

Draft Final Modification Report

GC0117: Improving transparency and consistency of access arrangements across GB by the creation of a pan-GB commonality of Power Station requirements

Overview: This modification will set out within the Grid Code a consistent connection process and enduring operational requirements across Great Britain.

Modification process & timetable



Have 10 minutes? Read our [Executive summary](#)

Have 120 minutes? Read the full [Draft Final Modification Report](#)

Have 3 Business Days? Read the full Draft Final Modification Report and Annexes.

Status summary: The Draft Final Modification Report has been prepared for the recommendation vote at Panel.

Panel recommendation: The Panel will meet on 25 April 2024 to carry out their recommendation vote.

This modification is expected to have a: **High impact** on Generators who own and operate Embedded Power Stations with a Registered Capacity of less than 100MW, Distribution Network Operators Balancing Mechanism participants, National Grid ESO and Transmission Licensees.

Modification drivers Consistency of the Connections Process across GB

Governance route This modification has been assessed by a Workgroup and Ofgem will make the decision on whether it should be implemented.

Who can I talk to about the change?

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Executive summary

The Grid Code does not currently apply consistency of access or connection arrangements across GB and, as such, does not assist the creation of a pan-GB market for Power Stations and Power Generating Module (PGM) technology, by increasing the commonality of Power Station requirements. Putting this another way, a 10MW Embedded Power Station connected in the north of Scotland would have to sign up to a significantly greater number of agreements and requirements than a 10 MW Embedded Power Station connected in England and Wales.

What is the solution and when will it come into effect?

Proposer's solution: The Proposer's solution for future Power Stations across GB is to define Large Power Stations as 10MW and above and Small Power Stations as less than 10MW. For new connections, there would be no concept of Medium Power Stations, nor the ability for a Generator to apply for a Bilateral Exemptible Large Licence Exempt Generator Agreement (BELLA). This proposal is non-retrospective and would be expected to apply from June 2027 when the appropriate ESO Balancing IT systems have been upgraded in order to facilitate the expected additional numbers of Balancing Mechanism (BM) participants. The proposal would not apply to any Generator who has submitted a Connection Application to the DNO prior to the implementation of the modification.

Summary of alternative proposal:

WAGCM1

- Under this option, the Power Station thresholds of Small (less than 50MW), Medium (50 – <100MW) and Large (100MW or greater) that currently apply in England and Wales would also be applied in Scotland. For new connections, from the date of implementation, the Large, Medium, and Small Power Station classification criteria would be the same across GB. A Generator who has already submitted a Connection Application to the DNO prior to the implementation would not be impacted by this solution e.g., a 15MW Generator in the North of Scotland that has submitted a connections application prior to the implementation would remain as a 'Large' Power Station, but a 15MW Generator in the North of Scotland that submits a connections application after the implementation, would be classed as a 'Small' Power Station.

Implementation date: The legal text would be implemented in the Grid Code 10 Business Days after The Authority's decision.

Please see Annex 11 for the ESO's estimated delivery timeframes, associated costs, and indicative implementation dates. Therefore, the time from when the requirement applies will depend upon which solution is adopted.

Workgroup conclusions: The Workgroup concluded by majority that neither the Original or WAGCM1 better facilitated the Applicable Objectives than the Baseline.

Panel recommendation: Panel will meet on 25 April 2024 to carry out their recommendation vote.

What is the impact if this change is made?

This modification proposes to change the Small, Medium, and Large Power Station threshold which could have a significant impact for future Generators which own and operate Embedded Power Stations of less than 100MW in England and Wales and the South of Scotland. Although the European Requirements for Generators (RfG) now decouples the majority of technical requirements from the definition of Small, Medium and Large Power Stations, there are some Grid Code requirements which only apply to Large Power Stations, and these requirements would in future have to be applied to those Power Stations that would be classed as Small or Medium under the current rules, but would be Large if the Original proposal was implemented. This modification does not have any impact on on-going Ofgem led Significant Code Reviews. This modification facilitates the implementation of consistent access and connection arrangements across GB for the connection of new generation.

Interactions

As part of this Grid Code modification, it has been established that there are interactions with other codes that have been considered, including the BSC, the CUSC, the Distribution Code, and the SQSS.

What is the issue?

The Grid Code does not currently apply consistent access and connection arrangements across GB and, as such, does not assist the creation of a pan-GB market for power generating module (PGM) technology, by increasing the commonality of Power Station requirements.

The requirements that currently apply to a Generator seeking to connect a Power Station within the GB synchronous area are contrary to the aim and purpose of the European Network Codes¹ in respect of Power Generating Modules (Type A, B, C or D) and will continue to lead to consequences that do not benefit the consumer or enhance the efficient and effective operation of the System. For example, the current baseline arrangements appear to lead to the consequence of deliberate sizing of Generators to fit below an arbitrary MW threshold which varies depending on where in GB the plant is located, leading to a loss of economy of scale and particularly for renewable generation, a reduced ability to efficiently exploit the available energy resource, which ultimately is reflected in a higher cost of production and a greater cost to end consumers.

Why change?

This Proposal is one of several which seeks to build on the relevant provisions of the EU Network Codes/ Guidelines. Although the UK has now left the EU, the majority of these requirements have been integrated into UK law through the application of Statutory Instruments.

The full set of EU Network Codes/ Guidelines are:

- *Regulation 2015/1222 – Capacity Allocation and Congestion Management (CACM) which entered into force 14 August 2015*
- *Regulation 2016/1719 – Forward Capacity Allocation (FCA) which entered into force 17 October 2016*
- *Regulation 2016/631 - Requirements for Generators (RfG) which entered into force 17 May 2016*
- *Regulation 2016/1388 - Demand Connection Code (DCC) which entered into force 7 September 2016*
- *Regulation 2016/1447 - High Voltage Direct Current (HVDC) which entered into force 28 September 2016*
- *Regulation 2017/1485 - Transmission System Operation Guideline (TSOG) - which entered into force 2 August 2017*
- *Regulation 2017/2196 - Emergency and Restoration (E&R) Guideline - which entered into force 24 November 2017*

The Requirements for Generators (RfG) (EU) Network Code was drafted to facilitate greater connection of renewable generation; improve security of supply; and enhance competition to reduce costs for end consumers, across EU Member States.

The Requirements for Generators Network Code specifically sets out, in Recitals (3) and (27), the need for harmonised technical standards for the connection of new generation.

Grid Code modifications [GC0100](#), [GC0101](#) and [GC0102](#) implemented RfG into the GB Grid Code in 2018.

¹ Which are, post Brexit, retained UK law, i.e., in their retained forms they are still applicable in GB.

Whilst there are consistent technical requirements in the Grid Code and Distribution Code for Type A, Type B, Type C and Type D Power Generating Modules, it should be noted that this consistency does not apply in respect of Power Stations, which could comprise of any combination of a Type A, Type B, Type C and Type D Power Generating Module.

[Extracts from Ofgem letter on [GC0102](#) of 15 May 2018 as referenced in footnotes]

Applying a consistency of access arrangements across GB “...*should help improve competition between manufacturers and make it cheaper to build PGM technology, thus reducing costs for consumers*”² as neither manufactures or Generators will need to develop / specify different requirements for the same sized plant depending on whether they are connecting in Carlisle, Glasgow or Perth; a distance of about 150 miles (from Carlisle to Perth); or between Carlisle and Penzance, a distance of about 450 miles.

Furthermore, achieving “...*harmonised systems across the GB energy market should help make it easier and more efficient to operate the electricity system, by introducing a common, clear set of requirements which every new connection to the electricity network will need to meet*”².

Implementation of this change “... *should also help facilitate competition in the generation of electricity by improving transparency and consistency of access arrangements across different electricity systems in [GB]. This removes a potential barrier to entry and allows market participants to trade between Member States more easily by ensuring that there is a level playing field in terms of connection requirements, thus improving competition in generation*”⁴ [emphasis added] as generation plant of the same size will be treated in a non-discriminatory manner across the whole of the GB system.

The “*European Regulations [such as the RfG] intend to deliver a harmonised set of rules for the operation of the electricity sector in Europe. The European Regulations aim to help ensure security of supply, facilitate the decarbonisation of the energy sector and create a competitive, pan-European market which benefits consumers*”⁵.

This modification aims “*to introduce commonality and reduce complexity of arrangements across GB. This should improve the security and efficiency of the system as a whole and encourage further harmonisation thereby providing a clear and predictable framework from which to operate by. This, in turn, should encourage increased standardisation of equipment and specifications across the whole of [GB] and lead to improved economies of scale and increased interconnection driving improved security of supply. We therefore consider that [the] modification will promote the security and efficiency of the electricity generation, transmission and distribution systems.*”

Guidance from BEIS³ and Ofgem was to apply the new EU requirements within the existing GB regulatory frameworks. This would provide accessibility and familiarity to GB parties, as well as putting in place a robust governance route to apply the new requirements in a transparent and proportionate way.

