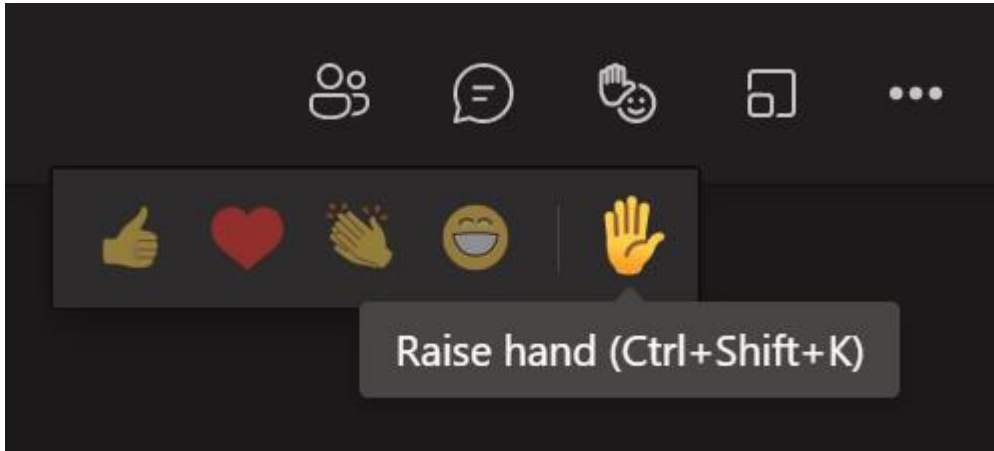


Issue 98 Digital Meeting Etiquette

- Welcome to the Issue 98 Workgroup meeting 3
- No video please to conserve bandwidth
- Please stay on mute unless you need to talk – use the Raise hand feature in the Menu bar in Microsoft Teams if you want to speak, or use the Meeting chat



- Lots of us are working remotely – be mindful of background noise and connection speeds

ELEXION

Issue 98

**Review of the current practice of setting
Dynamic Parameters within the Balancing
Mechanism**

Workgroup Meeting 3

9 March 2022

Meeting Agenda & Objectives

- Recap of Workgroup Meeting 2
- Discuss and confirm the solution(s)
- Confirm next steps following the conclusion of the Issue Group

Agenda Item	Lead
1. Welcome and Meeting objectives	Elliott Harper (Chair)
2. Recap of Workgroup Meeting 2	George Crabtree (Lead Analyst)
3. Presenting the Solution Options	Keren Kelly and Steve Baker (NGESO)
4. NGESO's position	Keren Kelly and Steve Baker
5. Group Discussion	Workgroup
6. Conclusion of the Issue Group	George Crabtree
7. AOB & Meeting close	Elliott Harper



RECAP OF WORKGROUP MEETING 2

Recap of Workgroup Meeting 2 (1 of 3)

- Workgroup Meeting 2 was held on 4 February 2022
- NGESO:
 - Explained how the current set of dynamic parameters are used by the Control Room
 - Explained how the ESO reflects different CCGT configurations
 - Introduced the Modern Dispatch Instructor
 - Presented solution options for consideration
- Ofgem provided their position on this Issue and suggested the way forward – The Issue group should come forward with solid proposals that Ofgem can express a view on

Recap of Workgroup Meeting 2 (2 of 3)

Dealing with dynamic parameters

- The Workgroup reiterated the importance of developing sets of parameters that apply equally to all unit types, and highlighted practices where units may be treated differently which should be standardised in any future work on dynamic parameters
- The Workgroup agreed that a desirable outcome from this process should include an understanding at Ofgem and NGESO about how different contexts and operating modes of generation units affect what they are able to do at a given time, and articulating what is permitted under the relevant legislation
- The Workgroup noted that EBS (Electricity Balancing System), a balancing system including automated scheduling and dispatch) would have enabled more options for dynamic parameters
- The Workgroup highlighted the effectiveness of the Super SEL contract, and noted that reducing bid prices would also accommodate some more real-life flexibility availability at generating units
- Ofgem explained to the group that their interpretation of what is permitted is based on the Grid Code as currently written
- Ofgem agreed that Parties should have commercial control over the operation of their assets, provided that operation is consistent with the details of Codes, Licenses and legislation

Recap of Workgroup Meeting 2 (3 of 3)

Actions:

- **NGESO** to inform the Workgroup of where there is flexibility in the Grid code.
- **NGESO** to provide an update giving more clarity on the Modern Dispatch Instructor.
- **NGESO** to determine whether a Mod to alter BOA prices would be feasible.
- **Workgroup members** to submit any further considerations on what they would like from any parameter changes.



