

Modification proposal:	<b>Grid Code (GC) GC0141: Compliance Processes and Modelling amendments following 9<sup>th</sup> August Power Disruption (GC0141)</b>		
Decision:	The Authority <sup>1</sup> directs <sup>2</sup> that the proposed modification to the Grid Code be made		
Target audience:	National Grid Electricity System Operator (NGESO), the Grid Code Review Panel, Grid Code users and other interested parties		
Date of publication:	12 December 2022	Implementation date:	5 January 2023

## Background

Both Ofgem and the Government’s Department for Business, Energy & Industrial Strategy (BEIS) investigated, reviewed and published reports on the incident of 9th August 2019 when over 1 million customers lost their electricity supply as a consequence of unexpected losses of generation following a correctly cleared fault event on the Transmission System. This modification aims to address the concerns raised in Action 3 of the Ofgem Report<sup>3</sup> and Action 2 of the BEIS report<sup>4</sup>. Both Actions are identical, and required *“the ESO (Electricity System Operator), in consultation with large generators and transmission owners, should review and improve the compliance testing and modelling processes for new and modified generation connections, particularly for complex systems. The ESO should report its progress to the E3C (the Government’s Energy Emergencies Executive Committee) by April 2020”*.

<sup>1</sup> References to the “Authority”, “Ofgem”, “we” and “our” are used interchangeably in this document. The Authority refers to GEMA, the Gas and Electricity Markets Authority. The Office of Gas and Electricity Markets (Ofgem) supports GEMA in its day to day work. This decision is made by or on behalf of GEMA.

<sup>2</sup> This document is notice of the reasons for this decision as required by section 49A of the Electricity Act 1989.

<sup>3</sup> [https://www.ofgem.gov.uk/sites/default/files/docs/2020/01/9\\_august\\_2019\\_power\\_outage\\_report.pdf](https://www.ofgem.gov.uk/sites/default/files/docs/2020/01/9_august_2019_power_outage_report.pdf)

<sup>4</sup> [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/855767/e3\\_c-gb-power-disruption-9-august-2019-final-report.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/855767/e3_c-gb-power-disruption-9-august-2019-final-report.pdf)

## The modification proposal

GC0141 is proposed by the ESO in response to the above Actions and concerns raised by both Ofgem and BEIS following the review of the 9<sup>th</sup> August 2019 power outage. GC0141 proposes seven broad changes to the Grid Code with regards to the following areas; Grid Code compliance, the robustness of the modelling process, and Fault Ride Through requirements. A workgroup convened 14 times to discuss the Grid Code defects, and devise and assess potential solutions<sup>5</sup>. Through this process, alternative solutions were put forward for five of the seven areas of change proposed within GC0141.

Each workgroup member selected their preferred solution, which has been put forward as a Workgroup Alternative Grid Code Modification (WAGCM), comprising in WAGCMs 1 to 13. Additionally, WAGCM14 comprises the most popular solution for each of the seven proposals within GC0141. This results in GC0141 comprising fifteen proposals; the ESO's original proposal, and WAGCMs 1 to 14. These 15 proposals, and the changes that they comprise are listed in Annex 1.

In the section below, we discuss each of the changes proposed within GC0141 alongside our views.

### *GC0141 proposals related to Grid Code Compliance*

GC0141 proposes two changes in relation to Grid Code Compliance;

- (1) for simulation studies submitted as part of the Compliance Process, for Generators or DC Converter Stations, to be independently verified, and
- (2) for all Users to submit a compliance statement and self-certification of compliance every 5 years.

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<sup>5</sup> We note that a number of sub-workgroups were created to discuss certain elements of the GC0141 proposal in more detail. More information on these sub-workgroups can be found in Annex 5 of the GC0141 FMR.

## (1) Independent verification of simulation studies

This aspect of GC0141 was raised to address concerns we highlighted in our 9<sup>th</sup> August 2019 power outage report regarding the ESO's reliance on User self-certification, and lack of independent compliance testing or verification during plant commissioning<sup>6</sup>. GC0141 contains four proposals in relation to independent verification of simulation studies; the ESO's proposal and three workgroup alternatives. All propose changes to the Grid Code Compliance Process and European Compliance Process Appendix 3 Simulation Studies for Generators or DC Converter Stations, requiring the simulation study reports submitted to demonstrate compliance be independently verified by an independent engineer employed by the User prior to submission.

