

Modification proposal:	<b>Grid Code (GC) GC0156: Facilitating the implementation of the Electricity System Restoration Standard (GC0156)</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:	05 February 2024	Implementation date:	Twenty working days after Authority decision

## Background

In April 2021, the Department for Business, Energy and Industrial Strategy (BEIS), now the Department of Energy Security and Net Zero (DESNZ), released a policy statement introducing the Electricity System Restoration Standard (ESRS).<sup>3</sup> The ESRS requires that in the event of a Total or Partial Shutdown of the Great Britain (GB) electricity system, the Electricity System Operator (ESO) must be capable of restoring 60% of Demand on the Transmission System in all regions within 24 hours, and of restoring 100% of Demand nationally within 5 days.<sup>4</sup> It also sets out that the ESRS requirements must be met by 31 December 2026. In August 2021, we issued our decision on licence modifications to facilitate compliance with the ESRS.<sup>5</sup> As a result, the ESO proposed a number of changes to the Grid Code to facilitate these requirements.<sup>6</sup>

DESNZ introduced the ESRS as any significant loss of electricity supply would severely impact national infrastructure networks, public services, and economic activities. DESNZ noted in their policy statement<sup>7</sup> that a nationwide electricity failure has never occurred in GB, but events on a similar scale have occurred internationally. Thus, whilst such events

<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.gov.uk/government/publications/introducing-a-new-electricity-system-restoration-standard/introducing-a-new-electricity-system-restoration-standard-policy-statement>

<sup>4</sup> All capitalised letters are defined in the Grid Code

<sup>5</sup> <https://www.ofgem.gov.uk/publications/decision-licence-modifications-facilitate-introduction-electricity-system-restoration-standard>

<sup>6</sup> Ofgem did not have any involvement with the development of these modifications. Our role was to monitor the ESRS progression and assess the options presented to us via the code modifications submissions.

<sup>7</sup> <https://www.gov.uk/government/publications/introducing-a-new-electricity-system-restoration-standard/introducing-a-new-electricity-system-restoration-standard-policy-statement>

are unlikely, they represent a credible risk for our energy network. As a result, DESNZ concluded that GB must adequately prepare for the worst-case scenario and therefore introduced the ESRS.

### **The modification proposal**

GC0156 was raised by the ESO (the Proposer) on 09 February 2022. It seeks to put in place measures, tools, and procedures through the Grid Code to enable the ESO to meet the ESRS requirements. GC0156 builds on the System Restoration related work undertaken through the implementation of the EU Emergency and Restoration Code<sup>8</sup> (as amended by UK Statutory Instrument (SI) 2019/533),<sup>9</sup> which was in part introduced into the Grid Code via modifications GC0125, GC0127, GC0128<sup>10</sup> and GC0148.<sup>11</sup> The EU Emergency and Restoration Code (NCER Regulation) is part of "Assimilated Law" and is relevant to GC0156.

GC0156 proposes changes to the Grid Code to ensure the requirements of the ESRS can be met. At a high level, these include requirements related to the controllability and availability of generation and network assets in the event of a Partial or Total shutdown. Additionally, GC0156 includes provisions relating to co-ordination between relevant parties in designing and implementing Restoration Plans, and subsequent expansion of a Power Island formed under such plans.

The GC0156 Workgroup convened sixteen times to discuss GC0156 and consider the proposed solution. Previous work was also carried out in relation to implementation of the ESRS, including non-code sub working groups, which fed into the GC0156 Workgroup considerations.<sup>12</sup> One Workgroup Alternative Grid Code Modification (WAGCM1) was raised by a Workgroup representative after the Workgroup consultation<sup>13</sup> and this was discussed by the Workgroup. The differences between the GC0156 Original Solution and the WAGCM1 solution are summarised below.

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<sup>8</sup> Commission Regulation (EU) 2017/2196; <https://www.legislation.gov.uk/eur/2017/2196/contents>

<sup>9</sup> SI "The Electricity Network Codes and Guidelines (System Operation and Connection) (Amendment etc.) (EU Exit) Regulations 2019" 533 2019 is accessible here: <https://www.legislation.gov.uk/ukSI/2019/533/contents>

<sup>10</sup> Our decision on GC0125, GC0127 & GC0128 is accessible here:

<https://www.ofgem.gov.uk/publications/gc0125-gc127-and-gc128-authority-decision-letter>

<sup>11</sup> Our decision on GC0148 is accessible here: <https://www.ofgem.gov.uk/publications/authority-decision-modification-gc0148-implementation-eu-emergency-and-restoration-code-phase-ii>

<sup>12</sup> Details of NGENOs non-code working group considerations can be viewed within Annex 3 of the GC0156 Report.

