ELEXON

Issue Report

Issue 98 ‘Review of the current practice of setting Dynamic Parameters within the Balancing Mechanism’

Contents

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About This Document

Not sure where to start? We suggest reading the following sections:

- Have 5 mins? Read section 1
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- Have 30 mins? Read all sections
- Have longer? Read all sections and the annexes and attachments
- You can find the definitions of the terms and acronyms used in this document in the *BSC Glossary*

This document is the Issue 98 Group’s Report to the BSC Panel. Elexon will table this report at the Panel’s meeting on 9 June 2022.

There are three parts to this document:

- This is the main document. It provides details of the Issue Group’s discussions and proposed solutions to the highlighted issue and contains details of the Workgroup’s membership.
- Attachment A contains the Issue 98 Proposal form.
- Attachment B contains the National Grid Electricity System Operator’s (NGESO) Technical Feasibility Report.

1. Summary

Issue 98 was raised by Energy UK on 13 October 2021 to review the current practice of setting dynamic parameters within the Balancing Mechanism.

Background

Strict compliance with the prevailing interpretation of market manipulation rules following Ofgem's 'Open letter on dynamic parameters and other information submitted by generators in the Balancing Mechanism'[1] may lead to a less economic and efficient wholesale market outcome than that achievable under how some generating plant was operating prior to Ofgem's open letter being published.

Whilst there is an understanding across the industry that there is need for clear guidance and for transparency around the operating capabilities of assets, there is a concern around the lack of distinction between technical and economic parameters and what this could mean in practice for parameters submitted by generating plant to NGESO.

There is a difference between the absolute limit of a technical parameter that a unit can operate at and the level at which it can do so in the most economic and efficient manner. For example pushing some generation units to the limit of their Minimum Zero Time (MZT) would be more expensive due to the associated risks and strain on the asset. Sometimes NGESO may prefer a shorter MZT with associated more expensive Megawatt (MW) values, and at others a longer MZT with cheaper MW values. Therefore, there is an inherent commercial trade-off between risk and capability when submitting these parameters which may not be reflected in the current prevailing market practices.

This Issue Group was raised to investigate the possibility of maintaining compliance with transparency and market conduct requirements whilst also enabling the most economic and efficient operation of the electricity system.

Conclusions

The Issue Group concluded that no new BSC Modifications or Change Proposals would be raised directly from Issue 98, in part due to solutions primarily sitting within the Grid Code. Some Issue Group members were in favour of industry code change, but based on updates provided by NGESO on system and optimisation capabilities, the group were unlikely to pursue this in the short/medium term as progress would be limited.

Seven solution options were suggested:

- Option 1 - Grid Code wording change
- Option 2 - Non-monotonically increasing Bid/Offer prices
- Option 3 - Multiple sets of Dynamic Parameters
- Option 4 - New Ancillary Services where needed
- Option 5 - Explicitly model sub-assets
- Option 6 - Dynamic Stable Export Limit (SEL)/ Stable Import Limit (SIL) (GC0126) and other Dynamic Parameters

[1] https://www.ofgem.gov.uk/publications/open-letter-dynamic-parameters-and-other-information-submitted-generators-balancing-mechanism

- Option 7 - Additional Dynamic Parameters

Of these options, Options 2, 4 and 7 were either decided not to be feasible in the short to medium term based on NGESO feedback, or there was no appetite from members to pursue them.

Following the third and final Workgroup, members requested that NGESO determine if Options 3, 5 and 6 were feasible to implement on the current legacy IT systems. From this further work it was concluded that only Option 6 is technically feasible to implement in the current NGESO systems. Per member request, the feasibility review completed by NGESO only considers what may be viable from an IT perspective. The review does not assess any benefits however, so to determine whether there is value in pursuing Option 6, further work will need to be carried out.

Workgroup members were keen to pursue Option 1 which would involve a Grid Code modification to be raised by industry to change the definition of dynamic parameters. This may require a consequential BSC Modification to be raised as the BSC references the provisions of the Grid Code relating to dynamic parameters.