Recital (27) of the RfG also sets out that:

“*The regulatory authorities, Member States and system operators should ensure that, in the process of developing and approving the requirements for network connection, they are harmonised to the extent possible, in order to ensure full market integration.*” [emphasis added]

² BEIS is now referred to as Department for Energy Security and Net-Zero (DESNZ).

What is the solution?

Proposer's solution

Currently, there are up to three different applications of 'Large', 'Medium' and 'Small' Power Station depending on which of the three onshore TO systems a Generator connects to. Further details on these can be found in Annex 5.

The aim of this modification is to develop a single, common, and harmonised solution which would apply across the whole of GB by removing the definition of Medium Power Station and amending Large Power Station to one with a Registered Capacity of 10MW or more and Small Power Station to one with a Registered Capacity of less than 10MW. A Large Power Station would be required to be a full participant in the BM by means of a BEGA. BELLAs would not be available going forwards from the date of implementation unless the Generator has submitted a connections application prior to the implementation of the modification.

The removal of the BELLA option (which is currently only available in Scotland), is to ensure full participation within the BM for Large Power Stations. A BM Unit with a BELLA is no different from a full BM Unit other than that a Generator in respect of a BELLA does not need to submit Bid Offer Data or Dynamic Parameters. BELLAs give the ESO little ability to accurately control a BELLA BM Unit in an intelligent way when compared to a normal BM Unit. As this modification is seeking to ensure consistency between Power Stations across GB, and noting that a BELLA has to meet more or less the same requirements as a Large Power Station operating in the BM, it has been proposed to remove the BELLA option going forward as part of this modification.

It is intended that this proposal would not be implemented retrospectively. If the Original Proposal is approved, Generators impacted would be those which have Embedded Power Stations with a Registered Capacity of 10MW or more which applied for a Connection Agreement on or after the Implementation Date and concluded purchase contracts for their Main Plant and Apparatus on or after the 01 June 2027. If the WAGCM1 is approved, the thresholds in England and Wales would be applied into Scotland for Generators that submit a Connection Application after WAGCM1 has been implemented.

However, where, in accordance with Article 4(1) of the RfG, an *Existing* Type C or Type D Power Generating Module has been subject to a Substantial Modification then it will be required to meet the requirements of the RfG either through the Grid Code or EREC G99. Where a Generator was subject to a Substantial Modification (see Annex 10), and its Registered Capacity was 10MW or above, and submits a Modification Application after the Implementation Date, and concluded contracts for its Main Plant and Apparatus on or after 01 June 2027, it would be treated as a Large Power Station going forward.

Workgroup considerations

The Workgroup convened 23 times to discuss the perceived issue, detail the scope of the proposed defect, devise potential solutions, and assess the proposal in terms of the Applicable Objectives.

Workgroup Title

The Workgroup decided to change the title of the modification, replacing Power Generating Module PGM to Power Stations, to bring the terminology up to date. This change was made to the title on the modification page on the ESO website and was retrospectively approved by the Grid Code Review Panel on the 27 July 2023.

Consideration of the proposer's solution

Refresher Presentation by the ESO

Due to the time elapsed between the previous Workgroup meeting in July 2019 and May 2021; as a result of the need to progress other EU compliance work, the ESO delivered an updated presentation at the Workgroup meeting in May 2021. This highlighted the background context of the modification and a summary of the current options being considered to achieve the harmonisation of access arrangements in Great Britain. There was discussion within the Workgroup around the defect and if it would be a solution applied either for newly connected Generators and those existing Generators which had been subject to a Significant Modification of their equipment, or retrospectively applied to all existing Generators as well (irrespective of whether they had or had not substantially modified their Plant or Apparatus). The discussion also linked into RfG requirements and the impact of the Connection and Use of System Code (CUSC) Clause 6.3.

The presentation also covered the types of connection agreements and differences in the agreements in each Transmission region. The Workgroup noted the issue of retrospectivity and suggested that it may need to be raised as an alternative proposal. The ESO's presentation can be found in Annex 6.

A summary table of the current arrangements in GB for Small, Medium, and Large Power Stations for England and Wales and the two Scottish transmission areas can be found in Annex 4.

Reason for different definitions of Small, Medium and Large in GB - Historical context

At vesting in 1990, a cornerstone of the privatised industry landscape was the treatment of Small, Medium and Large Power Stations which in turn defined the connection process, technical requirements and charging arrangements. With the introduction of the British Electricity Transmission and Trading Arrangements (BETTA) in 2005 this issue became even more focussed noting that the definitions of Small, Medium and Large Power Stations were different in Scotland to those in England and Wales and the enduring obligations and connection process applicable to Small, Medium and Large Power Stations are very different.

To put this into context, a Large Power Station in the North of Scotland would be one with a registered capacity of 10MW or above whereas a Large Power Station in England and Wales is one with a registered capacity of 100MW or above. Under the current arrangements a Large Power Station (even if Embedded) is required to accede to the CUSC, satisfy the applicable requirements of the Grid Code and be part of the wholesale market. In comparison, Embedded Small and Licence Exempt Embedded Medium Power Stations need only have a connection agreement with the Distribution Network Operator and satisfy the applicable requirements of the Distribution Code.

Although the RfG Code introduced common technical requirements for Generators, such that new Power Generating Modules must meet the same technical requirements irrespective of their location, being purely based on size; this did not amend the existing distinctions in the Grid Code. This modification ensures consistent treatment of new Power Stations across GB, with respect to the connection process and the enduring obligations they are required to meet with regard to data provision, but does not extend to financial charges.

Consideration of other options

The Proposer originally suggested six options for a harmonised solution, which would change the existing Small / (Medium) / Large Power Station thresholds. Prior to detailed Workgroup discussion these options included:

1. Applying the present 'North of Scotland' threshold of 10 MW in the 'South of Scotland' and England & Wales.
2. Applying the present 'South of Scotland' level threshold of 30 MW in the 'North of Scotland' and England & Wales.
3. Applying the present England & Wales level threshold of 50 MW in the 'South of Scotland' and the 'North of Scotland'; or
4. Applying the level based on the RfG Power Generating Module Type - A, B, C and D thresholds rather than Power Stations; or
5. Applying the level based on other figures than those associated with the four options above.
6. A further option variation could be centred around removing all references to 'Small', 'Medium' and 'Large'.

The Workgroup discussed the implications of the above options, such as the increased visibility of available generation to the ESO. It was agreed to proceed with option 1 for the Original Proposal, which involves applying the present 'North of Scotland' threshold of 10MW in the 'South of Scotland' and England & Wales.

In order to assess the implications and impacts of for Users, a questionnaire covering the following issues was prepared and circulated amongst the industry for completion:

- Visibility of generation connected to the GB Distribution Systems;
- Associated operational metering costs;
- The connections process and types of applicable Agreements under CUSC (e.g. Bilateral Embedded Generation Agreements (BEGAs) or Bilateral Embedded Licence exemptible Large Power Station Agreement (BELLA));
- Applicable costs from the Connection Application process to data submission and operation in real-time;
- Identification of other costs; and
- Single data submission to both the ESO and DNO's and avoidance of duplication.

In addition, and as part of the investigation following the 9 August 2019 event, Ofgem initiated a Request for Information (RFI) to gauge a view on the visibility of generation, in particular embedded generation. This is something that has been an important input to the Open Networks work which is looking at the holistic and industry wide changes that may be required for GB to meet its net-zero targets.

Questionnaire Feedback

To gauge an initial understanding of the issue and seek views from stakeholders, the ESO developed a questionnaire which sought to identify the impact and costs on Generators depending on the type of Power Station they owned and operated, the view being that from these results, the ESO could understand the potential costs arising from the impact of changing the Power Station thresholds and produce a cost impact assessment that summarised these potential costs. The questionnaire was issued to parties on the Grid Code circulation list and Distribution Code circulation list, the latter being achieved with the help of the ENA.

The ESO questionnaire received just 8 responses, consisting of five Generators, of which four had storage, and 3 DNOs. Of the Generators, three owned and operated Embedded Small Power Stations with no CUSC Contract and none owned or operated Embedded Large Power Stations.

- One Generator commented that they are developing sites in Scotland rated less than 100MW and would be applying for a BEGA due to the opportunity to be in the BM and for their BM actions associated with Transmission constraints to be paid via the BM, although they noted that having no direct agreement with the ESO would streamline the process and make it cheaper to connect.
- One Generator commented that in some circumstances, e.g., a complex multi-party Statement of Works process, a bilateral connection with the ESO may provide a more reliable means of securing network access. In general, cheaper fewer complex connections via the distribution network, where available, are preferable. A BELLA offers no discernible advantages for a developer of a Medium Power Station with ambitions to be more involved in a more diverse range of revenue streams.
 - In reacting to this comment, some Workgroup members noted that a Medium Power Station would not have a BELLA, as by definition this is only for Large Licence Exempt Power Stations.
- One Generator who owns and operates a Large Power Station commented that it costs up to £25,000 per annum to supply the data required under the Data Registration Code (DRC) within the Grid Code, including the submission of Week 24 data.
- One Generator commented that the Medium Power Station threshold should be removed with the Large Power Station threshold starting from 50MW with an option to participate in the BM; a second Generator was also in support of the Large Power Station Threshold starting from 50MW.
- One Generator was aware of the application and modification fees associated with a Generator with a BELLA or BEGA agreement (but did not provide any actual costs), in comparison to the streamlined process available to Embedded Small Power Stations with no agreement under CUSC.
- One DNO commented that if the current thresholds were changed between a Small and Large Power Station, each connection that becomes Large will require the customer to apply for a BEGA within the current process for combined queue management. This involves the ESO completing a Transmission impact assessment to gain a queue position. The typical BEGA Application Fee is £17,000 and reflected in the Industry Cost Impact Assessment which can be found in Annex 20.

