



**Rob Wilson**

**Presentation to recap and summarise GC0147 proposal**  
**1<sup>st</sup> Workgroup meeting - 8<sup>th</sup> Sept 2020**

**GC0147**

**Last resort disconnection of Embedded  
Generation – enduring solution**

# The defect - recap of GC0143 background and urgency

- Under emergency conditions the Electricity System Operator (ESO) may need to instruct a Distribution Network Operator (DNO) to disconnect embedded generators connected to its system
- Existing ability under the Grid Code to do this was felt to lack detail and be legally ambiguous
- GC0143 clarified the format of instructions and removed the ambiguity
- The requirement for this was due to the unprecedented societal changes brought about by the COVID-19 pandemic which has led to demands out-turning up to 20% lower than predicted
- During very low demand periods very few controllable larger generators will be running
- Urgency was required to achieve a solution before the Bank Holiday weekend on 8 May 2020
- Sunset clause included in solution times out on 25 Oct 2020 after which the original defect will return

# GC0143 Timeline

Milestone	Date
Raised at Grid Code panel	1 May 2020
Ofgem agree urgency	1 May 2020
Code Administrator Consultation	1 May 2020 to 5pm on 5 May 2020
Panel meeting to approve Final Modification Report	6 May 2020
Ofgem approval	7 May 2020
Implementation	7 May 2020



# GC0143 Ofgem decision – key points

In approving GC0143 Ofgem's decision noted the following key points:

- The need for urgency
- The time-limited nature of the GC0143 solution
- Use of disconnections as a last resort only following the exhaustion of all commercial alternatives
- The concerns of respondents on environmental impact, safety issues and impacts on industrial processes, and an expectation on the ESO and DNOs to consider the order in which generation could be disconnected to minimize risks
- The need for an enduring solution which would:
  - Be progressed imminently
  - Allow for full engagement and consultation
  - Take account of the responses received to the GC0143 consultation

# Consultation responses – summary & key themes

Most respondents stated that they understand the reasoning behind the modification being raised and the threat to Security of Supply that the current situation (COVID-19) poses for the GB National Electricity Transmission System (NETS).

Whilst there was broad understanding of the issue facing National Grid ESO there were concerns raised around the approach outlined in this modification. Questions were raised around the approach through urgency and whether there would be unintended consequences to the modification being implemented as a result, plus the need for a more considered enduring solution.

# Theme #1 - The development of modification GC0143

Concern	Detail
Time taken to raise the change	It was highlighted by some respondents that in their view the ESO could have raised this change earlier and that the ESO had the opportunity to do so in the lead up to the paper being raised on the 30 April 2020.
Use of urgency	<p>Concerns were raised at the modification being treated as urgent, the limited opportunity for industry engagement, and whether there would be unintended consequences of the modification being implemented as a result.</p> <p>Although there was broad support that the defect needed addressing, many respondents felt that it should have been done in a more thorough, considered way ahead of implementation.</p> <p>Some respondents also stated that there was not enough time to get plans in place ahead of implementation on 7 May 2020.</p>
Enduring solution required	<p>Many respondents highlighted the need for an enduring solution to be developed as soon as possible. It should address the points raised in the GC0143 discussions and consultation responses, and should ensure that all relevant stakeholders are both made aware of the proposal and given suitable opportunity to engage in developing the solution.</p> <p>Some also stressed that the temporary solution, having been approved and implemented, should not set a precedent for the enduring solution.</p>

## Theme #2 - Carrying out emergency instructions

Concern	Detail
Clarity required over order of disconnection	<p>Clarity over the order in which generators would be disconnected, with some suggesting that certain generators, or types of generators, should not be subject to disconnection. Several factors were recommended as considerations that should be included:</p> <ul style="list-style-type: none"><li>• The government's carbon net zero targets, with the view that renewable generation should not be disconnected ahead of fossil fuel generation.</li><li>• Security of connection - those power stations providing the greatest level of security of supply should be the last to be disconnected.</li><li>• The consequences for customers, particularly those for whom generation formed part of a more complex industrial site, or where deenergisation of generation would also mean cutting off local demand, or could have environmental impacts.</li></ul>
'Last resort' only	<p>Assurance that use would only be in an emergency situation and as a last resort after all other options had been exhausted. Several suggested that this should be included in the legal text. It was also felt that there should be more transparency over the steps that would be taken ahead of any instructions being given, and that these details should be in the public domain.</p>
DNOs' visibility	<p>Concern over the visibility that the DNOs have of the information required to carry out emergency instructions, and how they would know what to disconnect.</p>
Clarity over instruction	<p>Respondents wanted more clarity over the disconnection process, including what the instruction from the ESO would look like, how DNOs would comply with the instruction and how generators would be notified.</p>
Notice period before disconnection	<p>Clarity over how much notice generators could expect before disconnection.</p>
Reporting requested	<p>Responses included the request that reporting is made publicly available detailing any emergency instructions of this type that are given by the ESO, including the rationale.</p>

