

Workgroup Report

GC0160: Grid Code Changes for BSC Mod P448

“Protecting Generators subject to Firm Load Shedding during a Gas Supply Emergency from excessive Imbalance Charges”

Overview: The [BSC Modification](#) proposes to address the risk of Generators in GB being prevented from generating this winter (due to Load Shedding during a Network Gas Supply Emergency) by allowing such Load Shedding instructions to be settled as Bids. As a result, and to ensure consistency between the BSC and the Grid Code, this Modification seeks to ensure that the actions of the affected party relating to Physical Notifications are aligned.

Modification process & timetable



Have 5 minutes? Read our [Executive summary](#)

Have 20 minutes? Read the full [Workgroup Report](#)

Have 30 minutes? Read the full Workgroup Report and Annexes.

Status summary: The Workgroup have finalised the proposer’s solution. They are now seeking approval from the Panel that the Workgroup have met their Terms of Reference and can proceed to Code Administrator Consultation

This modification is expected to have a:

High impact on Generators

Medium impact on the ESO

Modification drivers: Cross Code change and System Security.

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?

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Executive summary

The BSC Modification [P448](#) proposes to address the risk of Generators in GB being prevented from generating this winter (due to Load Shedding during a Network Gas Supply Emergency) by allowing such Load Shedding instructions to be settled as Bids. As a result, and in order to ensure consistency between the BSC and the Grid Code, this Modification seeks to ensure that the actions of the affected party relating to Physical Notifications are aligned.

What is the issue?

Due to the increased risk of gas shortages in winter 2022/23, Great Britain could be subject to one or more gas emergency scenarios this winter. If this occurs, gas supplies to the largest gas consumers with firm rights to gas may be curtailed (prevented from taking gas), to ensure safety on the gas system. As gas fired power stations are some of the largest consumers of gas, they would expect to be some of the first sites to have their gas curtailed. If these power stations have sold their power ahead of time through forward trading but are prevented from generating to deliver these volumes by a gas curtailment, then generators could be exposed to large volumes of electricity imbalance charges (plus the associated credit requirements). It is also likely that in these circumstances the ESO would have to instruct other plant or demand side response to make up for the lost gas plant volumes, which could drive very high or extreme levels of imbalance prices. The combination of high volumes of imbalance at extreme imbalance prices could be sufficient to cause generators to become insolvent, which would increase risks to security of supply.

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

Proposer's solution:

A change in the definition of a Physical Notification (PN), so that in the above gas curtailment situation, Physical Notification(s) (PN) submitted by a gas fired generator shall throughout the gas interruption reflect the expected output of the unit as at the time just prior to the start of the gas interruption. i.e. what the affected generator would have notified had the gas not been interrupted.

The PNs of any interrupted unit shall, for the duration of the (gas) interruption, not be increased as a result of any power sold after the start of the (gas) interruption, but may be reduced as a result of any mitigating actions taken by the relevant User.

Implementation date:

One working day after an Authority Decision.

Summary of Alternative solution(s):

There are no Grid Code specific alternative solutions as the Workgroup agreed that the Original Solution is sufficient for both the BSC Original and the BSC Alternative Solution.

Workgroup conclusions: The GC0160 Workgroup concluded by majority (5 out of 6 votes) that the Original better facilitated the Applicable Objectives than the Baseline.

What is the impact if this change is made?

This will mitigate the risk to the security of supply in the electricity market by preventing generators from becoming insolvent due to extremely high imbalance charges and credit requirements.

Interactions

GC0160 is a consequential modification to the primary BSC modification [P448](#). If you would like more information on the BSC Modification P448 please click [here](#).

There are expected impact(s) on the Electricity Balancing Regulation (EBR) Article 18 T&Cs.

What is the issue?

Russia's turning off of the Nord Stream 1 gas¹ supply to Western Europe as a result of the Ukraine War, and the post-covid demand for gas, has recently significantly increased the risk of gas shortages during winter 2022/23. Given the interconnected nature of the gas market, this in turn increases the risk of gas shortages in Great Britain.