PRESENTING THE SOLUTION OPTIONS AND NGESO'S POSITION

Issue 98 Work Group

Dynamic Parameters

Keren Kelly & Steve Baker | 9th March 2022

Potential Options

Initial Suggestions:

- Option 1 – Grid Code wording change
- Option 2 - Non-monotonically increasing Bid/Offer prices
- Option 3 – Multiple sets of Dynamic Parameters

Further Options considered:

- Option 4 - New Ancillary Services where needed
- Option 5 - Explicitly model sub-assets
- Option 6 - Dynamic SEL/SIL (GC0126) + others
- Option 7 - Additional Dynamic Parameters

To note:

- Option 0 - Other Projects / Wider context

Alter definition of Dynamic Parameters

- Change Grid Code definition of Dynamic Parameters from physical to commercial
- Minor Grid Code wording change
- No new information in parameters

Assessment Summary	
Timeframe	Short Term
IT Implications	Low / Limited (Dependent on change)
Market Implications	Risk that move away from technical definition reduces transparency and could impact market integrity
Other Considerations	Interactions with REMIT and Competition Law BSC Impact

Option 1- Grid Code Wording Change

ESO Considerations:

Amending the Dynamic Parameter definition could adversely impact on the ESO's ability to know that it is making optimal decisions

Consideration of ultimate impact to costs to consumers

The more open parameters are, the less transparency and visibility there is for the market and ESO

Option 2- Non-monotonically increasing Bid/Offer prices

Allow decreasing BOA prices

- Create new rules for the submission of Bid-Offer Acceptances to cover more commercial outcomes
- No new information in Dynamic Parameters – they represent plant operating conditions
- Requires Grid Code and BSC changes
- Requires IT system change

Assessment Summary	
Timeframe	Longer Term
IT Implications	Not feasible to implement on ESO legacy balancing systems. Impact assessment needed to understand if/how/when this could be implemented on future ESO balancing systems
Market Implications	Significant challenge for industry to understand why some balancing actions were taken over others e.g. was a more expensive action taken because of an expectation that cheaper parts of a price stack will be later activated, or was the action taken for a constraint reason?
Other Considerations	Possibility to feed into transformational/market reform work

Option 2- Non-monotonically increasing Bid/Offer prices

ESO Comments:

Adds significant algorithm complexity to be solved by balancing systems - it changes a 'convex' problem (as per the current BOA price rules) into a 'concave' problem

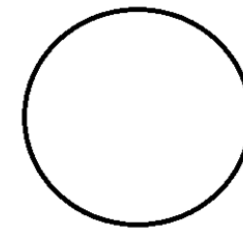
Transparency would be reduced

Introduces much more complexity in scenarios where ENCC engineers may need to manually decide on who to instruct - this would make it almost impossible for fully optimal decisions to be made

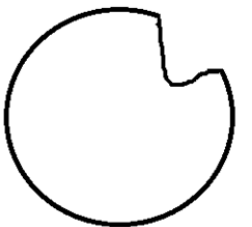
Convex v Concave variables

With optimisation, convex variables are far easier than concave variables for an optimiser to solve.

To take the shapes as an example: if an optimiser is tasked with finding the bottom of the shape, the convex shape is straightforward, but for the concave shape there is a risk that an optimiser might reach the dip in the cavity of the concave shape and believe it has found the overall (or "global") minimum, whereas in fact it has only found a "local minimum".



Convex



Concave

Option 3- Multiple sets of Dynamic Parameters

Create new, multiple sets of Dynamic Parameters

- Leave dynamic parameters as they are
- Create new sets of ‘Commercial Parameters’ based on commercial factors rather than physical
- Requires Grid Code and BSC change
- Requires IT system change

Assessment Summary	
Timeframe	Longer Term
IT Implications	Not feasible to implement on ESO legacy balancing systems. Impact assessment needed to understand if/how/when this could be implemented on future ESO balancing systems
Market Implications	Significant challenge for industry to understand why some balancing actions were taken over others, and why certain Dynamic Parameter sets were chosen over others
Other Considerations	Possibility to feed into transformational/market reform work

Option 3- Multiple sets of Dynamic Parameters

ESO Comments:

Adds significant algorithm complexity to be solved by balancing systems - it introduces significant numbers of additional integer variables. This is true for if only two sets of Dynamic Parameters per BMU are permissible; if there are three or more sets of Dynamic Parameters allowed, complexity increases again

Introduces much more complexity in scenarios where ENCC engineers may need to manually decide on who to instruct - this would make it almost impossible for fully optimal decisions to be made

Integer vs Linear Variables

Integer variables are those that have a small number of valid solutions, most often 1 or 0.