The questionnaire responses and summary can be found in Annex 8.

Workgroup discussions on WAGCM1

The Original proposal is for a single, harmonised, Small – Large Power Station categorisation threshold of 10MW that is applied across all of GB. This alternative proposal, raised by Northern Powergrid, is to apply the present England & Wales categorisation thresholds, Small – Medium threshold of 50MW and Medium – Large threshold of 100MW, across all of GB. The Workgroup members who supported this approach felt that the advantage of this proposal is that it would require no change to the arrangements in England and Wales and reduce the connection and enduring burden on new Generators connecting in Scotland.

The Workgroup members who did not support this approach felt that a potential disadvantage of this proposal is that it may reduce the visibility and controllability for new Generators connecting in Scotland, and that it would not address the ESO's concern that they require increased visibility and control of embedded generation across all of GB. Embedded generation has seen substantial growth over the last few years. A Workgroup member who supported this alternative proposal recognised these concerns but was of the view that they are more appropriately addressed by the current Open Networks initiatives which is looking at the holistic and industry wide changes that may be required for GB to meet its net-zero targets.

Most of the Workgroup voted in support of the alternative raised by Northern Powergrid to formally become WAGCM1. Some Workgroup members felt that the current thresholds in England and Wales (50 MW and 100MW) do not recognise the changing requirements of the system, the increased investment in the transmission system in Scotland (such that it is more meshed and integrated than at the time the thresholds were initially set in Scotland) and the increasing number of smaller parties connecting to the network. In particular the trend of large, decommissioned assets being replaced by multiple smaller assets which would fall outside the balancing mechanism. Some Workgroup members noted the following in relation to WAGCM1:

- It is a straightforward change which seeks to maintain the existing arrangement in England & Wales and addresses the core of the defect of the Proposal by providing harmonised levels.
- It seeks to holistically align with the Open Networks' suggestions in relation to the role of the DNOs and addresses the defect but could create potential issues with the need to change thresholds in Scotland.
- It addresses the defect better than the current thresholds, which perpetuates regional differences between Scotland and England and Wales but, makes the evolution of the co-ordination between the ESO and DNOs more urgent.
- Whilst addressing the defect, the ESO representative noted this proposal does not recognise the ESO's role of operating the Balancing Mechanism or its role in managing System Frequency which are fundamental pre-requisites to managing a safe, secure and economic System through the need to instruct plant in the Balancing Mechanism and selecting generation for appropriate Ancillary Services.

Further details on WAGCM1 can be found in Annex 7.

Access and Forward-Looking Charges Significant Code Review (SCR)

An ESO representative delivered a presentation on 22 October 2021 to provide an update to the Workgroup on Ofgem's Access and Forward-Looking Charges Significant Code Review (SCR). As a result of the presentation, the Workgroup did not foresee any implications, from the SCR, that would curtail development of GC0117.

The presentation is available in Annex 9.

Proposed Solutions discussed during the Workgroup Stages

The Workgroup agreed that the six options (the Original and five alternatives – see page 13 for full table) should be consulted on as part of the Workgroup Consultation.

As part of the discussion, it was noted that generation connected to OFTO networks are transmission connected and as such they would be bound by the requirements of the CUSC in the same way as any other directly connected onshore Generator. These arrangements are not to be confused with the term "Embedded Transmission" where an Offshore Transmission Network with a nominal operating voltage of 132kV connects to a

DNO's System in England and Wales. In this situation offshore generation is directly connected to the Offshore Transmission System and hence deemed to be "Transmission connected" however that Offshore Transmission Network is connected to a DNO and hence it is called Embedded Transmission"

Comparison of Original Solution with Alternative Requests

Throughout the Workgroup discussion, five alternative requests were raised by Workgroup members. Two of these were voted to become Workgroup Alternative Grid Code Modifications (WAGCMs), with Alternative Request 1 becoming WAGCM1 and Alternative Request 3 becoming WAGCM2. It was later agreed by the Workgroup (at Workgroup 17 on 23 May 2023) not to continue developing WAGCM2 as an option, and so it was withdrawn.

All alternative request forms can be found in Annex 7.

A summary table of ESO estimated delivery timeframes and costs for all solutions can be found in Annex 11.

| | S/M boundary | M/L boundary | Retrospective | Commentary |
|---|--------------|--------------|---------------|---|
| Original | 10MW | 10MW | No | Going forward the definition of Medium Power Station is removed and a Large Power Station is one with a Registered Capacity of 10MW or more and a Small Power Station is one with a Registered Capacity of less than 10MW. |
| WAGCM1 (Alternative Request 1) | 50MW | 100MW | No | Going forward this would apply the current definitions of Small, Medium and Large Power Stations in England and Wales into Scotland. |
| Alternative Request 2 | 100MW | 100MW | No | Going forward the definition of Medium Power Station is removed, and a Large Power Station is one with a Registered Capacity of 100MW or more and a Small Power Station is one with a Registered Capacity of less than 100MW. |
| WAGCM2 (Alternative Request 3) | 10MW | 100MW | No | Going forward a Large Power Station is retained with a Registered Capacity of 100MW or above, A Medium Power Station is one with a Registered Capacity of less than 100MW but 10MW or greater. Owners and operators of Medium Power Stations can either apply for Transmission Entry Capacity and have a Bilateral Embedded Generation Agreement (BEGA) or apply for Licence Exemption (LEEMPS Plus) where they would be treated as a Licence Exempt Embedded Medium Power Station but would be required to be in the BM. |
| Alternative Request 4 | 50MW | 100MW | No | Regional Development Programme (RDP). Going forward the same thresholds are adopted as per WAGCM1 but any Embedded Plant with a Registered Capacity of less than 100MW but greater than 10MW) would be required to sign up to an RDP. |
| Alternative Request 5 | 50MW | 100MW | No | Hybrid approach – Going forward, Medium Power Stations (50 – 100MW) would meet the requirements of Alternative 3 and Small Power Stations with a Registered Capacity of less than 50MW and greater than 10MW would have to sign up to an RDP. |

Alternative Request 1 (raised by Northern Powergrid)

- Under this option, the Power Station thresholds of Small (less than 50MW), Medium (50 – <100MW) and Large (100MW or greater) that currently apply in England and Wales would also be applied in Scotland. The Small, Medium and Large Power Station classification criteria would then be the same across GB.
- Implementation for this alternative request could be 10 working days following Authority decision.

Alternative Request 2: Large/Small Power Station Threshold changed to 100MW (Raised by UKPN)

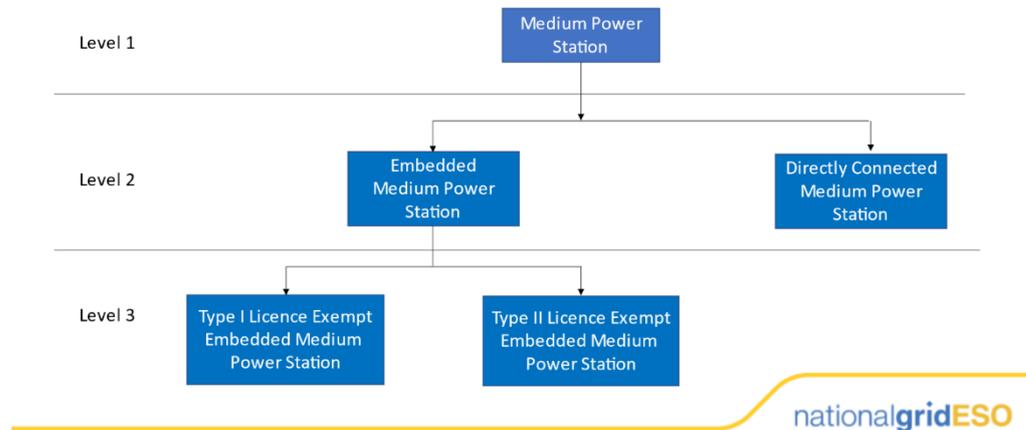
- This alternative proposes that the definition of Medium Power Station is removed, a Large Power Station is one with a registered capacity of 100MW or more and a Small Power Station is one with a registered capacity of less than 100MW.
- Implementation for this alternative request could be 10 working days following Authority decision, with further consideration required for Connection Applications already in the process.