There is therefore a credible risk that Great Britain could be subject to one or more gas emergency scenarios during this winter. If this happens then gas supplies to the largest gas consumers with firm rights to gas may be curtailed – i.e. prevented from taking gas to ensure safety on the gas system. Gas fired power stations are some of the largest consumers of gas in Great Britain and therefore would expect to be some of the first sites to have their gas curtailed.

If these power stations have sold their power ahead of time through forward trading, but are prevented from generating to deliver these volumes by a gas curtailment, then generators could be exposed to large volumes of electricity imbalance charges (plus the associated credit requirements). It is also likely that in these circumstances the ESO would have to instruct other plant or demand side response to make up for the lost gas plant volumes, which could drive very high or indeed extreme levels of imbalance prices. The combination of high volumes of imbalance at extreme imbalance prices could be sufficient to cause generators to become insolvent, which would increase risks to security of supply.

In order to seek to manage this substantial risk, generators can only avoid putting themselves in the position of being exposed to such imbalances. The only way they can do this is to avoid contracting ahead of time either in forward timescales or even in day ahead markets. Indeed, the only way a generator can eliminate this substantial risk is to present their volume in the Balancing Mechanism so that any volumes generated are paid for on delivery and not open to imbalance risk. This inevitably reduces liquidity in traded markets to the disadvantage of all trading parties.

In order to demonstrate the possible size of the issue, and the potential threat to generators and system security, it is worth considering the approach that is likely to be taken when gas is curtailed under a gas emergency. The priority in such an emergency will be to prevent the disconnection of domestic customers' gas. Therefore, demand customers with lower priority will be taken off first. In order to maximise the effectiveness of these actions, customers are likely to be taken off in order of size.

Generators make up a large proportion of the largest gas customers in GB and will therefore likely be the first customers to be curtailed, in order of size. By way of example, the 10 largest gas fired power stations² represent a total capacity of around 12.8GW, meaning that their average size is around 1.28GW. The largest of these is 2.2GW and the smallest around 900MW.

The table below shows the status quo situation and the potential sort of imbalance costs which could be incurred if these stations were to be fully contracted and then curtailed for

¹ For the avoidance of doubt, the references in this proposal to 'gas' is to natural gas.

² Based on the NETSO's published TEC Register.

24 hours. It does so on the basis of three levels of imbalance price: £3,000/MWh, £6,000/MWh and £9,000/MWh. The first has been chosen as it is similar in size to the offer prices which were experienced on occasion last winter (2021/22), the second as it is the current level of the Value of Lost Load (VoLL) and the third as it is around the level of the price at which some actions were taken by the ESO on 20 July 2022, albeit in these circumstances for (electricity) system purposes. It would not be unrealistic to assume that, in a period when there is a significant shortage in the supply of gas leading to gas curtailment of CCGTs etc., that there could also be significant scarcity in the electricity market too, and that actions around these sorts of levels may be accepted and go on to set imbalance prices. This could particularly be the case if customers are curtailed at prices factoring in their particular values of lost load, or if system to system trades are taken over interconnectors.

		Imbalance Price		
	MW	£3,000/MWh	£6,000/MWh	£9,000/MWh
Max	2200	£158.40m	£316.80m	£475.20m
Average	1280	£92.16m	£184.32m	£276.48m
Min	900	£64.80m	£129.60m	£194.40m

Table 1: Illustrative Imbalance exposure for each 24 hours' curtailment at full output.

Although the above table may show the worst-case scenario for a single power station by assuming that all of its capacity is contracted for the whole day, in reality generators might have multiple stations curtailed and / or the gas emergency could run for several days, or indeed weeks, during which significant imbalance exposures could accrue. Therefore, gas fired generators in GB face a potentially significant risk associated with gas (safety) emergency actions.

In the event that an imbalance situation did arise for the generator, and noting the illustrative quantum(s) set out in the table above, this would also be expected to quickly result in a substantial credit call arising (absent the BSC Modification) which could place the affected generator into default and then exit the market with the resulting market liquidity impacts noted above as, for example, has been seen with the Calon Energy market exit³. Furthermore, in the event that the affected generator went into payment default, then the resulting shortfall would rest with other (BSC) parties, which would also be detrimental to those (BSC) parties.