2. Background

NGESO uses the Balancing Mechanism (BM) to balance electricity generation and demand. Dynamic parameters are defined in the Grid Code and are submitted by generators to NGESO to assist NGESO with determining which balancing actions to take within the BM. The Grid Code requires that each of the dynamic parameters submitted represents the true operating characteristics of the plant. There is a difference between the absolute limit of a technical parameter that a unit can operate at and the level at which it can do so in the most economically efficient manner. There is a concern that strict compliance with the purely technical definition of dynamic parameters may lead to a less economic/efficient outcome for the market overall.

Various factors can influence a BM bid/offer and how the generation plant is operated affects the operational costs and therefore the prices that can be offered. By way of example, ramp rates can be quickened but would cost more depending on the risk the plant incurs in doing so. It is therefore not always possible to capture the running options and associated prices in a single BM bid/offer. This can result in NGESO having fewer and potentially more expensive options to choose from, which ultimately costs the end consumer more.

In the longer term, generating plant may need to balance their operations with environmental or maintenance limits. For example, a plant in the Capacity Market (CM) may have to be careful not to run out of operational hours due to environmental constraints at the start of winter as it may need to be open to meet CM obligations later in the winter.

Issue Group Meetings

Three Meetings were held:

- Meeting 1[2] was held on 22 October 2021. The purpose of this meeting was to give an overview and background of the Issue and discuss initial solution options. The group categorised which parameters were primarily technical or commercial and NGESO and Ofgem were asked to do further investigation into some options discussed.
- Meeting 2[3] was held on 4 February 2022. This purpose of this meeting was for NGESO to give an update regarding their solution benefits investigation as well as introducing the Modern Dispatch Instructor (MDI) to share relevant information on possible options for new dynamic parameters. The outcome of the meeting was that the Workgroup narrowed down on which solution options were likely to progress, of which NGESO was asked to investigate whether they were feasible.
- Meeting 3[4] was held on 9 March 2022. The purpose of this meeting was to decide on the preferred solution options following the conclusion of the Issue Group. The outcome of the meeting was to pursue four of the seven solution options discussed:
    - Option 1 - Grid Code wording change
    - Option 3 - Multiple sets of Dynamic Parameters
    - Option 5 - Explicitly model sub-assets
    - Option 6 - Dynamic SEL/SIL (GC0126) and other dynamic parameters

  NGESO were also requested following the meeting, to investigate at a high level if options 3, 5 and 6 were feasible to implement on their current legacy systems.

[2] https://www.elexon.co.uk/meeting/issue-98-workgroup-1/
[3] https://www.elexon.co.uk/meeting/issue-98-workgroup-2/
[4] https://www.elexon.co.uk/meeting/issue-98-workgroup-3/

3. Issue Group's Discussions

Discussion and problems faced when dealing with dynamic parameters

The Workgroup noted that some plant slow down their Run-Up Rates when coming back from outage in the interests of safety. In a situation where a plant would be left turned off for a number of hours to limit damage, but was then required to be turned back on due to an unexpected outage, the Grid Code does not allow the submission of multiple sets of dynamic parameters. Multiple sets of dynamic parameters could reflect different options for plant operation and could illustrate different levels of risk of damage to equipment.

It was highlighted that the operating characteristics of units have changed since the Grid Code was written. For example, the move of Combined Cycle Gas Turbines (CCGTs) from baseload to two-shifting to flexibility provision. The introduction of new optionality for plant operation and revenue generation by providing system stability services will lead to a greater range of valid dynamic parameters than those currently available.

The Workgroup discussed issues relating to starting and stopping generating units and how current rules on the declaration of these values impact on the use of Minimum Zero Time/Minimum Non-Zero Time. Reasons for adapting these, or otherwise needing multiple sets of pricing, include hitting statutory outage limits or emissions limits. It was noted that reasons change over time and are difficult to communicate. The Workgroup highlighted the effectiveness of the Super SEL contract, and noted that permitting reducing bid prices would also accommodate some more real-life flexibility at generating units.

