Public

Final Modification Report

GSR034: Review of Loss of Power Infeed Risk for Offshore DC Converters

Overview: This modification is proposed to assess the 1320MW restriction on the loss of power infeed for outages of offshore Direct Current (DC) converters.

Modification process & timetable

1. **Proposal Form**
   22 October 2025
2. **Code Administrator Consultation**
   05 November 2025 - 19 November 2025
3. **Draft Final Modification Report**
   21 November 2025
4. **Final Modification Report**
   16 December 2025
5. **Implementation**
   10 Business Days after Authority Decision

Have 30 minutes? Read the full Final Modification Report
Have 60 minutes? Read the full Draft Final Modification Report and Annexes.

Status summary: This report has been submitted to the Authority for them to decide whether this change should happen.

Panel recommendation: The Panel has recommended unanimously that the Proposer's solution is implemented.

This modification is expected to have a: High impact on Offshore Transmission Owners (OFTOs) and Offshore Generators and a **Medium Impact** on National Energy System Operator (NESO)

Governance route	Standard Governance modification which proceeded straight to Code Administrator Consultation	
Who can I talk to about the change?	**Proposer:** Bieshoy Awad Bieshoy.awad@neso.energy	**Code Administrator Chair:** box.SQSS@neso.energy

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Contents

What is the issue?

The National Electricity Transmission System (NETS) Security and Quality of Supply Standard (SQSS) restricts the loss of infeed risk for any single offshore DC converter, to the normal loss of infeed risk (1320 MW). This restriction, which aims to limit the consumers' exposure to events where frequency drops below 49.5 Hz, could result in additional and potentially sub-optimal investment being required to meet such criteria. It could also result in an unintended detrimental impact on the environment due to the increase in the numbers of cables and landing points required to connect offshore windfarms.

What is the solution?

Proposer's solution

Clauses 7.7.2.1 and 7.12.2.1 of the NETS SQSS restrict the loss of power infeed risk associated with a secured event on a single DC converter to the normal loss of infeed risk (1320MW). A summary of the background and history of these clauses and the changes that necessitate their review is provided in **Annex 03** of this proposal.

The principle used in this proposal to review the limits to the loss of infeed risk applicable to a single offshore DC converter (clauses 7.7.2 and 7.12.2 of the NETS SQSS) is to identify the implications of increasing such limit to the infrequent infeed loss risk and to check whether these implications are (1) manageable and (2) outweighed by the benefit achieved from such increase.

An assessment of the implications of the increase in the loss of infeed risk allowed for a single offshore DC converter, the details of which are in **Annex 03** of this document, identified the following impacts:

1. A short-term increase in the frequency response costs required to ensure the system frequency does not drop below 49.2Hz and is restored to above 49.5Hz within 60 seconds following the loss of 1800MW of offshore wind generation (Note this is a conservative assessment considering the current

technology availability of High Voltage Direct Current (HVDC) monopole systems is limited to 1500MW). This increase will be negligible once the 1800MW nuclear units are in service[1].

2. An increase in the number of events per year when the system frequency drops below 49.5Hz. This increase will depend on the number of Direct Current (DC) converters with a loss of infeed risk above 1320MW and the reliability of these converters. If this increase becomes significant, further frequency response would need to be procured to ensure that the loss of these converters would reduce the number of such events to an acceptable level.
3. Subject to the previous point, the cost associated with the potential requirement to ensure that frequency does not drop below 49.5Hz for the loss of offshore windfarms with capacity above 1320MW connected through a single HVDC converter. This cost, based on the analysis presented in Workgroup discussions, is capped at approximately £12m/annum based on a £3.7/MWh price for the relevant frequency response service[2].

This modification is essential to deliver the benefits offered by the Holistic Network Design (HND) which include £5.6bn savings, a 33% reduction in the environmental footprint of offshore connections, and a 2 million tonne reduction of CO_2 emissions between 2030 and 2032.

Considering that

- the operational impacts of an increase of the maximum loss of infeed risk for an offshore DC converter is manageable through procurement of additional frequency response services.
- the cost of these services is unlikely to exceed £12m/annum; and
- the economic and environmental benefits facilitated by such increase are significant.