- The ESO proposes to amend the Grid Code so that the simulation study reports must be checked and approved by an appropriately qualified independent engineer or an appropriate independent test body (employed only for the purposes of this verification), who must sign the report to approve that the study methodologies used are appropriate and the results are a true and accurate simulation of the behaviour of the plant.
- Workgroup alternative 1 proposes that for Users with a Registered Capacity of 100MW or more, the simulation study reports shall be submitted to and checked for compliance with the Grid Code Connection Conditions by an Independent Engineer, inform the ESO of the scope of the independent engineer's work, and state within the report any disagreement in scope. The term Independent Engineer is defined including reference to the appropriate technical expertise and separation from conflict of interest.
- Workgroup alternative 2 is the same as alternative 1, however also requires that if a User (100MW or more) is put into a Limited Operational Notification (LON), the Independent Engineer is required to check for compliance on the areas of defect in the LON.
- Workgroup alternative 3 is the same as alternative 2, however also requires that if a User (100MW or more) declares any material changes impacting compliance, the Independent Engineer is required to check for compliance on areas of material change.

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<sup>6</sup> In our 9th August 2019 power outage report, we raised concern that "the ESO relied significantly on self-certification by Hornsea 1 (a generator that failed to respond to the impact of the fault on the transmission system as expected) for the generator's commissioning process as demonstration of the generator's compliance with the Grid Code, despite the complexity of the connection. Following Little Barford's (a generator that unexpectedly disconnected from the transmission system concurrent to the transmission system fault) major refurbishment in 2011/12, the ESO relied on the RWE's confirmation that the modifications had not impacted the generator's compliance with the Grid Code requirements for generators to remain stable following network faults. No independent compliance testing or verification was carried out."

### *Our views*

The general feedback from the majority of workgroup members was that there was no distinct benefit in utilising an Independent Engineer, and that the ESO building in-house capability to scrutinise simulation modelling may realise more benefit than independent verification. Bi-lateral discussions with the ESO confirmed that, as part of the compliance process, it reviews the simulation study assumptions and validates the results. This overlaps significantly with the proposed role of independent verification, detracting from the benefit of independent verification. We therefore agree with the general workgroup consensus that it would be more economic and efficient for the ESO to more effectively scrutinise User self assessments than to commission independent verification.

We note that the Grid Code Compliance Process and European Compliance Process currently requires Users to submit, amongst other things, Compliance Statements and User Self Certification of Compliance *to the satisfaction of the ESO* prior to the issuing of Operational Notifications. It also allows the ESO to witness compliance testing at its discretion. We note that compliance test results are used, in part, to validate User models and simulations. We therefore consider the current Grid Code arrangements sufficient to allow the ESO to scrutinise User self certification submissions, and expect it to do so effectively as part of fulfilling its Licence obligations.

For the reasons outlined above, at this stage we do not consider there to be sufficient evidence to suggest that the involvement of independent verification, as opposed to more effective scrutiny by the ESO under current arrangements, would lead to an increased robustness of the compliance assessment. Therefore, having considered the options we do not consider that adopting one of the proposals that involve independent verification would better achieve the applicable Grid Code objectives.

### (2) Repeat compliance

The ESO considers that whilst Users consider each minor modification to their Plant and Apparatus in isolation, it may not be apparent that the overall performance of the Plant and/or Apparatus in question has changed over its lifetime as a result of the accumulation of these small changes. GC0141 contains two proposals to address this issue, both adding a repeat compliance plan every 5 years to the Grid Code Compliance Process and European Compliance Process; the ESO's proposal, and a workgroup alternative.

- The ESO proposal requires Users to submit a compliance statement and self-certification of compliance, as well as a complete set of relevant Planning Code

data (both Standard Planning Data and Detailed Planning Data), with validated actual values and updated estimates for the future including Forecast Data items such as Demand.

