a time varying parameter
- MDO and MDB can vary independently
- The value can be defaulted (as per other parameters at 11:00 every day)
- The suggested form for each of MDO or MDB is (at a logical level)
 - From time, From Volume (MWh), To Time, To Volume (MWh)
 - (23:30, 20, 23:40, 30)



Draft Workgroup Consultation Questions

Milly Lewis – ESO Code Administrator

Workgroup Terms 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



Any Other Business

Milly Lewis – ESO Code Administrator



Next Steps

Milly Lewis – ESO Code Administrator