<sup>13</sup> The GC0156 Workgroup consultation ran from 21 November 2022 to 30 December 2022, receiving 17 responses.

The GC0156 Original Solution and WAGCM1 are identical in all but one aspect, namely in relation to proposed resilience requirements on both new and existing Generators and DC Converter owners (including storage and interconnectors) who are either Transmission connected, form part of a Large Embedded Power Station, or are Balancing Mechanism Participants (in the context of this proposal these are referred to as the “relevant parties”):

- The Original Solution would require that all such relevant parties (existing and prospective) have resilience to a total loss of electricity supply to their site for 72 hours. This includes a requirement for plants to be made operational and operate in at least the same manner and as quickly as would be expected for a cold start, in accordance with data submitted in PC.A.5.7<sup>14</sup>, once electricity supply to the site is restored. The Original Solution would allow for relevant parties who believe this requirement to be cost prohibitive or technically impossible to discuss alternate resilience requirements with the ESO or to seek a derogation<sup>15</sup> where an agreement cannot be reached.
- WAGCM1 proposes no resilience requirements for relevant parties and would instead require relevant parties to prepare a plan detailing how their site would be re-energised and returned to operation. They would be required to submit such a plan to the ESO alongside existing ongoing System Restoration related data exchanges (under PC.A.5.7) as part of their annual Week 24 submission, from year 2025 onwards. WAGCM1 envisages that the ESO would then contract for any additional resilience required with relevant parties bilaterally via Anchor and Top Up services contracts.

### **Resilience background**

Resilience, as set out in the Original Solution, relates to the maintenance of capability post total loss of external electricity supplies to a site, for a minimum of 72 hours. It requires that from total loss of external electricity supplies, all equipment on the site shall shut down safely and be maintained (for at least 72 hours) in a condition such that when external electricity supplies are reconnected, the plant shall be capable of synchronising

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<sup>14</sup> Planning Code (PC) Appendix A PC.A.5.7 is a section in the Grid Code that comprises data submissions related to system restoration. We note that GC0156 (both the Original Proposal and WAGCM1) proposes changes to the data submitted under PC.A.5.7.

<sup>15</sup> A derogation is a direction from the Authority, relieving a licensee from its obligation to comply with a technical standard or code in its licence in specified circumstances and to a specified extent.

and load up (export to supply Demand) typically as per its cold start dynamic parameters (as submitted under PC.A.7.6). This includes ensuring all equipment for communication with the ESO continues to operate for 72 hours post total loss of external electricity supply.

Such resilience is important because once a site's resilience is exhausted, its equipment and plant will take longer to be made operational (following restoration of external electricity supplies) and require greater external electricity supplies to do so. The overall restoration process would therefore take longer if insufficient resilience were in place.

The System Restoration process is set out in the System Restoration Plan.<sup>16</sup> It involves implementing Local Joint Restoration Plans (LJRPCs) and/or Distribution Restoration Zone Plans (DRZPs), each of which energise pre-defined sections of the network, creating electrically isolated Power Islands across GB. These individual Power Islands will then be expanded and merged together, until the networks return to normal operation. The speed at which Power Islands can be expanded is limited by the speed at which Generators can be reconnected to the system and begin to export power, and the speed at which Demand can be reconnected to the system.

The parties to which the mandatory resilience requirements would apply (under the Original Solution) comprise all the Generators, storage providers and interconnectors that are instructible by the ESO (ie have a contract and have direct operational communication links with the ESO). The extent to which such parties have resilience would have a significant impact on the speed at which restoration could take place.

Both the GC0156 Original Proposal and WAGCM1 proposed changes to ensure that Network Operators (Transmission Owners (TOs) and Distributed Network Owners (DNOs)) and the ESO have the resilience and capability to switch in Demand at sufficient speed to meet the requirements of the ESRS.

### **Workgroup vote and Code Administrator Consultation**

On 3 April 2023, the Workgroup voted on their preferred solution, concluding by majority that WAGCM1 was preferred.

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<sup>16</sup> The System Restoration Plan has been updated as part of GC0156, and is included in Annex 8 of the GC0156 Final Report.

A Code Administrator Consultation ran from 02 May 2023 to 09 June 2023 receiving ten non-confidential responses and one partially confidential response. The non-confidential responses can be found in Annex 22 of the GC0156 submission.<sup>17</sup> We have taken all responses into account and specifically comment below on certain issues or concerns raised during this consultation.