- The workgroup alternative is identical to the ESO's proposal, however, only requires submission of detail of any changes to relevant Planning Code data compared with the data set originally submitted to achieve compliance.

### *Our views*

We note concern over duplication raised by a consultation respondent, as Users are already required to submit Standard Planning Data and Detailed Planning Data on an annual basis as part of existing data provision requirements (week 24 data). However, under this process, Users are permitted to confirm there is no change in data rather than re-submit data. Further, whilst the Compliance Process requires Users to notify the ESO of Modifications, submitting updated Standard Planning Data and Detailed Planning Data, this applies only to modifications that fall within the Grid Code definition of Modification<sup>7</sup>. It is the cumulative impact of multiple small changes, which may not constitute a Modification as defined by the Grid Code, over time that this aspect of this modification seeks to address. Noting that Users are required to keep up to date Standard Planning Data and Detailed Planning Data, we do not consider the mandated resubmission of this data in full on a 5-yearly basis to be unduly burdensome for Users, and do consider it to increase the robustness of User compliance, and improve the accuracy of the data held by the ESO. We also consider the mandated submission of a compliance statement and self-certification of compliance, confirming Grid Code compliance in full, would increase the robustness of the compliance process.

We emphasise that User compliance with the Grid Code is required at all times, and that this is a Licence requirement for Licensees. For the reasons outlined above, of the proposals made, we consider the ESO's proposal to best increase the robustness of the Compliance Process by putting in place a process to formalise the monitoring of ongoing compliance.

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<sup>7</sup> The Grid Code defines a 'Modification' as: Any actual or proposed replacement, renovation, modification, alteration or construction by or on behalf of a User or The Company to either that User's Plant or Apparatus or Transmission Plant or Apparatus, as the case may be, or the manner of its operation which has or may have a Material Effect on The Company or a User, as the case may be, at a particular Connection Site.

### *GC0141 proposals related to the robustness of the modelling process*

GC0141 proposes three changes in relation to the robustness of the modelling process; (3) introduction of new control system modelling requirements, (4) sharing of data to facilitate sub-synchronous interaction studies, and (5) provision of torsional data.

#### *(3) introduction of new control system modelling requirements*

Currently, the Grid Code lacks clarity on the format and requirements of generator control system modelling. Within GC0141, the ESO proposes to address this by amending the Grid Code Planning Code to specify the type of modelling required (Root Mean Square (RMS) or Electromagnetic Transient (EMT), as well as other models e.g. Real Time Dynamic Simulator models which will be specified in the Users Bilateral Agreement), including arrangements regarding confidentiality, model sharing, and validation. It is proposed that the changes apply to applicable plant with a Completion Date or subject to a control system Modification after 1 September 2022. No workgroup alternative proposals were put forward.

#### *Our views*

We consider that accurate models of plant are a pre-requisite to the operation of a stable NETS. We further note that the proposed changes are drafted towards the use of international standard models, with appropriate parameterisation to ensure its reflective of the actual plant. This ensures ease of use and exchange of relevant data. We acknowledge that further clarification, guidance or discussion with the ESO may be required in relation to emerging technologies where international standard models are not fully established, and in relation to the use of EMT models which are far more detailed when compared to RMS models. We expect the ESO to publish clarifications or guidance as needed, and do not consider this to detract from the proposed modification.

We note that some workgroup members, GCRP members and consultation respondees all expressed concern with regarding the confidentiality of manufacturers' intellectual property (IP) within the models as they may be shared with other relevant Users to allow industry to perform necessary studies. To limit this concern, the proposal allows an equivalent encrypted version of the model to be shared provided the User demonstrates that the performance of the models and the encrypted model are comparable, and limits the use of shared models. We consider the proposed change to be increase the robustness of the modelling process specified within the current Grid Code.

We note that concerns regarding the parties the models may be shared with are discussed within the next proposal, below.