Linear variables are those that can take any value (sometimes constrained within a range).

When it comes to optimisation, linear constraints are far easier to solve than integer constraints.

This option would add a significant number of integer variables into the problem space – e.g. if a BMU had multiple sets of dynamic parameters, then an optimiser would need to choose between each set, with that choice being an integer variable.

Option 4 - New Ancillary Services where needed

Include possible new services for different Dynamic Parameters

- Services similar to Super SEL could be considered for other dynamic parameters if there is a specific need identified

Assessment Summary	
Timeframe	Medium Term
IT Implications	New service design would need to be built into ESO systems Preference to implement on new IT systems rather than legacy - impact assessment would be required once more detail about the service was worked up
Market Implications	Could provide additional flexibility but only if a specific defect/requirement was identified
Other Considerations	

Option 4 - New Ancillary Services where needed

ESO Comments

Any new service would need to be designed to be included in optimisation algorithms and build into IT systems

Initial work would need to be undertaken to identify specific opportunities, if it was possible to build on existing services (e.g. Super SEL, Max Gen) and whether this is something that could be utilised by the ESO

Option 5 – Explicitly Model Sub-Assets

Directly Model Sub-Assets

- One option (specifically with reference to CCGTs) would be to explicitly model sub-assets
- Depending on the implementation the integer variables could have 3 or more permissible states, with each state increasing complexity

Assessment Summary	
Timeframe	Longer Term
IT Implications	Not feasible to implement on ESO legacy balancing systems. Impact assessment needed to understand if/how/when this could be implemented on future ESO balancing systems
Market Implications	Additional algorithmic complexity has the consequence of less market transparency - it is less obvious why one action has been taken over another
Other Considerations	More thought needs to be given to a possible solution but it could give increased visibility of the actual capabilities of each BMU

Option 5 – Explicitly Model Sub-Assets

ESO Comments:

Adds significant algorithm complexity to be solved by balancing systems - it introduces new integer variables, and depending on the implementation, the integer variables could have 3 or more permissible states, with each state increasing complexity

As with Option 3, there is a risk of less market transparency

Given the scale of the necessary algorithm changes, this would not be feasible to implement on legacy balancing systems

Introduce ability to submit profiled values for Dynamic Parameters

- Which parameters are the Group thinking have potential to make more dynamic?
- Need to understand Industry appetite

Assessment Summary	
Timeframe	Medium Term
IT Implications	Depending on solution, the ESO could build on previous IT development work
Market Implications	Previous analysis for dynamic SIL/SEL (GC0126) indicated insufficient value for end consumers to implement this
Other Considerations	

Option 6 – Dynamic/Profiled Dynamic Parameters

ESO Comments:

Previous Issue Group comments suggest that some parameters would benefit from being more dynamic/profiled

This type of change would introduce some algorithm complexity

GC0126 Implementing Profiled Stable Import and Export Limits: Cost Benefit Analysis concluded insufficient value for end consumers – do the Issue Group have any thoughts on this specifically?

Introduce new Dynamic Parameters

- These could potentially be technology-type specific

Assessment Summary	
Timeframe	TBC
IT Implications	Dependent on algorithm implications It may be infeasible to implement on legacy ESO balancing systems
Market Implications	Depending on the new parameters, it could enable characteristics of specific BMUs to be modelled more accurately
Other Considerations	

Option 7 – Additional Dynamic Parameters

ESO Comments:

Algorithm implications are dependent on which parameters are introduced, how many there are, and whether those parameters are linear or integer, static or dynamic – this will then contribute to assessing the IT impacts

Could enable better visibility of the actual capabilities of each BMU

Links to ESO MDI presentation from Issue Group 2

How to reflect the state of energy for storage assets is being considered by other ESO projects

Summary

We have investigated the options suggested at the instigation of this Work Group

ESO has used feedback from the Issue Group to provide commentary on further possible solutions

Feedback gathered at the end of Issue Group 2 shows that the scope of the potential defect(s) is wide with different participants holding varying views on details of the issue and how to approach any solution

To note, the Balancing Market Review is due to publish findings in April. Within the scope of this work is the consideration of market rules



GROUP DISCUSSION

Potential Options

- 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) + others
- Option 7 - Additional Dynamic Parameters

What happens next?

- What (if any) Grid Code changes should be raised? - WG members or industry may wish to raise through NGESO
- OR
- Are there any further actions/information required in order for the Workgroup to conclude its considerations?



CONCLUSION OF THE ISSUE GROUP

Next Steps

- Consider any actions from this meeting
- Meeting notes to be sent to Issue Group Members
- Any Other Business