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

The Grid Code Review Panel (the Panel) met on 12 July 2023 to carry out their recommendation vote. The Panel recommended by majority that the Original Solution and WAGCM1 better facilitate the Grid Code Objectives compared with the baseline. The Panel also recommended by majority that WAGCM1 (8 out of 10 votes) was the best option.

### **Our decision**

We have considered the issues raised by the modification proposal and in the Final Modification Report<sup>18</sup> dated 24 July 2023. We have considered and taken into account the responses to the industry consultation on the modification proposal which are included in the annexes to the Final Report<sup>19</sup> and also sought and obtained certain clarifications from the ESO. We have concluded that the Original Solution should be approved as:

- implementation of the Original Solution of GC0156 will better facilitate the achievement of the objectives of the Grid Code compared with both the baseline and WAGCM1;<sup>20</sup> and
- approving the Original Solution of GC0156 is consistent with our principal objective and statutory duties.<sup>21</sup>

### **Reasons for our decision**

We consider that both the Original Solution and WAGCM1 better facilitate Grid Code Objectives (i), (iii) and (iv) and have a neutral impact on (ii) and (v). However, we disagree with the Workgroup and the Panel as we consider that the Original Solution will better facilitate Grid Code Objectives (i), (iii) and (iv) compared with WAGCM1.

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<sup>17</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>

<sup>18</sup> This includes all annexes to the Final Modification Report

<sup>19</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>

<sup>20</sup> As set out in Standard Condition C14(1)(b) of the Electricity Transmission Licence, available at: [Licences and licence conditions | Ofgem](#)

<sup>21</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.

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

Original Solution

We agree with the Proposer, the majority of the Workgroup and the majority of the Panel that the Original Solution better facilitates Grid Code Objective (i) against the baseline. This is because the Original Solution introduces a number of requirements that should enable the ESO to meet the ESRS.

We note that a number of Workgroup and Panel members questioned the economic efficiency of the mandatory resilience requirements imposed on Generators under the Original Solution. Such questioning may be in part due to comments Ofgem made to the Workgroup on the Ofgem & BEIS (now DESNZ) Cost Benefit Analysis (CBA)<sup>22</sup> carried out to inform the ESRS.<sup>23</sup> Specifically, we stated that "We do not believe the GC0156 (Original Solution) Generator resilience requirements should be tied to the CBA. The CBA was not intended to prescribe the generation requirements to meet the ESRS." Ofgem made this statement since the cost of Generator resilience (for non-Restoration Contractors, as mandatory under the Original Solution) within the CBA was informed by a survey of only a subset of Generators and hence was not necessarily representative of all Generators who would require resilience under the Original Solution.

Subsequently, in Autumn of 2022, BEIS surveyed CUSC parties on behalf of the ESO (670 Power Stations in total)<sup>24</sup> and requested information about the costs of enhancing their sites' resilience to 72 hours. A cost range for site resilience per MW of capacity across different technology types was derived from this data. We have applied the highest cost of resilience per MW capacity to GB Power Stations as listed in Digest of UK Energy Statistics (DUKES) 2023 report<sup>25</sup> to estimate the maximum likely total cost of Generator resilience (as mandatory under the Original Solution) based on the latest available data from a more representative range of Generators. The maximum total cost of resilience

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<sup>22</sup> We note that the CBA included the total cost of meeting the ESRS, including ESO, Transmission Owner (TO) and Distribution Network Owner (DNO) costs.

<sup>23</sup> See page 22 of the FMR - <https://www.nationalgrideso.com/document/284546/download>

<sup>24</sup> Of the 670 who were given the opportunity to respond, 290 provided a response

<sup>25</sup> DUKES 5.11 – Power stations in the United Kingdom; <https://www.gov.uk/government/statistics/electricity-chapter-5-digest-of-united-kingdom-energy-statistics-dukes>. We note that this list of power stations includes smaller sites that are not required to have 72 hours resilience under the Original Proposal (therefore modelling costs that will not be incurred) and does not include interconnectors (therefore not including costs that may be incurred). Overall, we do not consider this to materially impact the outcome of the analysis carried out.

from this analysis is within 4% of the cost attributed to Generators who are not Restoration Contractors in our CBA. In light of this additional analysis, we consider that our CBA does provide economic justification for the requirements of the Original Solution as the CBA showed an overall net positive benefit to implement the ESRS.

We note that a few Workgroup and Panel members believed that the Original Solution does not better facilitate Grid Code Objective (i) as it will mandate 72 hours resilience from all relevant parties, and they do not believe that the ESO has sufficiently evidenced a need for all parties to have 72 hours resilience.