The Gas System Operator (GSO) is National Grid Gas. In the event of an expected shortfall in available gas (such as for the reasons noted above in terms of the Ukraine situation), that has a potentially detrimental effect on gas pressures within the pipelines in GB, then this will lead to the GSO, in close cooperation with the Network Emergency Coordinator (NEC), taking action in accordance with the Gas Safety Management Regulations⁴ to address a significant (gas) safety concern which, at a high level, includes both a Stage 1 and a Stage 2 situation. It is only at Stage 2 that the (gas) load shedding would be applied to the largest gas users which, in respect of this Modification, concerns gas fuelled generators in GB.

³ [Calon Energy's UK gas plants put in 'dormant state' by administrators - Energy Live News](#)

⁴ A guide to the Gas Safety (Management) Regulations 1996. Guidance on Regulations - L80 (hse.gov.uk)

Why change?

For the reasons set out above, there are likely to be imminent changes needed to be made to the Grid Code as a consequence of the likely solutions from the primary BSC Modification. These changes are required to ensure that the substantial risks for gas fuelled generators in the event of gas curtailment are addressed.

What is the solution?

Proposer's solution

The solution, which is limited to a gas curtailment situation, is that the Physical Notification(s) (PN) submitted by a gas fired generator, (subject to interrupted gas supplies to the site by load shedding during a Network Gas Supply Emergency interruption) shall, throughout the gas interruption, in the reasonable view of the User, reflect the expected output of the unit as at the time just prior to the start of the gas interruption. That is, the PN would reflect what the affected generator would have notified had the gas not been interrupted.

This shall take into account the amount of power already sold for delivery during the period of (gas) interruption by the User at the time of the start of the (gas) interruption and, if relevant, the relative efficiency of any (gas) interrupted unit compared with other non-interrupted (gas) units that would also be expected to deliver the power sold.

The PNs of any interrupted unit shall, for the duration of the (gas) interruption, not be increased as a result of any power sold after the start of the (gas) interruption but may be reduced as a result of any mitigating actions taken by the relevant User.

Workgroup considerations

The P448 and GC0160 Joint Workgroup convened 5 times to discuss the perceived issue, detail the scope of the proposed defect, devise potential solutions and assess the proposal in terms of the Applicable Code Objectives.

Consideration of the proposer's solution

Proposed BSC Solution

P448 proposes to create a mechanism in the relevant BSC Sections that would protect Generators from excessive Imbalance Charges that they may incur as a result of Load Shedding under a Network Gas Supply Emergency (NGSE) at Stage 2 or higher. A new form of Acceptance is proposed which would be settled as a Bid for affected units. The affected units would submit Physical Notifications (PNs) for the impacted period to reflect how they would have operated to meet their contractual position in the absence of a gas emergency, based on their contractual position at the point of receiving the Load Shedding instruction.

A new Network Gas Supply Emergency Settlement Validation Data Committee (NGSESVDC) is proposed to be established to verify the data used in Settlement (and amend it if necessary).

If you would like more information on the BSC Modification P448 please click [here](#).

As a result of this BSC change, the Workgroup agreed that a change would also be required to the definition of Physical Notification(s) (PN).

Further justification for changing the PN definition in the Grid Code

The Proposer explained that the PN would reflect what the affected generator would have notified had the gas not been interrupted. If the PN is set to zero, the imbalance/credit risk would not be mitigated in the short term. And that any other way would require a whole system change, which given this Winters work/capacity is considered to be too difficult to implement.

Consideration of other options

Balancing Mechanism Reporting Service

A suggested legal text change within the BSC was ‘Where the ESO is aware that Stage 2 of Network Gas Supply Emergency has been issued by the GSO it shall, without undue delay, make that available on Balancing Mechanism Reporting Service (BMRS). Where the ESO is aware that the GSO has instigated Stage 2 of Network Gas Supply Emergency load shedding it shall, without undue delay, make that available on BMRS.’