Alternative Request 3: “LEEMPS Plus” – Medium Power Station Threshold changed to 10 – 100MW across GB (raised by the ESO)

- This option applies the existing LEEMPS arrangements and includes an additional balancing mechanism and operating code component to the arrangements so the solution becomes a hybrid of LEEMPS and BELLAs or BEGAs.
- A Large Power Station is one with a registered capacity of 100MW or above, a medium Power Station is one with a registered capacity of less than 100MW but of 10MW or greater. A Small Power Station is one with a registered capacity of less than 10MW. Owners and operators of Medium Power Stations can either apply for transmission entry capacity (TEC) and have a BEGA or apply for licence exemption (LEEMPS Plus) where they would be treated as a LEEMPS but would be required to have a BM and operating code obligations which would be administered in conjunction with the DNO.
- A diagram showing how the existing LEEMPS and LEEMPS Plus solution would work is shown in Figure 1.0 below. In Figure 1.0 a Type I Licence Exempt Embedded Medium Power Station is between 50 – 100MW and there is no relationship with the ESO and they are not in the BM. A Type II Licence Exempt Embedded Medium Power Station is between 10 – 100MW and would be despatched by the ESO. The ESO would have an agreement with the Type II Licence Exempt Embedded Medium Power Station but only in respect of trading in the BM.
- This could be implemented 10 working days following The Authority’s decision although the earliest possible compliance implementation date is 2027 pending the outcome of the ESO Balancing Transformation Strategic review.

Figure 1.0

LEEMPS



Alternative Request 4: Use Regional Development Programme (RDP) for Power Stations with a registered capacity of 10MW+ (raised by the ESO)

- Apply the Small/Medium/Large Power Station thresholds in England and Wales in Scotland (as per WAGCM1) but all embedded plant between 10 – 100MW would be required to participate in the BM and provide ancillary services through a Regional Development Programme (RDP). The RDP is essentially a ‘black box’ which would take the bilateral connection agreement Appendix G and DNO active network management processes into account to enable an Embedded Generator to be visible in the BM and also to be instructed by the ESO but without being subject to the full rigour of the BM in its own right. ESO together with DNOs are trialling several schemes using this approach.
- This could be implemented 10 working days following The Authority’s decision although the earliest possible compliance implementation date is 2027 pending the outcome of the ESO Balancing Transformation Strategic review.

Alternative Request 5: Hybrid solution of Alternative Requests 3 & 4 RDP solution greater than 1MW or 10MW but less than 50MW and LEEMPS Plus solution for between 50 – 100MW (raised by the ESO)

- Under this option the same thresholds are used as per WAGCM1 but Medium Power Stations (50 –100MW) would meet the requirements of Alternative 3 and Small Power Stations with a registered capacity of less than 50MW and greater than 1MW would have to be managed via a RDP and meet the requirements of Alternative 4. The initial thinking as presented to the Workgroup was that Small Power Stations between 1MW and less than 50MW would need to be included within an RDP, however following this initial view, further discussions were held with the ESO’s information technology team who advised that the data volumes, costs and delivery timescale meant that this option is more likely to limit the level required to 10 MW or greater (and not 1MW to 10MW) but less than 50MW.
- This could be implemented 10 working days following The Authority’s decision although the earliest possible compliance implementation date is 2027 pending the outcome of the ESO Balancing Transformation Strategic review.

Having considered all these alternatives the Workgroup then formally determined that Alternative Requests 1 and 3 should be taken forward as Workgroup Alternative Grid Code Modifications (known as 'WAGCM1' and 'WAGCM2'). It was later agreed by the Workgroup (at Workgroup 17 on 23 May 2023) not to continue developing WAGCM2 as an option, and so it was withdrawn.

ENA Open Networks Project update

Members of the ENA's Open Networks Project delivered a presentation *on WS1B P6 Operational DER Visibility and Monitoring* to the Workgroup. This presentation document can be found in Annex 12.

It was clarified that the project covers the visibility of Generators' real time, or close to real time data (to both DNOs and the ESO) but was not intended to cover control. During the discussion, the ESO Workgroup member noted that under the Grid Code and bilateral agreements, operational metering signals should be refreshed every 1 second. For Embedded Generators connected to the DNOs' systems (with no CUSC contract), it was not clear that SCADA systems had the ability to transmit operational metering data at the same refresh rate and whether it would meet the ESO's requirements for real time data.

The Workgroup raised the following comments in relation to the above:

- DNOs should ideally currently have visibility of embedded generation of 1MW and above, which should also be available to the ESO, however this would only provide visibility alone and not control or interactions with the balancing mechanism.
- The Open Networks team produced a gap analysis on the level of visibility of generation assets across DNO networks, and then carried out a CBA for retrofitting these sites, looking at the cost and the benefits that greater visibility would unlock. This informed the recommendation from the product team to retrofit anything 1MW and above.
- Remote monitoring on all new sites is determined by the HV designs for each DNO, but for EREC G99 compliance all new (or significantly modified existing) installations $\geq 10\text{MW}$ must have the ability to provide remote monitoring capability to the DNOs. However, all DNOs now install SCADA at all generation sites down to a threshold which varies by DNO, but in all cases are less than 1MW.
- The Open Networks work included a CBA to determine the cost against the benefit of providing the enhanced embedded generation visibility for the Workgroup to review.
- Open Networks provided visibility of the level of accuracy and granularity of data from DER sites. DNOs do not normally collect a refreshed measurement at a set frequency (e.g. 1s) but rather based on change. A 1% change is what most DNOs have implemented.
- The Open Networks workstream reported their findings on the visibility aspects of their project to the GC0117 Workgroup at the end of 2021.
- It was noted that Open Networks is largely a piece of work developed between the DNOs and ESO and as such was not open to full representative stakeholder input and lacked the full open governance process as per the Grid Code.
- It was suggested that the Workgroup maintain communications with the Open Networks team as the solution develops particularly to avoid possible negative implications or duplication arising from this modification.

Retrospectivity discussion

The Proposer clarified that the Original proposal does not include retrospectivity, however if it were to include retrospectivity, there are multiple ways it could apply. A table outlining the retrospective considerations is available in Annex 14. This initial thinking helped the Workgroup conclude that retrospective application shouldn't be proposed.

The ESO favours not applying the proposal retrospectivity for all potential solutions due to the complexities that may result operationally in relation to the numbers of participants that would be part of the Balancing Mechanism and the additional costs to which existing Generators may be exposed. This could result in some plant being uneconomic due to major re-design potentially being required. It was recognised by the Workgroup that retrospectivity is rarely applied to code changes as it can lead to the erosion of existing investment and lead to unintended consequences. One Workgroup member promoted the use of retrospectivity in relation to data provision alone (i.e., real time data, structural data, and scheduled data).

The Workgroup reviewed the Threshold Matrix developed by the ESO and agreed that an analysis of the impact of retaining a Medium Power Station threshold from WAGCM1 should be added to the matrix. This is available in Annex 13.

Demand Capacity

Ahead of the Workgroup Consultation in summer 2022, the Workgroup noted that whilst the defect relates to equal treatment of Power Stations across GB, it was highlighted that there are also regional differences in relation to BM Units based on the size of their Demand Capacity as provided for in BC1.4.2(a)(1) and BC2.5.5. These MW thresholds are consistent with the regional differences in Power Station Registered Capacity between England and Wales and Scotland.

It was agreed amongst the Workgroup that these thresholds should not be changed as part of this modification but should be specially raised as a Workgroup Consultation question, and pending the outcome of the responses, consideration should be given to establishing a separate Grid Code modification if it is thought appropriate to do so.

Registered Capacity

During the Workgroup discussions, one Workgroup member raised concerns over the definition of Registered Capacity in the Grid Code. In particular, it was noted that the treatment of Registered Capacity had not universally been applied in the same way across historic power stations. The issue raised particularly revolves around Power Stations which are located within industrial sites in which the Power Station feeds demand at that site to run an industrial process rather than simply feeding power into the Total System. At a Transmission level there are fewer sites whereas at a distribution level the issue is more common and therefore clarification was sought in respect of this issue.

The ESO considered this issue and suggested that an appropriate way forward would be to make it clear that Registered Capacity should be based on the Rated MW output of each Generating Unit within that Power Station, less any Demand used for running the Generating Units alone and should not consider any Demand used for separate purposes such as an industrial process.

It was agreed that as different power Stations had been treated in different ways in the past the best solution would be to introduce a new clause into the Grid Code definition of Registered Capacity, making this point clear and that this definition would apply for new Power Stations only to avoid any unintended consequences for existing Power Stations.

In terms of Licensing, one Workgroup member noted that the requirements for Generation Licensing are defined in [Statutory Instrument SI 2001 3270](#) which uses the term “Net Declared Capacity”. The ESO having sought legal advice noted that the definition of Registered Capacity and Declared Net Capacity are not the same, though ultimately it is for the Generator to make the decision regarding Licensing and meet their Grid Code and Distribution Code obligations. It was noted that the revised legal text relating to Registered Capacity should be applied to any GC0117 legal text.

The Workgroup discussed Registered Capacity at their meeting in June 2022 and the corresponding legal text (see Annex 15). Following this meeting, the legal text was updated. A presentation covering the concept and thinking behind the treatment of Registered Capacity is included in Annex 16.