[1] March 2029 according to the Transmission Entry Capacity Register

[2] Dynamic Containment is the frequency response service that is likely to be used to manage the risk identified.

It is proposed to modify clauses 7.7.2 and 7.12.2 of the NETS SQSS to refer to the infrequent loss of infeed risk instead of the normal loss of infeed risk.

What is the impact of this change?

Proposer's assessment against SQSS Objectives	
Relevant Objective	**Identified impact**
(a) facilitate the planning, development and maintenance of an efficient, coordinated and economical system of electricity transmission, and the operation of that system in an efficient, economic and coordinated manner;	**Positive** The proposed change will facilitate better optimisation of the offshore network designs.
(b) ensure an appropriate level of security and quality of supply and safe operation of the National Electricity Transmission System;	**Neutral** There will be an increased level of frequency excursions however there is a mechanism to reduce these if necessary. The cost of ensuring this modification is neutral to the frequency excursions is outweighed by the benefits delivered by optimisation will outweigh that cost.
(c) facilitate effective competition in the generation and supply of electricity, and (so far as consistent therewith) facilitating such competition in the distribution of electricity; and	**Neutral**

(d) facilitate Licensees to comply with any relevant obligations under Assimilated law	**Neutral**

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	**Neutral**
Lower bills than would otherwise be the case	**Positive** The facilitation of the implementation of the designs recommended by HND will reduce costs to consumers. In addition, radial offshore windfarm designs would have better flexibility to optimise their designs as they would be able to connect larger capacities using single converters.
Benefits for society as a whole	**Positive** The proposal will accelerate progress towards Net Zero and will help reduce carbon emissions.
Reduced environmental damage	**Positive** A reduction in landing points and cable routes will reduce environmental damage.
Improved quality of service	**Neutral**

Code Administrator Consultation Summary

The Code Administrator Consultation was issued on 05 November 2025, closed on 19 November 2025 and received four non-confidential responses and no confidential responses. A summary of the responses can be found in the table below, and the full responses can be found in **Annex 04**.

Code Administrator Consultation summary	
Question	
Do you believe that the GSR034 Original Proposal better facilitates the SQSS Applicable Objectives?	All four respondents believed objective (a) was better facilitated by the Original Proposal than the baseline. One of these respondents also believed objective (c) was better facilitated by the Original Proposal than the baseline.
Do you support the proposed implementation approach?	All four respondents supported the implementation approach. One respondent highlighted it aligns with current NESO processes and therefore did not anticipate any major obstacles.
Do you have any other comments?	All respondents were supportive of the proposal noting that changing the restriction on power loss for offshore DC converter outages is expected to improve transmission network development, optimise offshore network design, and lower consumer costs by enabling the connection of more offshore wind capacity via single converters. This change supports the move

	to Net Zero, reduces environmental impacts through fewer landing points and cables, and encourages the use of larger HVDC links, which boosts clean energy transmission and cost competitiveness. Two respondents highlighted that although frequency excursions may rise, mitigation is feasible, and the benefits outweigh the costs.
Legal text issues raised in the consultation	
No legal text issues were raised.	

The Proposer contacted the respondent from SSE Generation to address the comments made in the consultation response. After the discussion, the Proposer agreed to update the Proposal section to enhance the clarity of the solution. The solution remains unchanged, and the respondent confirmed acceptance of the amendments.

Panel Recommendation vote

The Panel met on 05 December 2025 to carry out their recommendation vote.

They assessed whether a change should be made to the SQSS by assessing the proposed change and any alternatives against the Applicable Objectives.

Vote 1: Does the Original facilitate the Applicable Objectives better than the Baseline?

Panel Member: **Alan Creighton, Network Operator Representative**

	Better facilitates AO (a)?	Better facilitates AO (b)?	Better facilitates AO (c)?	Better facilitates AO (d)?	Overall (Y/N)
Original	Y	-	-	-	Y
Voting Statement					
The proposed change should result in a lower cost offshore network design with a relatively small increase in operational costs.					

Panel Member: **Claire Newton, NESO Representative**

	Better facilitates AO (a)?	Better facilitates AO (b)?	Better facilitates AO (c)?	Better facilitates AO (d)?	Overall (Y/N)
Original	Y	-	-	-	Y
Voting Statement					
This proposed modification facilitates optimisation of offshore network design, i.e. the designs recommended by the Holistic Network Design (HND) project, which is anticipated to reduce costs to consumers. It also facilitates the optimisation of radial offshore connections. Overall, this should accelerate progress to Net Zero.					