The NGESO National Control confirmed that they make announcements on BMRS as per current set of warnings in the Grid Code, so if there is high risk of (electricity) demand reduction, it will be made as is required currently. Based on this feedback the Workgroup did not feel that a new modification needed to be raised, however there was not a consensus as to whether or not it should be included as part of the BSC P448 or GC0160 modification.

The Ofgem Representative fed back on their action around the use of PNs and confirmed to the Workgroup that REMIT requires (among other things) that market participants do not disseminate information which gives, or is likely to give, false or misleading signals as to the supply of, demand for, wholesale energy products. Where a generator is submitting Physical Notifications that are in line with its obligations under the Grid Code in the event of a gas emergency, this would not comprise a false or misleading signal. The Workgroup agreed that the draft legal text was in keeping with this ethos.

New definition “Network Gas Supply Emergency Physical Notification” (NGSEPN)

Following a review of the draft legal text by the internal NGESO legal team, NGESO recommended that the definition of “Physical Notification” remains unchanged, as this definition is based on active power which is no longer present in emergencies. Instead, they suggested creating a new definition within the Grid Code specifically to address the issues of Network Gas Supply Emergencies, to be known as a “Network Gas Supply Emergency Physical Notification” (NGSEPN). This would mean that during an emergency a Lead Party would cease sending Physical Notifications to NGESO but would instead send NGSEPNs (albeit using the existing processes and data files that were designed for submission of Physical Notifications).

NGESO explained that there are 93 references to PNs within the Grid Code, so this would be a simpler solution, rather than having to assess the implications of a definition change

on each of the individual references. This would also still allow PNs to be used as they normally would.

Some Workgroup members questioned whether a new NGSEPN definition was needed, as the same systems and processes would be used. Workgroup members felt that the NGESO still needed to review all mentions of PNs within the Grid Code to assess if any system/process changes would be required.

Concerns were also raised by the BSC SME (subject matter expert) that this would have a high impact on the BSC solution with a high level of change required within the BSC. To address this and to enable them to be able to treat an NGSEPN as if it were a Physical Notification, they would need to change the BSC definition of Physical Notification in Annex X-1. The BSC SME highlighted that this would mean a “Physical Notification” would have different meanings within the BSC and Grid Code. But the BSC SME felt this was preferable to the alternative of referring to “Physical Notification or Network Gas Supply Emergency Physical Notification” throughout the different sections of the BSC. The BSC SME went on to explain that there were already examples of this happening before e.g. a “Supplier” means different people under the Grid Code and BSC.

The BSC SME also felt that this may be a materially different approach to the Original Solution and gave an example of how the Grid Code defines “**Indicated Imbalance**” as a function of Physical Notifications. The Original solution would require NGESO to continue including BM Units in the calculation of Indicated Imbalance during a period of (gas) Load Shedding, whereas NGESO’s approach would require NGESO to exclude them.

The BSC SME also questioned whether NGESO would update the [Data Validation, Consistency and Defaulting Rules](#) to include validation and defaulting rules for NGSEPNs. As well as questioning how, they would check other industry documents which reference the Grid Code definition of Physical Notification.

Based on the concerns raised by the Workgroup, NGESO suggested merging the proposed definition of the NGSEPN with the proposed Original solution draft legal text rather than progressing their NGSEPN standalone definition as a proposed alternative solution. The Workgroup and Proposer agreed and incorporated the NGESO’s suggestion into the draft legal text used in the Workgroup Consultation. They requested that all references to PNs are reviewed ahead of the legal text being finalised and this included in the final legal text (Annex 6).

Alternative solution

There are no Grid Code specific alternative solutions as the Workgroup agreed that the Original Solution is sufficient for both the BSC Original and the BSC Alternative Solution. As the BSC alternative focuses on Contractual position, the Workgroup agreed there would not be any additional impacts to the Grid Code.

If you would like more information on the BSC Modification P448 please click [here](#).