At Workgroup 10, the ESO presented modelling, which showed the relationship between resilience and the average time taken to restore 60% of Demand.<sup>26</sup> From this modelling it appeared that 48 hours resilience would result in the same average time to restore 60% of Demand as from 72 hours resilience. However, the ESO has explained that this modelling only showed that under the particular scenarios modelled, they are likely to be able to re-energise most transmission connected generation within two days. The ESO also noted that Restoration events are highly unpredictable and there may be multiple reasons why the particular scenarios modelled may not be reflective of a real event, eg staffing, technical failures or extensive network damage. As mentioned above, once a site's resilience is exhausted, its ability to contribute to restoration is significantly hindered. Therefore, considering the unpredictability of a Restoration event, we consider that the ESO has shown sufficient rationale for mandating all relevant parties to have 72 hours resilience (except where a specific derogation is obtained).

In their reasoning in support of the 72 hours requirement, the ESO also highlighted to us the tightness in the margin between supply and Demand over recent winters. The ESO noted that the ESRS must be met at all times with the most onerous time being around the winter peak Demand. The ESO provided evidence to show that a large majority of relevant parties would be required to generate following restoration of the external electricity supply to their site in order to meet 60% of Demand.<sup>27</sup> The ESO also highlighted that when this is taken into account alongside the unpredictable nature of restoration events and reserve requirements needed on the system, it would be difficult to meet the ESRS without a large majority of relevant parties having 72 hours resilience.

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<sup>26</sup> <https://www.nationalgrideso.com/document/275081/download>

<sup>27</sup> This evidence was the comparison of winter demand data, taken from a November week, compared against the notified position of CUSC parties (excluding participants that cannot participate in restoration timeframes).

We therefore consider that the ESO have demonstrated the importance of a requirement for all relevant parties to have 72 hours resilience (except where a specific derogation is obtained).

Total and Partial Shutdown events are highly unpredictable and could have a severe impact on the economy and society. Therefore, we believe it is prudent that the ESO builds in reasonable redundancies to ensure that it can meet the ESRS.

#### WAGCM1 Solution

We also agree with the majority of the Workgroup and the majority of the Panel that WAGCM1 would better facilitate Grid Code Objective (i) compared with the baseline. This is because WAGCM1 would introduce the majority of the changes required to enable the ESO to be in a better position to implement the ESRS. However, WAGCM1 does not include the 72 hours resilience requirement for all relevant parties.

WAGCM1 aims to introduce a market-based mechanism under which the ESO would be expected to procure the level of resilience it needs. This reflects an argument to the effect that the Original Solution is not efficient or economic as it does not allow a market to offer up the parties that are best suited to provide this service to the ESO. Whilst we believe WAGCM1 may technically be possible, we have concerns about how economic this would be in practice.

WAGCM1 would require relevant parties to submit to the ESO their current levels of resilience. The ESO would then assess and procure at least the minimum level of resilience needed in each region to meet the ESRS requirements. There is a high likelihood that the ESO would have to enter into contracts with a large proportion of relevant parties to ensure sufficient confidence that there was enough resilience to meet the ESRS requirements. The ESO also highlighted that the pool of relevant parties available to provide resilience may be reduced due to there being a subset of parties that would find it cost prohibitive or technically impossible to attain the necessary resilience capability.

Since the ESO would need to procure resilience from a large proportion of relevant parties, we believe that relevant parties would likely be in positions of market power, especially due to the locational nature of resilience requirements. This would not enable effective competition to provide resilience, and the ESO would have limited choice about



which relevant parties to contract with. There is a high risk that this would lead to an uncompetitive, uneconomical situation in which relevant parties could extract high prices from the ESO (and therefore ultimately consumers), which exceed the efficient cost of providing resilience.

We are also concerned that the processes required to implement WAGCM1 would give rise to considerable administrative complexity and inefficiency due to the high likelihood that the ESO would need to contract with a large proportion of the market. This would create a significant administrative burden on the ESO to conclude and manage these contracts.

#### Comparison of Original Solution and WAGCM1

We consider that the Original Solution is a better overall solution than WAGCM1 when measured against Grid Code Objective (i). This is because we assess that the potential economic impact and likely inefficiencies of WAGCM1 outweigh the likely inefficiencies of the Original Solution, for the reasons outlined above.

The Original Solution also sets a mandate that all *new* relevant parties will be required to have 72 hours resilience. We believe this will be more efficient and economical than WAGCM1 as it is much more cost efficient to incorporate resilience at the design stage, than fitting in resilience retrospectively. This will also help to ensure that the ESO has sufficient resilience levels in the future.