The definition of Registered Capacity was amended to address the concerns of a Grid Code Panel Member raised at the Grid Code Review Panel on 26 January 2024, in respect of industrial sites where there is often an inherent linkage between the site demand and an industrial process, particularly in respect of heat and steam.

The finalised revised Legal Text was circulated to the Workgroup who had no further comments.

Workgroup Consultation

The Workgroup held the Workgroup Consultation between 07 July – 05 August 2022 and received 14 non-confidential responses and 0 confidential responses. The full responses and a summary of the responses can be found in Annex 17.

Industry Webinar

During the Workgroup Consultation response period, a [webinar](#) was held by the ESO on 14 July 2022 in order to provide interested industry parties a summary of the modification and the latest position in relation to the options to address the modification. Participants also had the opportunity to ask any questions and provide feedback.

Workgroup consultation summary

- Out of 14 respondents, 3 support the Original proposal and 3 support WAGCM1. Others believed that a cost benefit analysis and further investigations were required to fully assess the proposed solutions against the applicable Grid Code objectives.
- Some respondents expressed that the rationale / case for change is not clear. No demonstration of how the change would simplify and align Grid Code and generation considering discrepancies had been identified.
- The majority of respondents agreed that it is appropriate to change the definition of Demand Capacity and associated Grid Code definitions to align with the changes to Large, Medium and Small Power Stations but, via a separate modification.
- Most respondents were in support of revising the definition of Registered Capacity.
- Most respondents did not support a retrospective approach as it will be complex and result in increased costs.

- The majority supported establishing a holistic view of the required future net zero arrangements of the technical and commercial arrangements for connecting new and operating existing and new Generators.
- Some respondents did not comment on possible consequences of defining Type 1 LEEMPS (i.e. those existing LEEMPS who would not be affected by the change as there is no retrospectivity) and Type 2 LEEMPS (i.e. future LEEMPS caught under the proposed requirements of between 10 – 100MW who would also be in the BM) because they felt that enough information had not been provided to help them determine this.
- Some respondents expressed that the solutions had not been fully developed.
- One respondent suggested fully considering the Baseline and the reasons why the regional differences between the respective Transmission network areas exist - to establish both defect and benefits of harmonisation and quantitative analysis.
- A respondent advised that a holistic review is already being taken forward by the Open Networks project and continuing with GC0117 could result in duplication of effort and recommendations contrary to proposals under Open Networks.

Post Workgroup Consultation Discussions

On 16 August 2022, the Workgroup held an Alternative Vote, covering Alternative Requests 2 to 5. Alternative 3 was voted to become WAGCM2 by majority, with the other Alternative Requests not progressing to become a WAGCM. As there was not any support for the alternatives in the responses from the Workgroup Consultation, the chair chose not to save any of the alternatives which did not receive enough votes to progress to a WAGCM. Please see Annex 18 for the full Workgroup Vote form.

Withdrawal of WAGCM2

In relation to WAGCM2 (LEEMPS Plus), this option would require the ESO to instruct the LEEMPS while at the same time making the relevant DNO aware of this instruction in order for the DNO to assess the impact and have the opportunity to cancel the instruction should it be required.

Following later discussions with the ESO National Electricity Control Centre (ENCC), it was confirmed that this would not be practical from an operational point of view, i.e., the ENCC would not be able to wait for the DNO to confirm whether the instruction to the LEEMPS could be carried out, especially in an emergency situation. Due to this issue, and because this approach was starting to become very similar to the Original proposal the ESO withdrew this alternative.

Industry Analysis of GC0117 Impacts

As a result of Workgroup discussion, it was agreed that there was a requirement for a CBA (Cost Benefit Analysis) to progress this modification prior to submission to the Authority. Alongside the CBA which was published in April 2023 (Annex 19), it was agreed by the Workgroup that ESO would also complete an industry cost impact assessment (Annex 20) to identify the potential additional obligations and costs other parties would be bound by as a result of the Original Proposal. Following the CBA, the ESO also undertook additional analysis in July 2023 to illustrate by case studies the requirement for controllability of Generators in the Balancing Mechanism (Annex 22) to reinforce the analysis completed as part of the Original CBA, and a Qualitative Assessment of GC0117 impacts of WACGM1 in August 2023 (Annex 23). At the Workgroup on 04 October 2023 DNO workgroup representatives raised concerns about the practical implementation of the 'control' aspects of the Original proposal including the:

- Connection process for Generators and the implications for queue management
- Technical implications including the primacy rules relating to instructions from DNOs and the ESO
- Operational implications associated with the ESO issuing BM instructions to >10MW Power Stations.

Further details are included as (Annex 24).

Cost Benefit Analysis

The Workgroup discussed the overview of the CBA, in particular the requirement to gain insight on potential ESO costs/savings from the assessment with a framework which answers the defect and assessed by the Workgroup as required.

The planned timescales and scope of the CBA the ESO Modelling Team undertook were discussed with the Workgroup, with the three work packages identified as below:

WP1. Balancing Mechanism (BM) price stack: Based on the last three years identify how the actions taken by NGENSO would change based on the different price stacks of bids and offers.

- **Concluding:** The Original Proposal could, in one of the four scenarios considered, lead to a reduction in marginal BM price resulting in annual cost savings of balancing the system of up to approximately £70m⁴.

WP2. Constraint analysis: To inform the decision-making regarding flows across constraint boundaries an understanding of the generation and demand behind the constraint is required. Each option will result in a different level of visibility for NGENSO.

- **Concluding:** The increased visibility of Generators provided by the Original Proposal could, in one of the four scenarios considered, lead to annual savings, in constraint costs of up to approximately £70m. The potential benefits were between £6m-£41m in the other three scenarios considered.
- The reduced visibility as a result of WAGCM1 could, in one of the four scenarios, considered lead to an increase in constraint costs of up to £80m per year. The potential constraint costs were between £33m-£66m in the other three scenarios considered.

WP3. Demand forecast errors: Investigate how the accuracy on the demand forecast varies for each option. Generators which are not part of the BM and connected to the distribution network are not visible to NGENSO and therefore they act to suppress the National Demand.

- **Concluding:** The increased visibility of Generators provided by the Original Proposal could, in one of the four scenarios considered, lead to reduction in Demand forecast errors and therefore cost savings of up to approximately £105m per year. The potential benefits were between £10m-£80m in the other three scenarios considered.
- The reduced visibility of wind units in Scotland as a result of WAGCM1 could, in one of the four scenarios considered, lead to a significant increase in Demand forecast errors and therefore additional annual costs of up to approximately

⁴ All costs/savings based on modification implemented from 2022.¹ From 2029 in the "Leading the Way" FES scenario.

£533m per year. The potential costs were between £259m-£438m in the other three scenarios considered.

Most Workgroup members were supportive of constraint costs being factored into the CBA. The following suggestions were made:

- Including Batteries, EV units and gas generation.
- Estimates as to what aggregators will be doing and within what threshold.
- Contact the Control Room in Wokingham as they may have useful data (although this will be predictive rather than actual).
- For the ESO IT team to create a layout of the content of the CBA against the requirements of the modification and an outline of costs from changes on industry parties. This might encourage parties that could provide data to do so.
- The Workgroup needs to decide how to better address effects on Generators.

The full benefits assessment can be found in Annex 19.

After the presentation of the initial benefits assessment, the proposer of WAGCM1 discussed whether visibility of Embedded Generators would provide the benefits as presented in the paper and what the granularity and latency of data would be required to deliver the benefits. The ESO Workgroup member noted that where there was visibility without control, operational costs would continue to rise.

Following the presentation of the CBA in May 2023, two actions were raised:

- For the ESO to provide further analysis on the CBA to establish if full BM participation was required as part of the Original Proposal or visibility alone would achieve the same benefit.
 - Further CBA analysis was presented to the Workgroup on 19 July 2023 that demonstrated the effect of the requirement for Generators under the Original Proposal to be full BM Participants and controllable via the ESO Control Room. This analysis concluded that with full visibility and control in the BM, in the small number of scenarios considered, additional cost benefits could be realised. These additional savings can be found in the additional analysis that can be found in Annex 22.
 - The Workgroup discussed whether there would be any benefits from providing visibility of planning timescale data. The ESO explained that providing quantitative analysis would be difficult, but some form of qualitative assessment could be made. At the Workgroup on 08 August 2023, the ESO gave an overview of why they believe the providing of Planning Timescale Data alone would not produce the potential benefits demonstrated in the CBA. This qualitative assessment can be found in Annex 23.
- For the proposer of WAGCM1 to consider including the provision of planning timescale data for embedded generation >1MW. The Proposer sought confirmation from the ESO that providing this degree of visibility would deliver tangible benefits. The ESO subsequently confirmed that the benefits described in the benefits assessment (Annex 19) would not be delivered with visibility alone. Hence the proposer of WAGCM1 decided not to enhance the data sharing provisions in WAGCM1 on the basis that there would be no tangible benefits.