Workgroup Consultation Summary

The P448 and GC0160 Joint Workgroup held their individual Workgroup Consultations between 7 October 2022 – 12 October 2022. The GC0160 Workgroup Consultation received 7 non - confidential responses. The full responses along with a summary of the responses can be found in Annexes 4 and 5. In summary:

- The majority of responses were supportive of the implementation approach and no alternatives were raised;
- The majority of the responses supported the Workgroup's assessment in Workgroup Meeting 4 that there were no EBR impacts (1 respondent did not believe the assessment had been made);
- The majority of responses agreed that the Original better facilitated applicable objective a), b) and c), however 1 response did not agree that it better facilitated any of the applicable objectives;
- Several responses raised concerns that the Workgroup had not fully discussed the impacts of changing the definition of PNs which needed to be addressed;
- Due to lack of detail on the potential BSC alternative(s) respondents were unable to comment fully on the likely impacts to the Grid Code, but highlighted that it would be different from the Original and therefore require further Workgroup discussion.

Onward Impacts of changing the PN

Whilst the Workgroup accepted that working at pace had meant that detailed analysis of changing the PN definition on all systems had not been fully addressed. The Workgroup were comfortable to proceed with the original solution based on NGENSO confirming that the PN is not the decisive factor within processes for issuing system warnings. They also stated that in the event of a stage 2 or higher Network Gas System Emergency loading shedding event the NGENSO Control Room would receive a communication from the GSO, with all of the subsequent calculations within the NGENSO then completed manually (by either using the lower PN or MEL) meaning the PN definition change would have no impact on the existing processes in real time.

Whilst the NGENSO did not believe that there were any impact of the PN definition change to the capacity market notifications, this would form part of the further analysis which will take place, during the Code Administrator Consultation period, and corrective action would subsequently be implemented where necessary. With any impacts being notified to Grid Code Review Panel prior to the modification being submitted to the Authority for their decision.

After seeking further clarification on the obligations related to REMIT notifications during a gas emergency and curtailment of gas generation, the Authority representative confirmed that all parties were still required to notify the market as per their existing REMIT obligations.

At points where Workgroup discussion deviated from scope of this modification, Workgroup members were reminded of their rights under open governance process.

Electricity Balancing Regulation Assessment

Post the Grid Code Review Panel, on 18 October 2022, and further legal counsel the Workgroup agreed to that the modification could have EBR implications and these should be referenced in the Code Administrator Consultation (Annex 7).

Final Legal Text

The Final legal text for this change can be found in Annex 6.

What is the impact of this change?

Proposer's assessment against Code Objectives

Proposers' assessment - Impact of the modification on the Grid Code objectives:

Relevant Objective	Identified impact
(a) To permit the development, maintenance, and operation of an efficient, coordinated, and economical system for the transmission of electricity	Positive In the view of the Proposer this Modification will better facilitate Applicable Grid Code Objective (a), as it will allow the ESO to operate the NETS more efficiently, economically and in a more coordinated manner by continuing to have the affected plant available after a GDE situation.
(b) Facilitating effective competition in the generation and supply of electricity (and without limiting the foregoing, to facilitate the national electricity transmission system being made available to persons authorised to supply or generate electricity on terms which neither prevent nor restrict competition in the supply or generation of electricity);	Positive In the view of the Proposer this Modification will better facilitate Applicable Grid Code Objective (b), by promoting liquidity in traded markets in timescales running up to real time.
(c) Subject to sub-paragraphs (i) and (ii), to promote the security and efficiency of the electricity generation, transmission and distribution systems in the national electricity transmission system operator area taken as a whole;	Positive In the view of the Proposer this Modification will better facilitate Applicable Grid Code Objective (c) as this change will facilitate the affected generators continuing to participate in the market and operate for system stability purposes in light of a GDE.
(d) To efficiently discharge the obligations imposed upon the licensee by this license and to comply with the Electricity Regulation and any relevant legally binding decisions of the European Commission and/or the Agency; and	Neutral