## Theme #3 - Impacts of emergency disconnection

Concern	Detail
Commercial impact / lack of compensation	<p>One of the most frequent concerns raised in the responses was the lack of compensation that would be provided to any embedded generators that were disconnected via this process.</p> <p>This was seen to be a financial risk to generators, with many believing this demonstrated the absence of a level playing field and that the process was detrimental to competition since, in contrast, transmission connected generators and those that are in the Balancing Mechanism would receive compensation should the instruction be enacted.</p>
Damage to assets	<p>Potential for emergency disconnection to cause health and safety risks, damage to assets and the need for significant maintenance intervention. In some cases, forced disconnection could lead to wider plant shutdowns and disruption to industrial processes. They could be followed by further shutdowns after the system was restored. Some respondents wanted assurance from DNOs that essential infrastructure sites would not be affected.</p> <p>Respondents wanted clarity over the reconnection process, and suggested that, where restarting plants would require a site visit, this would be more difficult now due to the COVID-19 restrictions.</p>
Risk to network stability	<p>There were concerns at the impact to network stability if certain generators that provide services such as inertia and voltage control were disconnected.</p>



# What has been done to address concerns?

Action	Progress
Work with DNOs on communication that can be published to improve transparency	Joint guidance agreed and published*
Letter to be published from the ESO on their position on GC0143	Published*
Review all responses ahead of raising a modification for the enduring solution involving all stakeholders in its development	Report required by Ofgem – completed and published*
Establish new ODFM service to provide commercial alternative to disconnection	In place
Repeat consultation to comply with EBGL A18 requirements	1 month consultation ran from 21 May to 22 June.
Develop enduring solution following normal governance including engagement and consultation	Needs to be in place by Spring 2021; to be raised at July Grid Code Review Panel

# Optional Downwards Flexibility Management (ODFM)

- The ESO balances balance generation and demand in real time.
- To allow us to do this we need to hold enough reserve to turn generation up or down to meet demand second by second.
- When demand is low, we would expect embedded generation to be running along with nuclear, any transmission connected renewable generation, interconnectors and some conventional generation running at minimum stable export limit (SEL).
- With this profile, there may be a requirement for additional flexibility to balance generation and demand, as well as to achieve sufficient negative reserve and high frequency response.
- ODFM is a new optional service for non-BM parties to allow the ESO to access flexibility that is not currently available in real time.
- ODFM in its current form will time out on 25 October 2020.
- A new product will be developed for use in 2021.
- <https://data.nationalgrideso.com/ancillary-services/optional-downward-flexibility-management-odfm1>

# Use of Emergency Instructions and ODFM in May 2020

## Use of Emergency Instructions:

None – EIs are a last resort to be used only when all commercial alternatives are exhausted

## Use of ODFM:

Sunday 10 May

- Demand of 15.5GW, 238MW used for 3 hours

Saturday 23 May

- Demand of 14.8GW over 1B period (1GW of ODFM used)
- Demand of 16.7MW over 3B period (1938MW of ODFM used)

Sunday 24 May

- 1B demand of 14.5GW (800MW of ODFM used)
- 3B demand of 17GW (no ODFM used)

Monday 25 May

- 1B demand of 16.8GW (no ODFM used)
- 3B demand of 16.45GW (1020MW of ODFM used)

**1B – night/early morning minimum**  
(ie low demand but no solar)  
**3B – afternoon minimum**  
(slightly higher demand but with solar)

# Joint ESO/DNO Guidance - High Level Principles

The following high-level principles will be adhered to where possible and practical. However, it is also recognised that in a developing situation there may be circumstances that prevent either NGESO and/or DNOs from doing this. As experience of this and NGESO's requirements develop, the means of implementing an EI will evolve.

NGESO will observe the following conditions:

**An NRAPM will be issued at the earliest opportunity and prior to requesting EI**

The NRAPM will detail total volume shortfall of downward regulation, applicable time period(s) and time of next review

**Total volume of emergency instruction requested across GB will typically be in blocks of 500-700MW over a 30min period**

Emergency instruction of embedded generation will be:

**Equal across all DNO license areas**

The aggregate registered capacity of the embedded generation associated with an EI will be the same for all DNO license areas

**Likely to cover a whole DNO license area**

The aggregate registered capacity of the embedded generation associated with an EI will be requested at a DNO GSP or GSP group level

**Requested in 50MW blocks**

The aggregate registered capacity of the embedded generation will be in 50MW blocks per GSP, GSP group or DNO license area

**Unlikely to exceed 50% of the combined forecast of embedded wind and PV**

The volume of EI requested per DNO license area is unlikely to exceed 50% of the combined forecast of embedded wind and PV within that area

**Implemented by DNOs in pre-prepared blocks within 5 to 30 min**

Emergency Instructions should be implemented 'without delay' and using reasonable endeavours. Where a pre-prepared switching schedule is used this should take between 5 and 30 min. Implementation of a more specific emergency instructions via a bespoke switching routine could take longer but will still be on a best endeavours basis