At the Workgroup meeting held on 19 July 2023, the ESO queried why the arrangements for embedded generation in the North of Scotland where the current 10MW threshold already applies, could not be applied in the South of Scotland and England and Wales. The rationale for this is summarised in Annex 21. A DNO Workgroup representative

indicated that there was anecdotal evidence that the current arrangements in the North of Scotland did not work well in practice and suggested that there should be further assessment of the implications before those same arrangements were replicated across England and Wales. The Proposer acknowledged the DNO representatives' concern. One Workgroup member agreed to investigate any particular issues, however none were identified.

Industry Impact Cost Assessment

The Workgroup discussed the impact that the modification could have on industry parties (principally Generators), and agreed that ESO should conduct an impact cost assessment on the potential additional costs for new Generators under the Original Proposal.

This assessment was based on responses received from the industry questionnaire previously detailed in the Workgroup report and individual responses in Annex 8. The assessment also includes an estimate of the number of new Generators that would be impacted by the Original Proposal from 2027 in order to provide a view of the estimated cost to the Generator community per year. Details of the assessment can be found in Annex 20.

The potential revision to WAGCM1 to include the submission of planning timescale data for embedded generation of 1MW or above was presented to the ESO on 18 July 2023 and discussed with the Workgroup on 19 July 2023. As set out above, following confirmation from the ESO that visibility would not provide the benefits associated as described in the CBA (see Annex 19), the proposer of WAGCM1 decided not to include provisions for enhanced data sharing, on the basis that there would be costs incurred by the DNO and no claimed benefit by the ESO.

The Industry Cost Impact Assessment (Annex 20) gives an estimated breakdown of costs related to the various obligations a Generator would need to meet as 'Large' under the Original solution.

The ESO representative investigated the additional number of Generators that could fall under this threshold should the Original proposal be approved, however it was not possible to gain an accurate figure. This was due to the initial CBA conducted by the ESO being based on additional MWs rather than individual Power Stations, combined with the additional complexity that the only Generators impacted by this modification would have both:

- applied for a Connections Application or a Modification Application after the implementation date (10 Business Days after the Authority's decision date), and
- signed contracts for Main Plant and Apparatus after the 01 June 2027.

The DNO Embedded Capacity Registers do not provide this level of information.

The ESO IT impact Assessment (Annex 11) gave an estimate of around 650 new units per year, but this included units that would fall into the Balancing Mechanism regardless of GC0117 as this impact assessment was to understand the impact on the various systems used in the ESO Control Room to balance the system.

On the basis that the CBA showed balancing cost benefits to the ESO of up to £360m per year, even with the one-off IT implementation costs of £11m, and that the Industry Cost Impact to Generators (Annex 20) that showed a cost of up to £265k/year per Generator (and simplistically assuming, for this purpose here, that there were to be zero increase in the benefit for those additional power stations providing services to the ESO), there would

need to be over 1,350 additional Generators connecting per year falling under the Large threshold (as a result of the Original solution) for the cost impact to outweigh the benefits, from a CBA perspective.

The ESO representative explained that the actual number of new Generators, based on the IT impact assessment, was likely to be significantly lower than 1,350. But that even if this was not the case that overall, the predicted benefit to consumers of this change outweighs the expected costs to impacted Generators.

Discussion by the Workgroup on Primacy Rules and DER Visibility

The Workgroup were presented with an overview of work being undertaken on behalf of the ENA relating to Primacy Rules and DER Visibility, with the intention of the work to enable data exchange for the ESO to make decisions, and give DNOs visibility of what the ESO is doing, to aid with planning and operation.

One Workgroup member queried whether it was credible for the ESO to issue BM instructions to large embedded Generators downstream of an ANM scheme. An ESO representative clarified that they manage the Balancing Mechanism and do not dispatch generation other than in respect of issuing bids and offers. The ESO may instruct Generators to adjust output based on market signals, but it was noted that they would not be able to do this downstream of an ANM scheme.

One Workgroup member noted that ANM schemes are not always active, so there could be occasions where Generators behind these schemes could participate in the BM.

Interaction with the smaller Generators and Aggregators

The ESO Workgroup Representatives presented an overview of the GC0117 Modification to the Association of Decentralised Energy (ADE) Industrial Forum on the 5 October 2023 and the Flexibility Forum (also part of the ADE) on the 19 October 2023 seeking their views and comments in relation to the proposed modification. Following these presentations, no comments were received.

In the latter stages of the Workgroup phase, representation from smaller Generators attended the Workgroups.

Connections Reform

A number of Stakeholder representatives highlighted the issue of the connections queue and the ability to enable Generators to connect in a more timely manner. These issues are being progressed separately through the Reserve Developer Capacity and Technical Limits, which a number of stakeholders noted could have an impact on GC0117.

The ENA wrote to the Code Administrator highlighting their concerns in November 2023 (Annex 26). The Code Administrator shared this letter with the Proposer and the wider Workgroup and invited comments.

The Proposer acknowledged the letter but were of the opinion that it should not delay the progress of GC0117. They also noted that:

- the work on GC0117 has been well known to the ENA's Open Networks initiative for many years, allowing ample time for considering the implications of GC0117 ahead of undertaking further work;

- prior to receiving the letter, the Workgroup had agreed to complete their Workgroup Vote at the following meeting; and
- the points raised within the letter could be highlighted as part of the Code Administrator Consultation.

The ESO Technical Codes Team confirmed that as part of their existing processes they will continue to work with their Connections Reform colleagues regarding any further changes required to the Grid Code.

Workgroup members discussed the impact of GC0117 on Connections Reform and the majority of Workgroup members agreed that the outputs from GC0117 and the Connections Reform work can coexist side by side. Going forward, the key objectives are:

- release the volume of Embedded which has applied in a timely manner (i.e. unlock the connections queue)
- ensure Network Constraints can be managed.
- ensure Embedded Generation above 10MW can be instructed in the most economic and efficient manner⁵

Several DNO Workgroup members echoed the concerns raised by the ENA, noting that the practical application date of GC0117 is several years away (i.e. 01 June 2027). They also advocated for further engagement with the SCG and Open Networks to work towards a whole system solution and noted that the current Original solution was not consulted on in the Workgroup Consultation, specifically the removal of BELLAs as part of the Original proposal.

The Proposer later responded to the DNO views, highlighting the importance of progressing GC0117 due to the time required for implementation and the consequential modifications. The Proposer also highlighted that there has been significant engagement with the Open Networks Project throughout the progress of this Modification. It is the Proposer's purview to change their solution at any point prior to publishing of the Workgroup report.

Interactions

A discussion took place between the Code Administrator and Ofgem on 16 August 2023 to give an overview of the potential changes required in other codes, and it was agreed that these could follow after a decision on GC0117 had been made on the basis of:

- The majority of changes relate to the Original Proposal which has an implementation date of the 01 June 2027 which should provide adequate time for these changes to be raised.
- If WAGCM1 is approved, this could result in different versions of the proposed legal text needing to be presented for each code change.

BSC

- Amendments are required for the Original Proposal to ensure future Embedded Large Power Stations require registration in CMRS (rather than SMRS).
- The Original Proposal and WAGCM1 will require clarification on the current conditions on which plant and apparatus can be aggregated into a single CVA BM

⁵ The key is ensuring the connections queue is not unlocked at the expense of having much higher future balancing costs

Unit - the WG discussed this with the Proposer and there are no plans to amend the current thresholds.

Distribution Code (see Annex 25)

- Small and Large Power Station thresholds refer to Grid Code definitions, but changes would need to be made to the Medium threshold as this is currently defined in the Distribution Code.
- The concept of Licence Exempt Embedded Medium Power Stations (LEEMPS) would still be required for existing Medium Power Stations if the Original proposal were to be approved.
- EREC G99 has specific clauses for Medium Power Stations, which will require amending.

CUSC

- Small, Medium & Large refer to the Grid Code definitions so no changes would be required.
- In the Original Proposal, changes may be required to the references of Bilateral Embedded Licence Exemptible Large Power Station Agreements (BELLAs), as these would not be available going forwards but will still exist for existing Generators who have them.
- The majority of references to 'Large Power Station' in the CUSC refer to a CUSC Schedule 1 that lists the names of Users.
- The Authority Representative confirmed that the reference to GC0117 within the [CMP298 decision letter](#) was to acknowledge the ongoing work as part of GC0117 modification proposal. Subsequently, it did not require the GC0117 Workgroup to look at any specific aspects in relation to CMP298.

SQSS

- Small, Medium and Large thresholds would need to be amended to reflect the Original Proposal and WAGCM1.

STC

- Initially the proposal was thought to have potential impacts on provisions managing delivery of transmission connections by Onshore TOs in coordination with ESO.
- Through development of the GC0117 proposal(s), it was eventually agreed by the Transmission Owner and ESO workgroup representatives that any consequential STC impacts from GC0117 would be indirect (i.e. meaning no STC changes would be needed to implement GC0117).

Implementation information and additional ESO IT Costs

Implementation date of the Original Proposal

- The Original Proposal will result in an increased number of BM Participants from the date implementation.
- In Workgroup discussions, it was confirmed that there would be impacts on the various ESO IT systems that are used in the ESO Control Room as part of the day to day balancing activities. A full IT impact assessment was completed.