(e) To promote efficiency in the implementation and administration of the Grid Code arrangements	Neutral
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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 Due to the mitigation of the risk to the security of supply in the electricity market through generators becoming insolvent due to extremely high imbalance charges and credit requirements.
Lower bills than would otherwise be the case	Positive Due to the mitigation of the risk that the reduced liquidity of the market would significantly increase wholesale electricity prices, which would be passed on to consumers.
Benefits for society as a whole	Positive The 'Benefits for society as a whole' consumer benefit is due to a combination of the 'Improved reliability and safety' and 'Lower bills than would otherwise be the case' consumer benefits described above.
Reduced environmental damage	Neutral
Improved quality of service	Neutral

Workgroup Vote

Workgroup vote

The Joint P448 and GC0160 Workgroup met on 14 October 2022 to carry out the GC0160 Workgroup vote. The full Workgroup vote can be found in Annex 8. The table below provides a summary of the Workgroup members view on the best option to implement this change.

The Applicable Grid Code Objectives are:

- a) To permit the development, maintenance and operation of an efficient, coordinated and economical system for the transmission of electricity
- b) Facilitating effective competition in the generation and supply of electricity (and without limiting the foregoing, to facilitate the national electricity transmission system being made available to persons authorised to supply or generate electricity on terms which neither prevent nor restrict competition in the supply or generation of electricity);
- c) Subject to sub-paragraphs (i) and (ii), to promote the security and efficiency of the electricity generation, transmission and distribution systems in the national electricity transmission system operator area taken as a whole;

- d) To efficiently discharge the obligations imposed upon the licensee by this license and to comply with the Electricity Regulation and any relevant legally binding decisions of the European Commission and/or the Agency; and
- e) To promote efficiency in the implementation and administration of the Grid Code arrangements

The GC0160 Workgroup concluded by majority (5 out of 6 votes) that the Original better facilitated the Applicable Objectives than the Baseline.

Option	Number of voters that voted this option as better than the Baseline
Original	5

When will this change take place?

Implementation date

One working day after an Authority Decision.

Date decision required by

As soon as possible.

Implementation approach

Changes to internal systems / procedures of the affected generator(s).

Interactions

- | | | | |
|---|--|--|--------------------------------|
| <input type="checkbox"/> Grid Code | <input checked="" type="checkbox"/> BSC | <input type="checkbox"/> STC | <input type="checkbox"/> SQSS |
| <input type="checkbox"/> European Network Codes | <input checked="" type="checkbox"/> EBR Article 18 T&Cs ⁵ | <input type="checkbox"/> Other modifications | <input type="checkbox"/> Other |

There is an interaction with the BSC Modification [P448: “Protecting Generators subject to Firm Load Shedding during a Gas Supply Emergency from excessive Imbalance Charges”](#).

Acronyms, key terms and reference material

Acronym / key term	Meaning
BSC	Balancing and Settlement Code
BMRS	Balancing Mechanism Reporting Service
CMP	CUSC Modification Proposal
CUSC	Connection and Use of System Code
EBR	Electricity Balancing Guideline
GC	Grid Code
GSO	Gas System Operator
GDE	Gas Deficit Emergency

⁵ If the modification has an impact on Article 18 T&Cs, it will need to follow the process set out in Article 18 of the Electricity Balancing Regulation (EBR – EU Regulation 2017/2195) – the main aspect of this is that the modification will need to be consulted on for 1 month in the Code Administrator Consultation phase. N.B. This will also satisfy the requirements of the NCER process.

NEC	Network Emergency Coordinator
NGESPN	Network Gas Supply Emergency Physical Notification
NGSESVDC	Network Gas Supply Emergency Settlement Validation Data Committee
PN	Physical Notification(s)
STC	System Operator Transmission Owner Code
SQSS	Security and Quality of Supply Standards
SME	Subject Matter Expert
T&Cs	Terms and Conditions
VoLL	Volume of Lost Load

Annexes

Annex	Information
Annex 1	Proposal form
Annex 2	Terms of reference
Annex 3	Urgency letters
Annex 4	Workgroup Consultation Responses
Annex 5	Workgroup Consultation Responses Summary
Annex 6	Final Legal Text
Annex 7	Regulated Sections of the Grid Code
Annex 7	Workgroup Vote