#### (4) sharing of data to facilitate sub-synchronous interaction studies

Since the Grid Code was modified in June 2005 through modification (H/04) to cover convertor-based technology (including HVDC plant) there has been a huge growth of this type of plant and apparatus connected to the transmission system with increasingly complex connection arrangements. Such plant gives rise to sub-synchronous torsional interaction (SSTI) with synchronous plant on the system, and sub-synchronous controller interaction (SSCI) with power electronic devices on the system. The Grid Code currently requires Users to carry out SSTI and SSCI studies prior to connection, however, to facilitate this, the ESO is required to share existing User modelling information; a requirement which is currently not included in the Grid Code. GC0141 contains four proposals to facilitate the sharing of relevant data enabling SSTI and SSCI studies to be carried out; the ESO's proposal and three workgroup alternatives.

- The ESO proposes to allow it to share relevant modelling information submitted by a User to another User, and that the User receiving the information can only use it to complete the analysis required by ECC.6.3.17.1 and EEC.6.3.17.2 (SSTI and SSCI studies).
- Workgroup alternative 1 follows the ESO's proposal, though allows the ESO to share relevant information with another User, a consultant employed by the ESO, or the relevant Transmission Owner (TO) to carry out the analysis on behalf of the User.
- Workgroup alternative 2 follows the ESO's proposal, though the ESO can only share relevant information with a consultant that has no affiliation with a supplier of Plant and Apparatus and is employed by the User, to carry out the analysis.
- Workgroup alternative 3 proposes for the ESO or TO to provide the User with an EMT model of the appropriate portion of the NETS as determined by screening studies, with the model hosted by the ESO or TO. The User will then submit its plant model to the ESO or TO who will host it separately, and the User will carry out the analysis.

#### *Our views*

We note that some workgroup members questioned whether the ESO is not discharging its Licence responsibilities when asking Users to perform SSTI/SSCI studies in a wider portion of the NETS, noting that System Operators in some other countries perform the studies themselves. The ESO, via Standard Licence Condition C14, is required to

implement and comply with the Grid Code. ECC.6.3.17 currently requires SSTI/SSCI studies to be carried out by the User, requiring that the ESO specify extent of SSTI/SSCI studies, and provide parameters, to the extent that they are available, for equipment and relevant system conditions. We therefore disagree with the apparent suggestion that the ESO is not discharging its Licence responsibilities, and note that this proposal aims to facilitate the transfer of data required for Users to fulfil their responsibilities.

We understand that the three workgroup alternative proposals were proposed primarily due to concern with regards to the sharing of User models with other Users due to the risk of compromising IP. As mentioned in the previous section, Users are permitted to submit an equivalent encrypted version of the model to be shared, and use of shared models is restricted. Further, all Users are bound by the Connection and Use of System Code (CUSC) confidentiality requirements. We therefore do not consider there to be a risk of compromising IP. We consider the use of a consultant employed by the ESO within workgroup alternative proposal 1 to conflict with the existing requirement for Users to be responsible for the necessary studies and demonstrating compliance. We consider the mandatory involvement of consultants within workgroup alternative proposal 2 to be an unnecessary complication. We consider the model hosting solution within Workgroup alternative proposal 3 to be complex, and is yet to be proven capable; we therefore consider mandating its use to be an unnecessary complication.

We note that some workgroup consultation respondents were concerned that plant original equipment manufacturer (OEM) may refuse to allow models submissions to be shared with other Users, who may be associated with competitor OEM. Should such instances arise, in line with the current ECC.6.3.17 requirements, we consider it the responsibility of the ESO (in coordination with the relevant TO) to ensure the studies are carried out in accordance with the specified requirements. We thus consider the onus on facilitating the studies to be on the ESO, and expect them to explore reasonable options in doing so. We note that this may involve the use of independent consultants, or other parties (e.g. the relevant TO, or the ESO) employed by the User to carry out the studies on the Users behalf, or novel model hosting arrangements as per workgroup alternative proposal 3. We consider that such arrangements could be implemented within the ESO's proposal. We note that the trend of increased convertor-based plant and apparatus connecting to the transmission system is expected to continue as we strive to achieve Net-Zero. This will lead to increased SSCI which will need to be mitigated. Through bi-lateral discussion with the ESO, we understand that where there are significant OEM IP concerns, independent consultants have been utilised by Users to fulfil their Grid Code requirements. SSCI studies and analysis is highly complex and there are currently few



independent consultants capable of carrying out the necessary studies. As the volume of affected plant connecting to the system increases, the scale and complexity of mitigating SSCI will increase. The ESO will need to manage this challenge. We consider that there may be benefit in the ESO building in-house capability to reduce the reliance on consultants and better understand the interdependencies between Users.