- The outcome of the IT impact assessment identified the various IT Systems that would require change as a result of the Original Proposal based on the estimated number of future BM participants (this number includes Generators that would be participating in the BM regardless of this modification).
- Based on the IT impact assessment, it was discussed and agreed with the Workgroup that the implementation date of the Original Proposal would be the 01 June 2027. This would allow the required changes to the impacted IT Systems to be completed.

Additional ESO IT costs as a result of the Original Proposal

- The IT impact assessment identified that the ESO Balancing Transformation Programme is delivering a number of changes to allow the Control Room to efficiently manage higher numbers of BM Units going forwards, with these changes being delivered outside of the modification i.e., these costs have already been allocated as part of the Programme.
- The additional ESO IT System changes that are required as a direct impact of GC0117, were identified, with around £11m of one-off costs required to support the Original Proposal.

Implementation Date and ESO IT Costs as a result of WAGCM1

- A Generator who has already submitted a connections application to the DNO prior to The Authority's decision would not be impacted by this solution e.g., a 15MW Generator in the North of Scotland that has submitted a Connections Application prior to implementation would remain as a 'Large' Power Station, but a 15MW Generator in the North of Scotland that submits a Connections Application after implementation would be classed as a 'Small' Power Station.
- There would be no additional ESO IT costs as a result of WAGCM1.

Related Potential Modifications Outside the Scope of GC0117

Whilst considered by the Workgroup to be out of scope for GC0117, the Workgroup agreed that separate modifications could be raised once the Authority Decision had been received, to look at elements of the compliance process to ensure efficiency and transparency.

Legal text

The legal text for the Original Proposal and WAGCM1 can be found in Annex 3.

What is the impact of this change?

The EU Network Codes/Guidelines implementation has been undertaken as a substantial programme of work within the GB industry. However, this modification does not impact on any on-going SCR. This modification facilitates the implementation of consistent technical standards across the EU for the connection of new generation.

Proposer's assessment against the Grid Code Objectives

Impact of the modification on the Code objectives:

| Relevant Objective | Identified impact |
|--------------------|-------------------|
|--------------------|-------------------|

| | |
|--|--|
| (a) To permit the development, maintenance, and operation of an efficient, coordinated, and economical system for the transmission of electricity | Positive Reducing the Large Power Station threshold down to 10MW enables the ESO greater visibility and control of generation which in turn should reduce operating costs. |
| (b) Facilitating effective competition in the generation and supply of electricity (and without limiting the foregoing, to facilitate the national electricity transmission system being made available to persons authorised to supply or generate electricity on terms which neither prevent nor restrict competition in the supply or generation of electricity); | Positive The increased numbers of Generators within the Balancing Mechanism should result in increased competition. |
| (c) Subject to sub-paragraphs (i) and (ii), to promote the security and efficiency of the electricity generation, transmission and distribution systems in the national electricity transmission system operator area taken as a whole; | Positive Greater transparency of Generation by the ESO should result in an increase to the efficiency of the operation of the Electricity System. |
| (d) To efficiently discharge the obligations imposed upon the licensee by this licence and to comply with the Electricity Regulation and any relevant legally binding decisions of the European Commission and/or the Agency; and | Neutral |
| (e) To promote efficiency in the implementation and administration of the Grid Code arrangements | Neutral |

Workgroup vote

The Workgroup met on 08 January 2024 to carry out their Workgroup vote. The full Workgroup vote can be found in Annex 18. The table below provides a summary of the Workgroup members view on the best option to implement this change.

The Applicable Grid Code Objectives are:

- a) To permit the development, maintenance and operation of an efficient, coordinated and economical system for the transmission of electricity
- b) Facilitating effective competition in the generation and supply of electricity (and without limiting the foregoing, to facilitate the national electricity transmission system being made available to persons authorised to supply or generate electricity on terms which neither prevent nor restrict competition in the supply or generation of electricity);
- c) Subject to sub-paragraphs (i) and (ii), to promote the security and efficiency of the electricity generation, transmission and distribution systems in the national electricity transmission system operator area taken as a whole;
- d) To efficiently discharge the obligations imposed upon the licensee by this license and to comply with the Electricity Regulation and any relevant legally binding decisions of the European Commission and/or the Agency; and
- e) To promote efficiency in the implementation and administration of the Grid Code arrangements

The Workgroup concluded by majority that neither the Original or WAGCM1 better facilitated the Applicable Objectives than the Baseline.

| Option | Number of voters that voted this option as better than the Baseline |
|----------|---|
| Original | 2 |
| WAGCM1 | 4 |

Code Administrator Consultation Summary

The Code Administrator Consultation was issued on the 19 February 2024, closed on 26 March 2024 and received 13 non-confidential responses. A summary of the responses can be found in the table below, and the full responses can be found in Annex 28.

| Code Administrator Consultation summary | |
|--|--|
| Question | |
| Do you believe that the GC0117 Original Proposal or WAGCM1 better facilitates the Grid Code Applicable Objectives? | <p>For the Original solution, the following numbers of respondents indicated that the change would better facilitate the objectives:</p> <ul style="list-style-type: none"> two for (a), seven for (b) and three for (c). <p>Five respondents believed none of the objectives would be better facilitated by the Original solution.</p> <p>For WAGCM1, the following numbers of respondents indicated that the change would better facilitate the objectives:</p> <ul style="list-style-type: none"> three for (a), eight for (b), three for (c), three for (d) and three for (e). <p>Three respondents believed none of the objectives would be better facilitated by WAGCM1.</p> <p>One respondent noted that both solutions could have a possible negative effect on objective (a).</p> |
| Do you support the proposed implementation approach? | <p>8 respondents indicated they did not support the proposed implementation approach.</p> <p>4 respondents indicated they support the proposed implementation approach, with 1 additional respondent noting that they support it for WAGCM1 only.</p> |
| Do you have any other comments? | <p>Several DNO respondents highlighted that they did not feel the materiality of the defect had been demonstrated and felt that the proposed Original solution exceeds the scope of the defect without sufficiently investigating the impacts on</p> |

| | |
|--|--|
| | <p>stakeholders. These concerns were also echoed by one Generator respondent, and several other respondents highlighted a potential for increased costs to industry.</p> <p>The lack of retrospectivity of the proposal was noted by several respondents, with one noting that this could introduce greater complexity due to the differing rules for Users connecting before and after implementation.</p> <p>One respondent highlighted concerns that DNOs and iDNOs will not be ready to incorporate the required changes prior to implementation. Several respondents highlighted the potential for GC0117 to interact with other potential changes within the industry, however one respondent noted that they thought these initiatives could coexist with GC0117.</p> <p>One respondent noted the importance of increased visibility of Generators and participation within the BM to allow the system to operate in a secure way with low balancing costs, noting that the Original solution has advantages over WAGCM1.</p> |
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Legal text issues raised in the consultation

No legal text issues were raised as part of the Code Administrator Consultation.

EBR issues raised in the consultation

One respondent noted that they did not believe the additional requirements that the Original proposal would place on smaller assets is reasonable and justified. Another respondent believed that the Original proposal creates an undue barrier to entry for smaller low carbon generation assets.

Several respondents noted that the Workgroup had not discussed the EBR impacts.

ESO view on the Code Administrator Consultation responses

The ESO and Proposer noted that the Recitals set out the benefits and need for harmonisation, non-discrimination and standardisation. They highlighted EBR Article (3) objective (e), noting that although the objective covers the avoidance of undue barriers for entry for new entrants, it also refers to preventing undue market distortions, which they believe that GC0117 can help to deliver.

They noted that GC0117 Original 'sets out harmonised rules', that will 'ensure adequate competition based on a level-playing field between market participants', including 'assets located at the distribution level', whilst ensuring a 'standardisation of balancing products'

with a 'set of standard characteristics and additional characteristics defining standard products', and it does so 'in a non-discriminatory, fair, objective and transparent basis'. As such it will be 'fostering effective competition, [and] non-discrimination' 'while preventing undue distortions within the internal market in electricity'. However, they believed that maintaining the status quo (or the 'Baseline') will not ensure the achievement of these aforementioned aspects.

Whilst noting that the Workgroup had not discussed the EBR impacts, the Code Administrator had clarified that based on a final review of the legal text against the Grid Code EBR Mapping Table, although the amends proposed by the Original solution featured minor amends to BC1 and BC2 the EBR implications questions would be included in the Code Administrator Consultation.

Panel Recommendation Vote

The Panel will meet on the 25 April 2024 to carry out their recommendation vote. They will assess whether a change should be made to the Grid Code by assessing the proposed change and any alternatives against the Applicable Objectives.

Panel comments on EBR

The Panel will discuss when they meet on the 25 April 2024 to carry out their recommendation vote.

Vote 1: Does the Original and WAGCM1 facilitate the objectives better than the Baseline?