**Implemented by DNOs in such a way as to deliver a reduction in export, as a consequence of disconnection, as close to 50MW per block as is practicable (ideally between 80 and 100%)**

Where practicable and recognising the real-time challenges of this since EIs are for disconnection of registered capacity and need to be implemented 'without delay', the reduction in export as a consequence of disconnection should be as close to 50MW per block as is practicable (ideally between 80 and 100%), preferably with reference to actual output where this can be established in reasonable timescales

# Joint ESO/DNO Guidance - Priorities for maintaining connection

The priority for maintaining connection to the network must consider whole system impact. These specific priorities will be kept under review in line with, for example, expectations for the season ahead. Priorities should reflect the general and specific information available to DNOs at the time with the aim of meeting the following objectives:

- 1) Maximising value to the total system and local networks by reducing the requirement for other balancing actions; and
- 2) Minimising plant, environmental or system impact on the local network and/or provider

The following guidance has been developed between NGESO and DNOs, taking into account system conditions this summer:

**The order that embedded generation is disconnected will be at the discretion of the DNO**

Under Grid Code BC2.9.3.3 (f) (i) NGESO may requested disconnection of a specific embedded generator

**This will take into account, where practicable, the effectiveness of the disconnection to address the issues trying to be resolved, wider system issues and the potential consequences for the embedded generators**

**It will be broadly in line with the following:**

ORDER	CATEGORY OF GENERATION	COMMENT
1	Non-synchronous generation	In order to maintain system inertia. The export from these technology types could be weather dependent. Although the instruction would be to disconnect 'registered capacity', it is still expected that this will deliver actual MW output change of between 80% and 100% of requested volume
2	Synchronous generators without any associated demand	Lower down the list due to the need to maintain system inertia wherever possible
3	Synchronous generators with associated demand	For example, CHP installation waste management facilities, other industrial facilities with substantial on-site demand
4	Critical DG support of COVID and CNI sites	

**The reconnection of embedded generation will be:**

**Not completed until notified by NGESO**

**Delivered by a 'consent to reconnect' by NGESO, to be completed as soon as reasonably practicable**

Recognising that the process to reconnect embedded generation may not be straightforward, NGESO will issue a consent to reconnect, and expect this to happen as soon as practicable



# Areas to Address in Enduring Solution

- Symmetry with demand control instructions and protocols in section OC6 of the Grid Code
- System warnings as covered under section OC7.4 of the Grid Code
- Compensation arrangements – not covered under the Grid Code but need to be considered. Also whether Article 13 paragraph 7 of the Clean Energy Package applies.

*NB This requires that “where non-market based redispatching is used, it shall be subject to financial compensation by the system operator requesting the redispatching....except in the case of producers that have accepted a connection agreement under which there is no guarantee of firm delivery of energy”.*

- Definition of last resort. Although in an emergency the ESO and DNOs have to maintain some flexibility to avoid worse disruption for consumers.
- Any other options such as turndown short of disconnections
- How an instruction will be implemented. Including:
  - Order of priority
  - Considerations around damage to equipment/environmental impact
  - Restoration process
- Reporting post-event
- Any cross-code impacts

# GC0147 Legal Text – proposed changes

The following sections have been updated in the proposed draft legal text for GC0147

Section	Changes
OC6B (new section)	<ul style="list-style-type: none"><li>• New section added, OC6B: Embedded Generation Control, which outlines the procedures for Embedded Generation Control and Disconnection</li><li>• Broadly symmetrical with the current OC6: Demand Control</li></ul>
OC7	<ul style="list-style-type: none"><li>• New System Warnings added to cover Embedded Generation Control.</li></ul>
Glossary & Definitions	<ul style="list-style-type: none"><li>• Various new and amended defined terms including the new System Warnings</li></ul>
BC2.6.3 Communication With Network Operators In Emergency Circumstances	<ul style="list-style-type: none"><li>• Updated to include Embedded Generation Control (symmetry with Demand Control)</li></ul>
BC2.9.1 Emergency Actions	<ul style="list-style-type: none"><li>• Timed out GC0143 solution with sunset clause removed</li><li>• Embedded Generation Control added to Emergency Actions</li></ul>

# Draft Timeline for Development of Enduring Solution

Milestone	Date
Raise modification at Grid Code Review Panel	30 July 2020
Workgroup nominations sought	19 August 2020
Workgroup meetings x 3	Sep – Oct 2020
Workgroup consultation (normally 15 working days)	Oct 2020
Workgroup vote on solution	Nov 2020
Workgroup report presented to panel	26 Nov 2020
Code Administrator consultation (1 month)	Dec 2020
Draft final modification report presented to panel & recommendation vote	Jan 2021
Submission of final modification report to Ofgem	Feb 2021
Ofgem decision (25 working day KPI)	March 2021
Implementation	+ 10 days