There was significant workgroup discussion with regards to the role of the ESO in setting the SSTI/SSCI study area and parameters, in particular with regards to the use of frequency domain screening methods which may be used to narrow down conditions of risk, or demonstrate the absence of risk associated with SSCI/SSTI phenomena, ahead of time domain analysis (i.e. the SSTI and SSCI studies in question). A number of workgroup members considered that the ESO should carry out screening studies in fulfilling its requirements to specify the extent and parameters for the required SSTI/SSCI studies. Through bi-lateral discussion with the ESO, we understand that such screening studies are specific to both a particular existing generator or power electronic device, and the modelled external network to which it is connected, which is influenced by the User connection in question. As such, multiple screening studies would need to be repeated for each new connection for which SSTI/SSCI studies are needed. As screening studies require resource, we consider it inappropriate to mandate their use, particularly as the SSTI/SSCI studies will provide full information on the transient response of the part of the system studied, and therefore identify all SSTI/SSCI risks. Further, should screening studies identify a risk, time domain analysis (the SSCI studies in question) would need to be conducted in order to mitigate the risk.

The ESO has set out its proposals<sup>8</sup> on determining the system area to be modelled, which includes the use of Multi-Infeed Interaction Factor (MIIF) which is recommended by CIGRE<sup>9</sup> for finding HVDC converters at risk of SSCI interaction. The ESO states that in its experience, the study area defined by MIIF is sufficiently large to cover generators with SSTI risks as determined by Unit Interaction Factor (UIF) screening methods, a screening method the workgroup considered should be utilised in defining the study area. Through bi-lateral discussion with the ESO, we understand that Users may undertake screening studies in order to reduce the parameters of the required time domain analysis. We therefore consider the method employed by the ESO to identify the study area is appropriate. We expect the ESO to engage with Users on the use of screening studies.

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<sup>8</sup> The ESOs proposal can be found in their Guidance Notes for Model Exchange for Converter Based Plant Interaction Studies; <https://www.nationalgrideso.com/document/261766/download>

<sup>9</sup> The International Council on Large Electric Systems (CIGRE) is a global non-profit organisation in the field of high voltage electricity.

We note that time domain analysis (the SSTI/CI studies in question) requires modelling information and data related to all applicable plant within the defined study area. Should this data not be available, the studies would be missing some potentially pertinent data and therefore may not guarantee that there would be no negative impacts on other parties. We consider that in fulfilling its requirements as per ECC.6.3.17, the ESO must maintain responsibility in setting the study parameters, and must be cognisant of the availability of plant or equipment models or data in doing so. We therefore expect that where required data is unavailable, the ESO should lead on, in discussion with the User, any necessary revisions of the study scope, potentially including the use of screening studies, to mitigate the risks associated with the missing data. If such risks are unable to be mitigated, we expect the ESO to keep the Grid Code under review and raise modifications that could mandate the provision of said data in a retrospective fashion, only if necessary and no other options are available to them.

For the reasons outlined above, we consider the ESO's proposal strikes the right balance in maintaining distinction between User and ESO obligations, and allows sufficient flexibility in conducting the relevant studies to allow them to be carried out efficiently. We therefore consider the ESO's proposal to be most appropriate.

#### (5) Provision of torsional data

In order to identify and assess the risks of SSTIs, data relating to the mechanical components of synchronous plant on the system is required. Currently, the Grid Code requires such data to be provided for synchronous plant with a Completion Date on or after 1 April 2015. Without the required data, the connection of new power sources (namely converter based plant) may be delayed, until the data is made available, or as mentioned above, the SSTI studies would be missing some potentially, pertinent data and therefore may not guarantee that there would be no negative impacts on other parties. GC0141 contains two proposals to modify the Grid Code to get such data for older synchronous plant; the ESO's proposal and a workgroup alternative.