Finally, it is important to note that through industry engagement, including a survey of 670 Power Stations, the ESO is aware that not all relevant parties are able to retrospectively provide 72 hours of resilience at their sites. The ESO therefore proposes to allow for a degree of pragmatism that may be required in implementing the resilience requirements. To that end, the Original Solution includes, for relevant parties who believe the 72 hours resilience requirement is "*cost prohibitive or technically impossible*" to enter into discussions with the ESO on whether they can provide an alternative level of resilience. If an agreement cannot be reached between the party and the ESO, the relevant party may apply for a derogation from the Grid Code. We believe that this process increases the efficiency of the Original Solution, since there would be a mechanism for relevant parties to be exempted from the requirement to install resilience, where the cost of doing so was excessive or where technical barriers could not be overcome.

We expect the ESO to be cautious in its application of these alternative arrangements. We will require the ESO to keep an up-to-date internal register of all parties with alternative requirements. This should include the reasons for a party's alternative requirements and the impact their alternative requirement would have on overall restoration. We expect engagement between the ESO and the relevant party prior to any derogation requests. Providing the ESO exercises its discretion appropriately, we do not anticipate the need for many derogation requests.

***Grid Code Objective (ii) to facilitate 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)***

Original Solution

We consider that the Original Solution is neutral when comparing Grid Code Objective (ii) against the baseline.

The Proposer believes that the Original Solution will improve competition in future restoration tenders for Anchor and Top Up Plants. This is because in order to be an Anchor or Top Up Plant, a provider must have at least 72 hours resilience.<sup>28</sup> Therefore currently those plants that do not have 72 hours resilience would have to price in their costs of implementing 72 hours resilience within their tender bid. As a result, the proposer believes that the Original Solution will remove barriers for parties currently without 72 hours resilience to enter future restoration tenders. We agree with this argument but consider that the Original Solution could have an adverse impact on competition in other respects and that the potential overall impacts on competition broadly cancel each other out.

We believe that the Original Solution could have an adverse effect on certain parties as the blanket requirement set out in GC0156 could result in some parties being commercially disadvantaged relative to others. This will be dependent on plant age, size and technology type, and therefore the cost of achieving the standard required under the

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<sup>28</sup> Can be found in the technical requirements of the Restoration Tender information: <https://www.nationalgrideso.com/industry-information/balancing-services/system-security-services/restoration-services#Document-library>

Original Solution. It should also be noted that some parties have had cost of installing the required level of resilience paid for via legacy Restoration Contracts. Whilst we acknowledge that those parties with Restoration Contracts provide a service which is more than just resilience, we note that they have recovered, at least in part, the costs of providing resilience through Restoration Contracts. Therefore the Original Solution could put these parties with Restoration Contracts at a commercial advantage when compared with parties who do not have such contracts and now have to fund the cost to implement 72 hours resilience. We note that Connection and Use of System Code (CUSC) modification CMP398<sup>29</sup> has interactions with this issue. However, for the avoidance of doubt, our assessment and decision on GC0156 has been made on its own terms. We have yet to make a decision on CMP398, and nothing in this decision on GC0156 should fetter our discretion or be understood as an indication of our decision on CMP398.

We note that a number of Workgroup members and a minority of the Panel also believed that the Original Solution was negative against Grid Code Objective (ii). This is because they believed that the ESO had not explained the rationale for the 72 hours mandate well enough and that the Original Solution does not use a market-based mechanism as referred to in Article 4(1)(d) of the NCER Regulation. We disagree with these members of the Workgroup and Panel in their overall assessment against Grid Code Objective (ii) as we do not consider their explanation is relevant to Grid Code Objective (ii). We consider that the rationale for the 72 hours mandate is a relevant argument against Grid Code Objective (i) and the point about market-based mechanisms is a relevant argument against Grid Code Objective (iv). We have considered these arguments in the context of those Grid Code Objectives.

#### WAGCM1 Solution

We consider that WAGCM1 would be neutral when comparing Grid Code Objective (ii) against the baseline.

The Workgroup and Panel believe that WAGCM1 would create a market that will allow the parties which are best suited to provide resilience to the ESO to do so in the most economic and efficient manner. We agree that at face value it appears that WAGCM1 could be assessed as positive against Grid Code Objective (ii) as it will create a market-based mechanism, that could facilitate competition. However, after analysing WAGCM1 in

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<sup>29</sup> <https://www.nationalgrideso.com/industry-information/codes/cusc/modifications/cmp398-gc0156-cost-recovery-mechanism-cusc-parties>

more detail, we do not believe that a competitive market for this resilience requirement would emerge due to the reasons set out in our assessment of WAGCM1 against Grid Code Objective (i). We have therefore concluded that WAGCM1 would be neutral rather than positive against Grid Code Objective (ii).