Panel Member: **Cornel Brozio, Onshore Transmission Owner Representative**

	Better facilitates AO (a)?	Better facilitates AO (b)?	Better facilitates AO (c)?	Better facilitates AO (d)?	Overall (Y/N)
Original	Y	-	-	-	Y

Voting Statement
This change will significantly reduce the investment cost and environmental impact of offshore HVDC connections. This outweighs the consequent increased operational cost.

Panel Member: **Garth Graham, Generation Representative**

	Better facilitates AO (a)?	Better facilitates AO (b)?	Better facilitates AO (c)?	Better facilitates AO (d)?	Overall (Y/N)
Original	Y	-	-	-	Y

Voting Statement
I believe that GSR034 would better facilitate Applicable Objective (a); whilst being 'neutral' in terms of (b), (c) and (d); and is, overall, better than the 'Baseline' as it will, in particular, ensure the planning, development and maintenance of the NETS is efficient and economical. This change is also expected to result in substantial savings to consumers as well as environmental benefits (as summarised at the bottom of slide 33 in the presentation to the December SQSS Panel meeting).

Panel Member: **Le Fu, Onshore Transmission Owner Representative**

	Better facilitates AO (a)?	Better facilitates AO (b)?	Better facilitates AO (c)?	Better facilitates AO (d)?	Overall (Y/N)
Original	Y	-	-	-	Y
Voting Statement					
The proposed change should help the design and operation of offshore networks.					

Panel Member: **Martin Brown, Offshore Transmission Licensee Representative**

	Better facilitates AO (a)?	Better facilitates AO (b)?	Better facilitates AO (c)?	Better facilitates AO (d)?	Overall (Y/N)
Original	Y	-	-	-	Y
Voting Statement					
Whilst changing the maximum offshore infeed loss could potentially increase the number of system disturbances, there are mitigations that can be put in place and making the change best facilitates the continued development of the transmission system, and the connection of green generation, at the least cost to the consumer.					

Panel Member: **Roddy Wilson, Onshore Transmission Owner Representative**

	Better facilitates AO (a)?	Better facilitates AO (b)?	Better facilitates AO (c)?	Better facilitates AO (d)?	Overall (Y/N)

Original	Y	-	-	-	Y

Voting Statement
We acknowledge the need to update the SQSS to reflect the increased scale of offshore generation projects and the associated HVDC connection technologies. The Proposal provides a pragmatic framework that better aligns with current and anticipated system development. While wider environmental or societal benefits may depend on project-specific circumstances and policy context, the technical case for revising the loss-of-infeed limit for offshore converters is well-presented and appears justified and we support the modification Proposal.

Vote 2 – Which option best meets the Applicable Objectives?

Panel Member	Best option	Which objectives does this option better facilitate? (If baseline not applicable).
Alan Creighton	Original	a
Claire Newton	Original	a
Cornel Brozio	Original	a
Garth Graham	Original	a
Le Fu	Original	a
Martin Brown	Original	a
Roddy Wilson	Original	a

Panel Conclusion

The Panel has recommended unanimously that the Proposer's solution is implemented.

When will this change take place?

10 Business Days after Authority Decision.

Interactions

☐Grid Code	☐BSC	☐STC	☐CUSC
☐European Network Codes	☐Other modifications	☐Other	

No interactions.

Acronyms, key terms and reference material

Acronym / key term	Meaning
BSC	Balancing and Settlement Code
CUSC	Connection and Use of System Code
DC	Direct Current
HND	Holistic Network Design
HVDC	High Voltage Direct Current
NETS	National Electricity Transmission System
OFTO	Offshore Transmission Owner
SQSS	Security and Quality of Supply Standards
STC	System Operator Transmission Owner Code

Annexes

Annex	Information
Annex 01	GRS034 Proposal Form
Annex 02	GSR034 Legal Text
Annex 03	GSR034 Background and Detailed Assessment Considerations
Annex 04	GSR034 Code Administrator Consultation Responses and Summary