- The ESO proposes to amend PC.A.5.3.2(g) to remove reference to 'with a Completion Date on or after 1 April 2015' such that the data is required for all synchronous plant.
- A workgroup alternative proposed amend PC.A.5.3.2(g) such that Generating Units with a Completion Date before 1 April 2015, are required to provide the data in accordance with good industry practice and without undue delay when requested by the ESO.

### *Our Views*

We acknowledge the views of some workgroup members, GCRP panel members and consultation respondents that where the required data is not readily available, it can be time consuming and costly to calculate or obtain. To mitigate this, the Workgroup alternative aims to require the ESO to identify that an SSTI risk is present, by carrying out screening studies, before requesting the data. However, we note that this is not explicitly stated within the proposed change.

Given SSTI risks are dependent on interactions with new connecting parties, we do not consider it appropriate for existing Users to spend potentially significant resource in calculating or obtaining data where it is not readily available. We do expect existing Users to approach their plant OEM to request the relevant data without undue delay. However where not readily available, we consider the onus should be on the ESO to demonstrate an SSTI risk is present before requiring Users to calculate or otherwise obtain the data.

Of the two proposal options, we consider the workgroup alternative to strike a more appropriate balance of responsibilities. This is because we consider that a two staged approach as indicated above can be implemented within the workgroup alternative proposal.

### *GC0141 proposals related to Fault Ride Through*

GC0141 proposes two changes in relation to Fault Ride Through (FRT); (6) amending the FRT requirements, and (7) adding requirements for enhanced FRT studies.

#### (6) Amending the FRT definition

Grid Code modification GC0151<sup>10</sup> introduced a process to manage Users with potential FRT issues to maintain security of supply, due to the ESO identifying a trend in increased FRT failures. Through the development of this modification, defects within the current Grid Code FRT requirements were identified, with resolutions currently being progressed via Grid Code modification proposal GC0155. A defect of high priority due to its impact on system stability is the expectation that plant must remain connected and transiently stable after having rode through transmission system faults that have been cleared, on which the current Grid Code requirements are ambiguous.

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<sup>10</sup> <https://www.ofgem.gov.uk/publications/gc0151-grid-code-compliance-fault-ride-through-requirements>

The ESO proposes to amend the applicable sections of the Connection Conditions and European Connection Conditions so that Users are required to remain connected and stable for up to 30 minutes following an applicable fault or disturbance, provided the system operating conditions have returned to within the normal operating limits. The ESO proposes this change to be applicable to both new and existing Users (referred to as “retrospective” application in the Final Modification Report).

#### *Our Views*

Through bi-lateral discussion with the ESO, we understand the 30 minute timeframe proposed is deemed as sufficient for system security, and aligns to the maximum duration that Secondary Response, used in response to a loss of power infeed, is required to be sustained. We therefore consider it prudent to ensure that generators operational at the time of a fault remain available, unless otherwise permitted to trip, for at least 30 minutes to ensure that services held to respond to system incidents, including faults, remain available.

We note concern raised by workgroup members and consultation respondees that requiring Users to remain connected post fault for 30 minutes does not adequately account for any potential subsequent unrelated trip relating to site safety, which the Grid Code currently allows. We consider that site safety considerations take precedence, and plant will always be permitted to trip should it move into, or to prevent it moving into, an unsafe operating condition. We therefore consider there to be no conflicts with site safety as a result of this proposal.

We also note views raised by consultation respondees that it is currently accepted that unplanned trips are not in the interests of commercial parties due to the balancing costs incurred. We therefore consider connected plant will be designed to be capable of remaining connected and stable when the system is within the specified normal operating limits. We emphasise that we consider this proposal seeks to codify the above accepted view in order to better ensure system operability post fault clearance, due to unexpected actions seen in during past system events.

We note that a consultation respondent raised concerns with regards to whether or not repeated FRT capability could be achieved, in particular with regards to embedded power stations. In such instances, we expect Users to engage with the ESO to discuss compliance, ultimately seeking a derogation if compliance cannot be economically achieved.

For the reasons outlined above, we consider the retrospective modification proposed to be desirable, and proportionate to system needs and operability risks.