The Workgroup noted that some Market Participants can come up against IT constraints caused by IT systems when trying to operate their assets within the BM. There was a suggestion that assets are withdrawing from the balancing market where they are not being used as a result of IT constraints. The importance of building markets that work for the assets was highlighted, and it was suggested that the current rules and IT systems are too inflexible to make best use of the growing portfolio of flexible assets.

Dynamic parameters are defined in the Grid Code (BC1.4.2(e) and BC2.5.3.1 below) as:

The Dynamic Parameters submitted under this BC2.5.3.1 shall reasonably reflect the true current operating characteristics of the BM Unit and shall be prepared in accordance with Good Industry Practice.

Dynamic parameters can also be resubmitted at any time. Operating characteristics means how the plant is being operated at any particular moment. This is distinct from technical parameters, which are more usually ratings or actual limits. Resubmission of dynamic parameters has been used, for example, in the provision of the 'super SEL[5]' commercial service which is based on a resubmission of lower SEL limits which is helpful to NGESO during specific low demand periods. This resubmission of parameters for super SEL is entirely within the definition of current operating conditions.

The Workgroup noted that it may be helpful to agree which of the dynamic parameters are not truly 'dynamic' in the sense that they are effectively fixed values. The remaining parameters could therefore be open to a more flexible definition.

Within NGESO's current balancing system solution, more dynamic parameters or multiple submissions would require significant development, an option that has been examined

[5] https://www.nationalgrideso.com/industry-information/balancing-services/reserve-services/super-sel

specific to the proposals for provision of dynamic SIL/SEL functionality. Associated costs would not be recouped as this functionality is likely to be more easily achievable in NGESO's Future Balancing System which is a project that is already in development with a delivery date of 2027-2030. NGESO highlighted that significant constraints in what potential changes could be accommodated related to the capabilities of legacy IT systems, and the need to solve complex optimisation problems. Feedback provided by NGESO narrowed down the solution options that were progressed for further consideration by the Workgroup in the short to medium term.

Technical and Commercial limits

Dynamic parameters were defined at the point at which generation was typically very large plant connected to the Transmission System. The generation landscape has changed significantly in recent years and there are now lots of highly flexible plant. NGESO wants to maximise resources available on the system through these providers participating in the BM. However, the Workgroup felt that the BM can be very unattractive to industry if they own a highly flexible plant.

There are often other related factors which mean that commercial aspects cannot be completely discounted when setting dynamic parameters. Operators and traders will come up with this technical limit which may be their comfortable operating limit for the plant in the prevailing conditions. However, as has been seen with Super SEL, it may sometimes be possible to go beyond those comfortable limits and reduce the level of SEL, provided there is sufficient compensation to account for the extra costs of operating in this way.

Traders will frequently need to defer to power station colleagues for technical limits to be declared. The Workgroup discussed how the message in the Ofgem open letter[1] suggested that the distinction between technical and commercial limits is clear and noted that there were multiple examples where this was not the case and both technical and commercial factors would need to be considered in the declaration of dynamic parameters.

The Workgroup agreed that all dynamic parameters were set using a mix of commercial and technical considerations but some tend more towards one or the other:

- Run-Up Rates/Run-Down Rates – Technical, as there tends to be a relatively clearly defined maximum rate at any given operating condition at which an asset can run up or run down, and multiple sets can be submitted to account for commercial optimisation.
- Notice to Deviate from Zero (NDZ) – Technical, as there tends to be a minimum amount of time at any given operating condition required for an asset to begin ramping up.
- Notice to Deliver Offers (NTO)/Notice to Deliver Bids (NTB) – Technical, as there tends to be a minimum amount of time required for an asset to begin varying output
- Minimum Zero Time (MZT)/Minimum Non-Zero Time (MNZT) – Commercial, as there are a number of non-technical reasons defining whether an asset is able to start, including insurance requirements, emissions regulations and cooling/warming times.
- SEL/SIL – Commercial, as there are often increased risk factors with decreased SELs, meaning there is a strong interaction between cost to run and the 'technical' SEL limit.
- Maximum Delivery Volume (MDV) – Technical as there tends to be a maximum volume that an asset can deliver.