#### Comparison of Original Proposal and WAGCM1

As explained above, we consider that both the Original Proposal and WAGCM1 are broadly neutral in relation to Grid Code Objective (ii). Our decision about the relative merits of the two proposals is therefore based on our assessment against Grid Code Objectives (i), (iii) and (iv).

#### ***(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***

##### Original Solution

We consider that the Original Solution would better facilitate Grid Code Objective (iii) compared against the baseline. This is because the Original Solution would require there to be a robust process which would enable the ESO to restore the network following a Total or Partial Shutdown as quickly as possible. The ESO highlights that if resilience 'expires' before a site can be secured by external means, then the site is unlikely to offer any meaningful value to System Restoration, as the site will remain electrically 'dead' (ie de-energised and fully shut down), consuming more power and taking longer to be made operational post restoration of electricity supplies to the site. High levels of resilience are therefore conducive to the security of the system.

Both the Original Solution and WAGCM1 propose resilience requirements on the ESO and Network Operators (both TOs and DNOs), effectively requiring 72 hours resilience to maintain critical functions of assets and systems necessary for System Restoration (to meet the ESRS). It is important to note that, regardless of the resilience of network assets, the system cannot be restored without sufficient generation available. Further, once network asset resilience is exhausted, restoration progress is seriously hampered. Noting the unpredictable nature of restoration events, we consider it prudent to align the duration of resilience of the core generation fleet with the duration of resilience of the Networks. Moreover, not doing so may undermine the benefit and thus efficiency of Network resilience.

The Original Solution would also require all *new* relevant parties to have 72 hours resilience. We note that the future generation mix is likely to be dominated by renewable generation which offers less certainty due to reliance on weather conditions. As a result, we believe there is a need to have greater diversity and redundancy in plants that have resilience. Therefore, as the Original Solution sets requirements on future relevant parties it would better ensure that the ESRS requirements can be met on an enduring basis.

#### WAGCM1 Solution

We consider that WAGCM1 would better facilitate Grid Code Objective (iii) compared against the baseline.

This is because WAGCM1 would, like the Original Solution, introduce the majority of the tools, procedures and measures into the Grid Code that are required to enable the ESO to be in a better position to implement the ESRS. The only difference is the requirement of 72 hours resilience for the relevant parties. WAGCM1 would also give the ESO a better understanding of current resilience capability of plants, due to the requirement that relevant parties would have to submit this information to the ESO, in greater granularity than required under the Original Solution.

However, we note that due to the uncertain nature of restoration, assurance of meeting the ESRS is provided by the ESO via probabilistic modelling of a number of credible/reasonable worst case restoration scenarios, with the average restoration time demonstrating overall likely capability. Given that the evidence provided by the ESO demonstrates that the large majority of relevant parties require 72 hours resilience in order to best ensure the ESRS can be met, we consider any reduced resilience (as may be facilitated under WAGCM1) would come at the expense of slower restoration overall, and reduced confidence in meeting the ESRS across credible/reasonable worst-case scenarios.

#### Comparison of Original Solution and WAGCM1

We believe that the Original Solution is a better overall solution than WAGCM1 against Grid Code Objective (iii). This is because the Original Solution would require all relevant parties to have 72 hours resilience (unless a relevant derogation was obtained). The Original Solution would therefore create a more secure system that would be more likely to enable restoration of the network within the timescales set out in the ESRS.

It should be acknowledged that if there is a Restoration event, the cost and impact to both the economy and society would be very large. The Original Solution has a greater level of redundancy built in which would give the ESO a better chance of restoring the system in a timely manner, negating added costs of a prolonged period of system shutdown.

As noted above, we acknowledge that WAGCM1 could lead to the ESO having more information than under the Original Solution. However, we consider that this advantage is outweighed by the reduced certainty and level of redundancy which WAGCM1 would provide. We are also concerned about the risk WAGCM1 would create with regards to the ESO's ability to meet the ESRS. WAGCM1 assumes that relevant parties would be willing to come forward to offer the ESO resilience at an efficient cost. We are concerned that this might not occur in practice with the result that (i) the ESO could have a shortfall in the level of resilience it requires on the system and/or (ii) the ESO may need to pay significantly inflated prices to be confident that it has procured sufficient resilience to meet the ESRS requirements.