#### (7) Enhanced FRT studies

The current Grid Code requirements in relation to FRT compliance simulations are considered inadequate as they do not account for potential foreseeable alternative running arrangements, particularly with respect to large windfarms and HVDC systems. The ESO proposes to amend the Grid Code Compliance Process so that Power Park Modules (PPMs) and HVDC systems must repeat the required simulation studies for foreseeable running arrangements (to be agreed between the ESO and the User), with PPMs also requiring to repeat the studies with 50% of the PPMs synchronised to the system. No workgroup alternative proposals were put forward.

#### *Our views*

We note that the Grid Code defect in this area was identified through the 9 August 2019 system outage investigation, and investigations into potential FRT non-compliances carried out as a result of GC0151. Due to the criticality of FRT on system stability, we consider compliance should be demonstrated under all foreseeable alternative running arrangements. We therefore see benefit in the ESO proposal.

#### **Grid Code Review Panel recommendation**

The GCRP convened on 28 July 2022 to carry out their recommendation vote. The Panel were unable to reach a consensus on which solution should be recommended for implementation, and each panel member noted a number of solutions were better than the baseline. We note that WAGCM14 was supported by the highest number of panel members.

#### **Our decision**

We have considered the issues raised by the modification proposal and in the Final Modification Report dated 9 August 2022. We have considered and taken into account the responses to the industry consultation on the modification proposal which are included in the Final Report<sup>11</sup>. We have concluded that:

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<sup>11</sup> Grid Code proposals, final reports and representations can be viewed on NGESO's website at: <https://www.nationalgrideso.com/industry-information/codes/grid-code/modifications>

- implementation of WAGCM14 of the modification proposal will better facilitate the achievement of the objectives of the Grid Code;<sup>12</sup> and
- approving WAGCM14 of the modification is consistent with our principal objective and statutory duties.<sup>13</sup>

## **Reasons for our decision**

We note that as can be seen in Appendix 1, the component proposals that make up WAGCM14 align to our views against each of the seven proposal areas comprising GC0141 as expressed in the section above (titled 'The Modification Proposal'). These views form the basis of our decision. In the section below, we align our views with respect to each aspect of WAGCM14 to the Grid Code Objectives. In doing so, we refer to each aspect by number as set out in the section above (i.e. proposal (1) relates to WAGCM14's solution for Independent verification of simulation studies, proposal (2) relates to WAGCM14's solution for repeat compliance, etc.).

We consider WAGCM14 of GC0141 will better facilitate Grid Code objectives (i), (iii) and (v), and has a neutral impact on objectives (ii) and (iv).

### ***(i) to permit the development, maintenance and operation of an efficient, co-ordinated and economical system for the transmission of electricity***

Proposals (3), (4) and (5) better ensure that there are no negative control or sub-synchronous interactions as a result of new plant connecting to the NETS. Proposals (6) and (7) better ensure that FRT requirements are met, and that following faults, plant connected to the system remain available to provide the required response. Proposal (2) better ensures User compliance, and improves the robustness of data held by the ESO. We consider all the aforementioned proposals improve the operation of the NETS, and therefore consider them to better facilitate this Grid Code objective.

### ***(iii) 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***

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<sup>12</sup> As set out in Standard Condition C14(1)(b) of the Electricity Transmission Licence, available at: <https://epr.ofgem.gov.uk/>

<sup>13</sup> The Authority's statutory duties are wider than matters which the Grid Code Panel Review must take into consideration and are detailed mainly in the Electricity Act 1989 as amended.

We consider this Objective to be at the core of all proposals within GC0141. Proposals (3), (4) and (5) better facilitate Objective (iii) by ensuring that there are no negative control or sub-synchronous interactions as a result of new plant connecting to the NETS. Proposal (2) better facilitates this Objective by requiring all Users to assess and declare Grid Code compliance, and submit updated Planning Code data to the ESO, on a 5-yearly basis regardless of whether or not User plant has undergone any Modifications, thus acknowledging and assessing the cumulative impact of minor changes over time. Proposals (6) and (7) better ensure that FRT requirements are met, and that following faults, plant connected to the system remain available to provide the required response. We consider FRT capability to be vital to the security and stability of the NETS and therefore consider these proposals to better facilitate this Objective.

