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Grid Code Modification Proposal Form

GC0183: Generator and Interconnector Availability During a Severe Space Weather Event

Overview: This modification will make changes to the Grid Code to obligate Generators and Interconnectors to notify NESO of their intended position in the event of severe space weather.

Modification process & timetable

1. **Proposal Form**
   09 July 2025
2. **Workgroup Consultation**
   19 August 2025 - 29 August 2025
3. **Workgroup Report**
   15 September 2025
4. **Code Administrator Consultation**
   19 September 2025 - 20 October 2025
5. **Draft Final Modification Report**
   27 October 2025
6. **Final Modification Report**
   30 October 2025
7. **Implementation**
   10 Business Days after Decision

Status summary: The Proposer has raised a modification and is seeking a decision from the Panel on the governance route to be taken.

This modification is expected to have a: High impact on Generators, Interconnectors, National Energy System Operator. Medium impact on Network Operators, Transmission Owners.

Modification drivers: System Operability, System Security

Proposer's recommendation of governance route	Urgent modification to proceed under a timetable agreed by the Authority (with an Authority decision)	
Who can I talk to about the change?	**Proposer:** Helen Newman helen.newman@neso.energy 07860 319 716	**Code Administrator Contact:** Claire Goult claire.goult@neso.energy 07938 737 807

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Contents

What is the defect you are trying to resolve?

Space weather refers to the environmental conditions in space. It can have a significant effect on the functionality of power grids because the rapid fluctuations in the Earth's magnetic field induce an electric field in the Earth's surface. This electric field then drives electrical currents to flow through conductive structures; this is known as geomagnetically induced currents (GICs). This can potentially lead to damage to some assets across the electricity system, depending on the asset design, location and geology.

The Sun experiences 11-year cycles of solar activity; the peak of this is called Solar Maximum. The Solar Maximum of the current cycle was reached in 2025. During Solar Maximum and the following 2-3 years, solar storms that lead to GICs are statistically more likely. Over the last 12 months, National Energy System Operator (NESO) and industry stakeholders have been working together in the Space Weather Subgroup to better understand the effects on the Great Britain (GB) electricity system and is currently drafting a Space Weather Industry Protocol (SWIP). The intention is that this will be shared with affected parties in September 2025 and will provide guidelines for operational decision making during an anticipated or actual severe space weather event. Following discussions around the protocol, a risk has recently been recognised that some Generators and Interconnectors may potentially alter the operational status of some assets, depending on their understanding of the risk, of a severe space weather event, to those assets. For example, some assets may cease operations entirely whilst others might reduce output (Generation) or flow (Interconnector). If this occurs, it could potentially lead to a shortfall in supply or, in the worst case, system instability.

Why change?

To enable NESO and market participants to understand the intended positions of Generators and Interconnectors during a severe space weather event. This will ensure NESO can effectively manage the system in real-time.

What is the Proposer's solution?

Make an amendment to the Grid Code to obligate Generators and Interconnectors to issue a 'Space Weather Outage Declaration' to NESO (and advise the market, via their REMIT (Regulation for Energy Markets Integrity and Transparency) / information submissions), setting out their anticipated availability during and after a severe space weather event, following a space weather Notification being issued by NESO and posted to the BMRS.

What is in and out of scope?

The Proposal covers the specific challenge around knowledge of Generator and Interconnector availability and intentions in order to facilitate system operation in a severe space weather event.

Any anticipated impacts (or any associated risks) of severe space weather on the wider energy system are out of scope of this modification.

Draft legal text

The following are the suggested SWIP definitions that would need to be included in the Grid Code; the actual code drafting will need to be determined by the Workgroup.

Space Weather Awareness Notification	A 'For Awareness' notification issued by **The Company** via email to relevant stakeholders following **The Company** being informed by the Met Office of space weather related activity that is of a nature and anticipated level (of [G2 to G4] using the Met Office ranking) that warrants **The Company** informing relevant stakeholders for their awareness purposes.
Space Weather Prepare Notification	A notification issued by **The Company** via the **BMRS** (and directly to **Control Centres** and **ESIOs**) following them being informed by the Met Office of space weather related activity that is of a nature and anticipated level (of [G4 or above] [G5] using the Met Office ranking) that warrants **The Company** informing relevant stakeholders for their preparation purposes. A **Space Weather Prepare Notification** is likely to be issued (by **The**