***(iv) 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***

Original Solution

We consider that the Original Solution would better facilitate Grid Code Objective (iv) by comparison against the baseline. This is because the changes being made to the Grid Code would allow the ESO to be in a better position to discharge Special Condition 2.2 of its electricity transmission licence.<sup>30</sup>

A minority of the Workgroup and the Panel believed that the Original Solution did not better facilitate Grid Code Objective (iv). This is because they believed that it was not in line with Article 4(1)(d) of the NCER Regulation<sup>31</sup> which states:

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<sup>30</sup> <https://www.ofgem.gov.uk/sites/default/files/2023-03/National%20Grid%20Electricity%20System%20Operator%20Consolidated%20Special%20Conditions%20-%20Current.pdf>

<sup>31</sup> Commission Regulation (EU) 2017/2196; <https://www.legislation.gov.uk/eur/2017/2196/contents>

*"When applying this Regulation, the Secretary of State, regulatory authority and system operators shall... ensure that TSOs make use of market-based mechanisms as far as is possible to ensure network security and stability"*

However, we disagree with this minority of the Workgroup and the Panel. Firstly, under the Original Solution, the ESO would still make use of market-based mechanisms in its Restoration strategy. The ESO run a number of competitive tenders in order to procure restoration services required to restore the system in the unlikely event of a Total or Partial Shutdown,<sup>32</sup> and we anticipate that the ESO would continue to do so under the Original Solution (since the 72 hours resilience requirement would not, in and of itself, be sufficient to enable the ESO to comply with the ESRS).

Secondly, we have considered other parts of the NCER Regulation. Article 4(1) also requires the Secretary of State, the regulatory authority and system operators to *"apply the principle of optimisation between the highest overall efficiency and the lowest total costs for all parties involved"* (see Article 4(1)(c)). As discussed above, we have significant concerns regarding the potential inefficiencies and excessive costs which could arise under WAGCM1. We consider that the Original Solution would advance the principles identified in Article 4(1), when taken collectively, as it would be an efficient means by which to ensure that the ESO has the necessary resilience at its disposal to comply with the ESRS.

We further note that there is a caveat in Article 4(1)(d) that states that market-based mechanisms should be used *"as far as is possible"*. We consider that this reflects the need for the principle articulated in Article 4(1)(d) to be balanced against the principles articulated in the other sub-paragraphs of Article 4(1).

#### WAGCM1 Solution

We consider that, on balance, WAGCM1 would better facilitate Grid Code Objective (iv) by comparison against the baseline. This is because it would put the ESO in a better position to discharge Special Licence Condition 2.2 of its licence, by implementing many changes to the Grid Code intended to assist the ESO in meeting the ESRS.

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<sup>32</sup> <https://www.nationalgrideso.com/industry-information/balancing-services/system-security-services/restoration-services#Document-library>

Nevertheless, we do hold concerns that WAGCM1 could risk the ESO not meeting the ESRS target date. This is because the legal text for WAGCM1 suggests that users will submit information related to their resilience capability and procedures to the ESO as part of their annual Week 24 submission, from year 2025 onwards. The ESO would not be able to make an assessment on how much resilience it would need until it had been given this information. The ESO would then need to create a competitive mechanism to procure the levels of resilience required from each Generator. This could take a considerable amount of time, which might limit the ability of Generators to take the necessary measures to reach the levels of resilience required. We are therefore not confident that WAGCM1 would result in the necessary resilience being in place by the time the ESO requires it in order to meet the ESRS.

We consider that WAGCM1 would be consistent with Article 4(1)(d) of the NCER, but (for the reasons noted above) are concerned that in practice it would not be consistent with Article 4(1)(c).

Finally, we also note that condition C28 of the Electricity Transmission Licence Standard Conditions,<sup>33</sup> sets out an obligation on the ESO to *"...ensure that the licensee carries out its functions, as system operator, and to co-ordinate and direct the flow of electricity onto and over the national electricity transmission system, in an efficient, co-ordinated and economic manner."* As mentioned in our arguments set out in Grid Code Objective (i), we are concerned that WAGCM1 would not be economic and efficient, thus putting the ESO at risk of not meeting this licence condition.

#### Comparison of Original Solution and WAGCM1

We consider that the Original Solution is better than WAGCM1 against Grid Code Objective (iv). This is because we believe the Original Solution would be more likely to facilitate the ESO discharging its licence condition, since the Original Solution would require all relevant parties to have 72 hours resilience which would increase the likelihood of the ESO satisfying the requirements of the ESRS.

As explained above, we have concerns over the effectiveness of WAGCM1 in ensuring that sufficient resilience was available, or only available as a result of the ESO (and

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<sup>33</sup> <https://www.ofgem.gov.uk/sites/default/files/2023-03/Electricity%20Transmission%20Consolidated%20Standard%20Licence%20Conditions%20-%20Current.pdf>



therefore ultimately consumers) paying high prices which exceed the efficient cost of providing resilience.