Even where a parameter is primarily technical there is a still a poorly defined line between whether a particular decision relating to it is technical or commercial. This is often defined by the person making the decision, either at the plant or by the commercial team, and is reflected in the Grid Code definition of dynamic parameters as the plant's 'operating characteristics'.

Bid Offer Acceptance (BOA) prices

The Workgroup discussed decreasing BOA prices for increased volumes in BOAs, which is not currently allowed within the BSC. The view was that prices may decrease with increased Offer volumes as generators may move to a more efficient operating window. There would need to be a consideration of the current limits for market solving algorithms to see whether the restriction on decreasing BOA prices could be removed. The Workgroup initially thought that altering the BOA prices would be a quick win and were keen to explore this as an option to take forward to a Modification. However NGESO informed the group that this would be a major change and would introduce significant algorithm complexity which could not easily be solved by balancing systems.

Modern Dispatch Instructor

The Workgroup was taken through, and discussed five different scenarios using the MDI, presented by a representative from NGESO:

- Minimum Flat Top time – a stability function that would preserve a Balancing Mechanism Unit (BMU) at a steady megawatt (MW) figure for a minimum length of time as part of a BOA. The Workgroup felt this is a parameter which could change over time depending on plant operating conditions and the operator's understanding of the units they are working with.
- Minimum Delta MW – a stability function that would prevent a BOA from moving a unit's flat top until a De Minimis value is met. There was some concern from the Workgroup that Ofgem could take issue to this parameter, potentially arguing that it results in greater procurement of energy than otherwise necessary.
- Near Maximum Export Limit (MEL)/Maximum Import Limit (MIL)/SEL/SIL action – where a BMU would be taken to a technical limit if an instruction would otherwise take the BMU close to that limit.
- Splitting Large MW values – using multiple BMUs to deliver a large instruction, reducing non-delivery risk. NGESO noted they don't/wouldn't determine delivery risk in advance.
- State of Energy – representing the maximum amount of energy a BMU can deliver (e.g. state of charge, fuel availability).

The NGESO representative presented these considerations as part of the ongoing development of the MDI. Any changes to introduce possible new dynamic parameters as a result of MDI would be raised through the relevant code change process and industry would have the opportunity to provide input as they were further developed.

4. Conclusions

There were three Issue 98 Workgroup meetings held, on 25 November 2021[6], 4 February 2022[7] and 9 March 2022[8].

The following solution options were presented to the Workgroup:

- Option 1 - Grid Code wording change
- Option 2 - Non-monotonically increasing Bid/Offer prices
- Option 3 - Multiple sets of Dynamic Parameters
- Option 4 - New Ancillary Services where needed
- Option 5 - Explicitly model sub-assets
- Option 6 - Dynamic SEL/SIL (GC0126) and other dynamic parameters
- Option 7 - Additional Dynamic Parameters

Following updates provided by NGESO, the Issue Group established that Option 2 cannot be progressed currently as what is possible from an optimisation and technical perspective is still being researched and investigated, despite some members of the Issue Group wanting to see this solution developed further. Potential new ancillary services suggested under Option 4 have been, and are already being looked at separately by NGESO. This option is therefore not being pursued from this Issue Group. Option 7 was suggested as a potential solution however Workgroup members did not decide on any additional dynamic parameters to be created.

The majority of the Workgroup indicated they were in favour of wanting to pursue Option 1. This would require a modification to be raised by a relevant party under the Grid Code and would seek to provide clarification of technical and commercial factors for consideration. This would affect interactions with Regulation on Wholesale Energy Market Integrity and Transparency (REMIT) and Competition Law as well as potentially requiring a consequential BSC Modification, depending on the scope of the Grid Code change.