	Company) some twelve to thirty-six hours ahead of a space weather event being forecast to impact the **NETS**.
Space Weather Possible Notification	A notification issued by **The Company** via the **BMRS** (and directly to **Control Centres** and **ESIOs**) following them being informed by the Met Office of an imminent space weather related activity that is of a nature and anticipated level (of [G4 or above] [G5] using the Met Office ranking) that warrants **The Company** informing relevant stakeholders for their possible [impactful] [actioning] purposes. A **Space Weather Possible Notification** is likely to be issued (by **The Company**) some twenty to sixty minutes ahead of a space weather event being forecast to impact the **NETS**.
Space Weather Outage Declaration	A **User's** best estimate of the expected (un)availability of their specified asset(s); in the event of a **Space Weather Possible Notification** being issued; that the **User** must submit to **The Company** within three hours of **The Company** issuing a **Space Weather Prepare Notification**. This shall cover the period of time from a **Space Weather Possible Notification** being issued (in the future) by **The Company** until [X] hour(s) after a **Space Weather Cessation Notification** being issued by **The Company** (where the 'X' shall be specified, for each relevant asset(s), by the **User** at the time of the declaration submission, and where zero hours is a valid response where the asset(s) will continue to be available throughout the period in question). For the avoidance of doubt, this declaration shall; if acted upon by a **Large Power Station** or of part of the **NETS**, or of part of a **User System** (following **The**

	Company issuing a **Space Weather Prepare Notification)**; be deemed a **Planned Outage**.
Space Weather Expected Notification	A notification issued by **The Company** via the **BMRS** (and directly to **Control Centres** and **ESIOs**) following them being informed by the Met Office or other relevant stakeholders that impacts, consistent with a space weather event, have been seen or experienced in GB so that stakeholders can inform **The Company** (by way of a **Space Weather Outcome Statement**) if such impacts are seen or experienced by the stakeholder's assets.
Space Weather Outcome Statement	A statement (prepared in good faith) that is issued, without undue delay, by the **User** or **Control Centre** or **ESIO** to **The Company** where; following the issuing of a **Space Weather Expected Notification**; their asset(s) have seen or experienced impacts that they believe, at the time, are or maybe of a nature consistent with a space weather event.
Space Weather Advisory	A statement issued by **The Company** via the **BMRS** (and directly to **Control Centres** and **EISOs**) that is sent to advise stakeholders of a space weather related matter that warrants **The Company** informing relevant stakeholders of, for their information and further consideration.
Space Weather Cessation Notification	A notification issued by **The Company** via the **BMRS** (and directly to **Control Centres** and **ESIOs**); following **The Company** being informed by the Met Office that the reason(s) for the issuing of any previous Space Weather related notifications (issued by the Met Office) have now passed, timed out or otherwise ceased to be relevant; that is sent to inform stakeholders that a space weather situation has concluded.

What is the impact of this change?

The proposal will obligate Generators and Interconnectors to issue a 'Space Weather Outage Declaration' to NESO (and advise the market, via their REMIT / information submissions), setting out their anticipated availability during and after a severe space weather event, following a space weather Notification being issued by NESO. It is aimed at providing greater visibility for NESO of the operational status of key assets in the event of a severe space weather event. This will support NESO in managing scenarios that have the potential to lead to a shortfall in electricity supply or instability of the GB electricity system.

Network Operators and Transmission Owners may need to inform NESO via a Space Weather Outcome Statement if their assets have experienced impacts as a result of Space Weather.

Proposer's assessment against Grid Code Objectives	
Relevant Objective	**Identified impact**
(i) To permit the development, maintenance and operation of an efficient, coordinated and economical system for the transmission of electricity;	**Positive** The timely provision of critical operational information related to a space weather event will enable NESO to operate the system if this situation arises.
(ii) 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** Both NESO and market participants will be informed, in a timely manner, of the potential market situation if a space weather possible notification is issued.
(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	**Positive** The modification aims to ensure that NESO, for potentially critical

electricity transmission system operator area taken as a whole;	operational reasons, has timely visibility of the intended positions of generators and interconnectors during a severe space weather event.
(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; and	**Neutral**
(v) To promote efficiency in the implementation and administration of the Grid Code arrangements	**Neutral**