In addition, the Original Solution would provide a clear obligation for parties to put in place measures to meet the 72 hours requirement. Therefore, it is more likely that parties will have this resilience in place prior to the 31 December 2026 deadline. In contrast, under WAGCM1, Generators would submit information to the ESO in 2025, and the ESO would then assess and procure the required resilience. We are therefore not confident that the WAGCM1 proposal would ensure sufficient levels of resilience were in place to meet the ESRS deadline.

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

We believe that both the Original Solution and WAGCM1 will have no impact on Grid Code Objective (v) and that this objective is therefore neutral for both proposals.

***Ofgem's principal objective and statutory duties***

Finally, we have reviewed the proposals submitted to us in in regards to our statutory duties and obligations. These include under section 3A of the Electricity Act 1989<sup>34</sup> which requires the Authority to protect “the interests of existing and future consumers” (section 3A(1)and 3A(1A)). This includes consumers’ interests in the security of the supply of electricity to them and their interests in the Secretary of State’s compliance with Sections 1 and 4(1)(b) of the Climate Change Act 2008 (net zero target for 2050 and five-year carbon budget).

The implications for consumers of a Total or Partial Shutdown of the National Electricity Transmission System would be severe. We consider that, of the options available to us, the Original Solution would best ensure that, in the event of a Total or Partial Shutdown, the ESO would be able to restore the electricity system in a quick and efficient manner, and thereby limit the damage associated with the shutdown. As explained above, we consider that WAGCM1 would be less effective in guaranteeing that sufficient resilience is available to comply with the ESRS; or at least that it would be likely to lead to the ESO (and ultimately consumers) having to pay high prices which exceed the efficient cost of providing resilience.

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<sup>34</sup> [Electricity Act 1989 \(legislation.gov.uk\)](https://www.legislation.gov.uk)

In light of the above, we consider that approval of the Original Solution is the course of action which is most consistent with our principal objective and statutory duties.

### **Decision notice**

In accordance with Standard Condition C14 of the Transmission Licence, the Authority hereby directs that Grid Code modification proposal GC0156: '*Facilitating the implementation of the Electricity System Restoration Standard*' be made.

We note that the FMR<sup>35</sup> indicated that this modification does not interact with the terms and conditions related to balancing (T&C) required under Article 18 of Commission Regulation (EU) 2017/2195 establishing a guideline on electricity balancing,<sup>36</sup> as amended by the Electricity Network Codes and Guidelines (Markets and Trading) (Amendment) (EU Exit) Regulations 2019 (EBGL).<sup>37</sup> Implementation of the Article 18 change process into the Grid Code was done in such a manner as to apply in all Standard Modifications,<sup>38</sup> we consider that the necessary procedural steps have been followed. We disagree with the assessment that GC0156 does not interact with the T&C as there are changes to the Grid Code legal text in sections OC9.4, BC2 and BC4 which are mapped onto the T&C as identified in section GR.B of the Grid Code. We therefore consider the submission of this modification to the Grid Code to also constitute a request to amend the T&C under Article 6 of the EBGL. Thereby, in line with our decision to approve the Original Solution into the Grid Code and having due consideration to the requirements of the EBGL, we approve this amendment to the T&C.

### **Grendon Thompson**

#### **Acting Deputy Director – Institutions for Net Zero**

#### **Energy Systems Management and Security**

Signed on behalf of the Authority and authorised for that purpose

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<sup>35</sup> See page 34 of the FMR - <https://www.nationalgrideso.com/document/284546/download>

<sup>36</sup> Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing (EBGL). EBGL came into force on 18 December 2018. Accessible at: <https://eur-lex.europa.eu/eli/reg/2017/2195/oj>

<sup>37</sup> The UK SI amendment of the EBGL:

[https://assets.publishing.service.gov.uk/media/5c17d6b440f0b60c8d601a2c/ENC\\_Markets\\_and\\_Trading\\_SI.pdf](https://assets.publishing.service.gov.uk/media/5c17d6b440f0b60c8d601a2c/ENC_Markets_and_Trading_SI.pdf)

<sup>38</sup> As set out in GR.21.3 and consistent with our decision on GC0132 -

[https://www.ofgem.gov.uk/sites/default/files/docs/2020/06/gc0132\\_authority\\_decision\\_0.pdf](https://www.ofgem.gov.uk/sites/default/files/docs/2020/06/gc0132_authority_decision_0.pdf)