The Workgroup were also keen on investigating the possibilities of Options 3, 5 and 6. However following the last meeting, the Workgroup requested that NGESO investigate which (if any) of these options would be feasible to implement on the current NGESO legacy systems. This was with a view to avoiding using wider industry resource raising code modifications where there was no feasible solution. The Workgroup suggested that any investigation by NGESO should be completed swiftly, focussing on actual feasibility and therefore not considering any overall benefit or cost of implementation.

NGESO have completed the Technical feasibility study as requested by the Workgroup, however, NGESO have not undertaken a full cost-benefit analysis for taking any options forward in a wider context.

NGESO completed their investigation (the full report is attached to this paper) and concluded that all three options will have a development and testing impact. Option 6 is believed to have the least impact and from purely within the scope of the IT report is NGESO's recommended option for potential progression to full Impact Assessment (IA) to quantify how much it will cost to deliver, dependent on wider factors. Option 5 requires more granular information relating to sub-assets before an accurate assessment on technical feasibility in legacy systems /legacy timescales (pre-2027) can be conducted, NGESO have considered that part of this will be possible. Option 3 is considered technically feasible, however, will be the most challenging of all the options to deliver and as such it is not recommended to pursue this option.

[6] https://www.elexon.co.uk/meeting/issue-98-workgroup-1/
[7] https://www.elexon.co.uk/meeting/issue-98-workgroup-2/
[8] https://www.elexon.co.uk/meeting/issue-98-workgroup-3/

Appendix 1: issue Group Membership

Issue Group membership and attendance

Issue 98 Group Attendance				
Name	**Organisation**	**25 Nov 21**	**04 Feb 22**	**09 Mar 22**
Elliott Harper	Elexon (Chair)	✓	✓	✓
George Crabtree	Elexon (Lead Analyst)	✓	✓	✓
Peter Frampton	Elexon (Design Authority)	✓	✓	✓
Zaahir Ghanty	Elexon (Business Analyst)	✓	✓	✓
Joseph Underwood	Energy UK (Proposer)	✓	×	×
Yumann Siddiq	Energy UK (Proposer)	×	×	✓
Alastair Martin	Flexitricity	×	✓	✓
Andrew Colley	SSE	✓	✓	✓
Christopher Proudfoot	Drax	✓	×	×
Claire Addison	Flexitricity	✓	×	×
David Kohler	EP UK Investments Ltd	✓	×	×
Grace March	Sembcorp	✓	✓	×
Iwan Hughes	VPI	✓	×	✓
James Fogarty	EP UK Investments Ltd	×	×	×
James Taylor	SMS-Plc	✓	×	×
John Bergeron	Rockland Capital	×	✓	×
John O'Toole	Gresham House	✓	×	✓
Julia Byford-Smith	Smartest Energy	×	×	×
Keren Kelly	NGESO	✓	✓	✓
Lauren Jauss	RWE	✓	✓	×
Lisa Waters	Waters Wye Associates	×	✓	✓
Paul Jones	Uniper Energy	✓	✓	✓
Paul Youngman	Drax	✓	✓	✓
Phil Russell	Independent	×	×	×
Philip Blythe	ESB	✓	✓	×
Robert O'Brien	ESB	✓	✓	✓

Robin Duune	Ofgem	✓	✓	✓
Scott Keen	Triton Power	×	✓	×
Seamus King	Grid Beyond	×	×	×
Shreyas Joag	Flexitricity	✓	✓	×
Stephen Baker	NGESO	✓	✓	✓
Tim Boorsma	Gazprom	×	×	×
Matthias Noebels	Ofgem	✓	✓	×
Seyedali Khatami	Enel X	×	✓	✓
Nick Williams	Erova Energy	×	✓	×
Keith Donaldson	TMA	×	✓	×
Simon Ellis	EPUKi	×	✓	×
Bernie Dolan	NGESO	×	✓	✓
Raoul Thulin	RWE	×	×	✓
Mitesh Gunputh	Grid Beyond	×	×	✓