** See Electricity System Operator Licence*

Proposer's assessment of the impact of the modification on the stakeholder / consumer benefit categories	
Stakeholder / consumer benefit categories	**Identified impact**
Improved safety and reliability of the system	**Positive** It is aimed at providing greater visibility for NESO of the operational status of key assets in the event of a severe space weather event. This will support NESO in managing scenarios that have the potential to lead to a shortfall in electricity supply or instability of the GB electricity system.
Lower bills than would otherwise be the case	**Neutral**
Benefits for society as a whole	**Neutral**
Reduced environmental damage	**Neutral**
Improved quality of service	**Neutral**

When will this change take place?

Implementation date:

10 Business Days following an Authority Decision.

Proposer's justification of Implementation date:

As explained above we are currently entering the most active period of solar activity in the 11-year cycle. This could last for 2-3 years therefore, implementing this modification as soon as possible will reduce the risk to the GB energy system.

In addition, the intention is that the SWIP will be issued to stakeholders in mid-late September. The Grid Code modification will sit alongside this protocol. By aligning the implementation of the Grid Code modification with the protocol 'go live' date this will provide greater clarity and certainty for relevant stakeholders and NESO.

Date decision required by

As soon as possible to mitigate the risk to security of supply.

Implementation approach

Processes will need to be developed by NESO to assess the data submitted by generators and interconnectors and for NESO to then provide DESNZ with updates.

Processes will also need to be developed to define how generators and interconnectors will submit the required date to NESO.

Proposer's justification for governance route

Governance route: Urgent modification to proceed under a timeline agreed by the Authority (with an Authority Decision)

This modification meets Urgency Criteria (b) A significant impact on the safety and security of the electricity and/or gas systems.

There is a risk to security of supply of the electricity system due to the current position at the peak of the solar cycle being reached in 2025.

The Space Weather Industry Protocol Workgroup have recently identified a risk to system stability due to the potential for Generators and Interconnectors to alter the operational status of some assets in the energy market based on the risk to their assets. This could lead to system instability or a shortfall in supply.

As it stands, under the current information processes, there may be insufficient time for NESO to be aware and thus manage any changes in Generators and Interconnector planned availability during an anticipated or actual severe space weather event.

Interactions

☐CUSC	☒BSC	☐STC	☐SQSS
☐European Network Codes	☐ EBR Article 18 T&Cs[1]	☒Other modifications	☐Other

The direct or consequential impacts to other codes will need to be identified through the Workgroup.

There may need to be changes to the BMRS processes due to space weather Notifications being published on the BMRS and additionally, there may be an interaction with Grid Code modification GC0164.

We are also considering whether an amendment to STC will be required. However, this would be as a result of the Space Weather Industry Protocol being issued rather than a consequence of this modification to the Grid Code.

Industry engagement and feedback

NESO have been engaging with industry over the last 12 months via the Space Weather Sub-group and more recently via the Space Weather Industry Protocol Workgroup on examining issues associated with space weather.

It was through discussions in this Workgroup that the risk to system stability was identified. This proposed Grid Code modification has been discussed in the SWIP Workgroup and received the full support of stakeholders from EDF, SSE Generation, National Grid Ventures, National Grid Electricity Distribution, Electricity Networks Association, Northern Power Grid, NESO and DESNZ.

An outline of this proposal was presented to the July Grid Code Development Forum to gain stakeholder feedback.

In addition NESO has provided space weather awareness updates to the Operational Transparency Forum, the latest of which was on 25th June 2025 (PowerPoint Presentation slides 13-25.)

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Acronyms, key terms and reference material

Acronym / key term	Meaning
BSC	Balancing and Settlement Code
BMRS	Balancing Mechanism Reporting Service
CUSC	Connection and Use of System Code
DESNZ	Department for Energy Security and Net Zero
EBR	Electricity Balancing Regulation
EISO	Externally Interconnected System Operator
GB	Great Britain
GC	Grid Code
GICs	Geomagnetically Induced Currents
NESO	National Energy System Operator
NETS	National Electricity Transmission System
REMIT	Regulation for Energy Markets Integrity and Transparency
STC	System Operator Transmission Owner Code
SQSS	Security and Quality of Supply Standards
SWIP	Space Weather Industry Protocol
T&Cs	Terms and Conditions