We note that WAGCM14 does not propose any Grid Code change in relation to proposal (1). We consider that proposal (1) would invariably benefit the security of the system, in some way, by including the additional step of independent verification of simulation studies within the Compliance Process. However, the proposed role of independent verification overlaps significantly with the role of the ESO in assessing and ensuring Grid Code compliance. We therefore consider it would be more economic and efficient for the ESO to more effectively scrutinise self assessments than to commission independent verification.

***(v) to promote efficiency in the implementation and administration of the Grid Code arrangements***

We consider that proposals (3) and (4) better facilitate this Objective by ensuring relevant models are submitted by new connecting Users, and that the ESO had the authority to share the models (or representative or encrypted versions, as may be the case), with other Users to allow them to fulfil their Grid Code requirement of carrying out applicable studies. We consider that proposal (5) better facilitates Objective (v) by striking an appropriate balance of responsibilities in requiring the ESO to identify an SSTI risk prior to requesting Users take action to obtain the data required to mitigate the risk.

Whilst proposal (6) imposes a Grid Code clarification on existing Users, as mentioned above, we consider that nearly all plant will be capable of meeting the clarified requirement, and hence consider it to have a neutral impact on this Objective.

We acknowledge that proposal (2) may have a marginally negative impact on this Objective due to it mandating a 5-yearly compliance statement and resubmission of

applicable data, when **Grid Code compliance is already required at all times**, and updated data submitted at least annually. However, we note that as Users are already required to maintain compliance and an up-to-date set of relevant data, we consider the benefit's in relation to Objective (iii) outweigh any inefficiencies introduced.

Overall, we consider WAGCM14 to have a positive impact on this Objective.

### **Decision notice**

In accordance with Standard Condition C14 of the Transmission Licence, the Authority hereby directs that Grid Code modification proposal Grid Code GC0141: 'Compliance Processes and Modelling amendments following 9<sup>th</sup> August Power Disruption' be made.

**Martin Queen**

**Head of Engineering Systems & Policy – Analysis & Assurance**

Signed on behalf of the Authority and authorised for that purpose





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Annex 1

The table below shows the proposal included in each of the modification options, for each category of the seven broad changes comprising GC0141. (With regards to the column headings in row 3; “N/A” refers to the existing baseline (i.e. no change proposed), “ESO” refers to the ESO’s proposal, “WG1”, “WG2” etc., refers to the Workgroup Alternative Proposal 1, Workgroup Alternative Proposal 2 etc., as listed in the above section titled ‘the modification proposal’)

GC0141 modification proposal	Grid Code Compliance								Robustness of the modelling process									Fault Ride Through				
	Independent Engineer				Compliance Repeat Plan				RMS & EMT Models		Sharing for SSTI / SSCI					Torsional Data			Definition		Enhanced Studies	
	N/A	ESO	WG1	WG2	WG3	N/A	ESO	WG1	N/A	ESO	N/A	ESO	WG1	WG2	WG3	N/A	ESO	WG1	N/A	ESO	N/A	ESO
Original		✓					✓			✓		✓					✓			✓		✓
WAGCM1	✓						✓			✓		✓					✓			✓		✓
WAGCM2	✓					✓				✓		✓						✓	✓			✓
WAGCM3		✓					✓			✓					✓		✓			✓		✓
WAGCM4	✓						✓			✓			✓					✓		✓	✓	
WAGCM5	✓						✓			✓		✓						✓	✓			✓
WAGCM6	✓							✓	✓			✓					✓		✓			✓
WAGCM7	✓							✓		✓		✓					✓			✓		✓
WAGCM8	✓					✓				✓		✓						✓		✓		✓
WAGCM9			✓				✓			✓		✓					✓			✓		✓
WAGCM10			✓				✓			✓	✓						✓		✓			✓
WAGCM11					✓			✓		✓			✓					✓		✓		✓
WAGCM12					✓		✓			✓			✓					✓		✓	✓	
WAGCM13	✓							✓		✓					✓			✓		✓		✓
WAGCM14	✓						✓			✓		✓						✓		✓		✓