Panel Member: **Alan Creighton, Network Operator Representative**

| | Better facilitates AO (a)? | Better facilitates AO (b)? | Better facilitates AO (c)? | Better facilitates AO (d)? | Better facilitates AO (e)? | Overall (Y/N) |
|------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------|
| Original | | | | | | |
| WAGCM 1 | | | | | | |
| Voting Statement | | | | | | |
| | | | | | | |

Panel Member: **Alastair Frew, Generator Representative**

| | Better facilitates AO (a)? | Better facilitates AO (b)? | Better facilitates AO (c)? | Better facilitates AO (d)? | Better facilitates AO (e)? | Overall (Y/N) |
|------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------|
| Original | | | | | | |
| WAGCM 1 | | | | | | |
| Voting Statement | | | | | | |
| | | | | | | |

Panel Member: **Darshak Shah, Generator Representative**



| | Better facilitates AO (a)? | Better facilitates AO (b)? | Better facilitates AO (c)? | Better facilitates AO (d)? | Better facilitates AO (e)? | Overall (Y/N) |
|------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------|
| Original | | | | | | |
| WAGCM 1 | | | | | | |
| Voting Statement | | | | | | |
| | | | | | | |

Panel Member: **David Monkhouse, Offshore Transmission Licensee**

| | Better facilitates AO (a)? | Better facilitates AO (b)? | Better facilitates AO (c)? | Better facilitates AO (d)? | Better facilitates AO (e)? | Overall (Y/N) |
|------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------|
| Original | | | | | | |
| WAGCM 1 | | | | | | |
| Voting Statement | | | | | | |
| | | | | | | |

Panel Member: **Jamie Webb, National Grid ESO**

| | Better facilitates AO (a)? | Better facilitates AO (b)? | Better facilitates AO (c)? | Better facilitates AO (d)? | Better facilitates AO (e)? | Overall (Y/N) |
|------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------|
| Original | | | | | | |
| WAGCM 1 | | | | | | |
| Voting Statement | | | | | | |
| | | | | | | |

Panel Member: **John Harrower, Generator Representative**

| | Better facilitates AO (a)? | Better facilitates AO (b)? | Better facilitates AO (c)? | Better facilitates AO (d)? | Better facilitates AO (e)? | Overall (Y/N) |
|------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------|
| Original | | | | | | |
| WAGCM 1 | | | | | | |
| Voting Statement | | | | | | |
| | | | | | | |

Panel Member: **Matthew White, Network Operator Representative**

| | Better facilitates AO (a)? | Better facilitates AO (b)? | Better facilitates AO (c)? | Better facilitates AO (d)? | Better facilitates AO (e)? | Overall (Y/N) |
|------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------|
| Original | | | | | | |
| WAGCM 1 | | | | | | |
| Voting Statement | | | | | | |
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Panel Member: **Robert Longden, Supplier Representative**

| | Better facilitates AO (a)? | Better facilitates AO (b)? | Better facilitates AO (c)? | Better facilitates AO (d)? | Better facilitates AO (e)? | Overall (Y/N) |
|------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------|
| Original | | | | | | |
| WAGCM 1 | | | | | | |
| Voting Statement | | | | | | |
| | | | | | | |

Panel Member: **Ross Kirkwood, Onshore Transmission Licensee**

| | Better facilitates AO (a)? | Better facilitates AO (b)? | Better facilitates AO (c)? | Better facilitates AO (d)? | Better facilitates AO (e)? | Overall (Y/N) |
|------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------|
| Original | | | | | | |
| WAGCM 1 | | | | | | |
| Voting Statement | | | | | | |
| | | | | | | |

Panel Member: **Sigrid Bolik, Generator Representative**

| | Better facilitates AO (a)? | Better facilitates AO (b)? | Better facilitates AO (c)? | Better facilitates AO (d)? | Better facilitates AO (e)? | Overall (Y/N) |
|------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------|
| Original | | | | | | |
| WAGCM 1 | | | | | | |
| Voting Statement | | | | | | |
| | | | | | | |

Vote 2 – Which option is the best?

| Panel Member | BEST Option? | Which objectives does this option better facilitate? (If baseline not applicable). |
|-----------------|--------------|--|
| Alan Creighton | | |
| Alastair Frew | | |
| Darshak Shah | | |
| David Monkhouse | | |
| Jamie Webb | | |
| John Harrower | | |
| Matthew White | | |
| Robert Longden | | |

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| Ross Kirkwood | | |
| Sigrid Bolik | | |

Panel conclusion

Panel will meet on 25 April 2024 to carry out their recommendation vote.

When will this change take place?**Implementation date**

With respect to the changes to the Grid Code this would be 10 Business Days after the Authority's decision. For compliance implementation this would be anytime between 10 days following implementation up to circa 2027 depending on the Authority's decision.

Date decision required by

As soon as possible.

Implementation approach

If the proposed solution is adopted there will be an impact on systems and processes as this modification seeks to change the threshold between Large and Small Power Stations to a value of 10MW.

If WAGCM1 is selected there will be minimal change to systems and processes.

Interactions

| | | | |
|--|---|---|---|
| <input checked="" type="checkbox"/> CUSC | <input checked="" type="checkbox"/> BSC | <input type="checkbox"/> STC | <input checked="" type="checkbox"/> SQSS |
| <input type="checkbox"/> European Network Codes | <input checked="" type="checkbox"/> EBR Article 18 T&Cs ⁶ | <input type="checkbox"/> Other modifications | <input checked="" type="checkbox"/> Other |

Acronyms, key terms and reference material

| Acronym / key term | Meaning |
|--------------------|---|
| BSC | Balancing and Settlement Code |
| BEGA | Bilateral Embedded Generation Agreement |
| BELLA | Bilateral Exemptible Large Licence Exempt Generator Agreement |
| ENCC | ESO National Electricity Control Centre |
| BETTA | British Electricity Transmission and Trading Arrangements |
| BM | Balancing Mechanism |
| BSC | Balancing and Settlement Code |
| CBA | Cost Benefit Analysis |
| CMP | CUSC Modification Proposal |
| CACM | Capacity Allocation and Congestion Management |
| CUSC | Connection and Use of System Code |
| DNO | Distribution Network Operator |

⁶ If the modification has an impact on Article 18 T&Cs, it will need to follow the process set out in Article 18 of the Electricity Balancing Regulation (EBR – EU Regulation 2017/2195) – the main aspect of this is that the modification will need to be consulted on for 1 month in the Code Administrator Consultation phase. N.B. This will also satisfy the requirements of the NCER process.

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| DCC | Demand Connection Code |
| ENA | Energy Networks Association |
| ESO | Electricity System Operator |
| DRC | Data Registration Code |
| EBR | Electricity Balancing Guideline |
| EV | Electric Vehicle |
| FCA | Forward Capacity Allocation |
| EU | European Union |
| GB | Great Britain |
| HVDC | High Voltage Direct Current |
| LEEMPS | Licence Exempt Embedded Medium Power Station |
| NGET | National Grid Electricity Transmission |
| MW | Megawatt |
| OFTO | Offshore Transmission Owner |
| PGM | Power Generating Module |
| RDP | Regional Development Programme |
| RfG | Requirements for Generators |
| RFI | Request for Information |
| STC | System Operator Transmission Owner Code |
| SCADA | Supervisory Control and Data Acquisition |
| SCG | Strategic Connections Group |
| SCR | Significant Code Review |
| SQSS | Security and Quality of Supply Standards |
| TEC | Transmission Entry Capacity |
| T&Cs | Terms and Conditions |
| TSOG | Transmission System Operation Guideline |
| TO | Transmission Owner |
| WAGCM | Workgroup Alternative Grid Code Modification |

Annexes

| Annex | Information |
|----------|--|
| Annex 1 | Proposal form |
| Annex 2 | Terms of reference |
| Annex 3 | Original and WAGCM1 legal text |
| Annex 4 | GC0117 Options |
| Annex 5 | Current, baseline, Grid Code definition of 'Small', 'Medium' and 'Large' |
| Annex 6 | ESO Refresher presentation |
| Annex 7 | WAGCM1 and Alternative forms |
| Annex 8 | Questionnaire responses and summary |
| Annex 9 | ESO presentation on Ofgem's Access and Forward-Looking Charges Significant Code Review (SCR) |
| Annex 10 | Substantially Modified Examples |
| Annex 11 | ESO estimated delivery timeframes and costs for Proposed solutions |
| Annex 12 | Open Networks Project presentation |
| Annex 13 | Threshold Matrix |
| Annex 14 | Retrospective considerations |
| Annex 15 | Registered Capacity draft legal Text |

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| Annex 16 | Registered Capacity presentation |
| Annex 17 | Workgroup consultation responses and summary |
| Annex 18 | Workgroup Vote |
| Annex 19 | ESO CBA results |
| Annex 20 | ESO Industry Impact Cost Assessment |
| Annex 21 | SSEN Concerns email |
| Annex 22 | ESO CBA Additional Analysis |
| Annex 23 | ESO Qualitative Analysis |
| Annex 24 | DNO Analysis |
| Annex 25 | Summary of DCode changes required as a result of GC0117 |
| Annex 26 | ENA Letter |
| Annex 27 | Attendance Log |
| Annex 28 | Code Administrator Consultation Responses and Summary |