GSR030

21 September 2023

Online Meeting via Teams


WELCOME

Modification Process

Teri Puddefoot – ESO Code Administrator

Code Modification Process Overview

Talk to us	Raise a mod	Refine solution	Consult	Decision	Implement
Forums	Panels	Workgroups (Workgroup Consultations)		Ofgem/Panel	

Objectives and Timeline

Teri Puddefoot – ESO Code Administrator

Objectives for GSR030 Workgroup 4

- SQSS Infeed Loss Risk Change Proposal
- Refine solutions and materials for Workgroup Consultation
- Workgroup Consultation questions
- Review Terms of Reference

Timeline for GSR030

Milestone	Date	Milestone	Date
Modification presented to Panel	09 November 2022	*Workgroup Report Showstopper*	*TBC – possible late January/early February*
Workgroup Nominations (15 Working Days)	14 November 2022 to 09 December 2022	Workgroup Report – Submission to Panel	06 March 2024*
Workgroup 1 Proposer's presentation, check Terms of Reference, initial review of legal text	20 January 2023	Panel sign off that Workgroup Report has met its Terms of Reference	13 March 2024*
Workgroup 2 Bipole, anchor drag risk, N-1-1 criteria	07 March 2023	Code Administrator Consultation	26 March – 24 April 2024 (20 days CAC to allow for Easter)*
Workgroup 3 Scoping for cost benefit and impact assessment	18 May 2023	DFMR Submission to Panel	3 July 2024*
Workgroup 4 Refine solution(s) and materials to be provided with Workgroup Consultation	21 September 2023	DFMR Panel Vote	10 July 2024*
Workgroup 5 Finalise Workgroup Consultation document	19 October 2023	FMR to Ofgem	23 September 2024*
Workgroup Consultation	31 October - 20 November 2023	Ofgem decision	TBC
Workgroup 6 Discuss consultation responses, refine solution and legal text	12 December 2023	Implementation Date	TBC
Workgroup 7 Finalise Workgroup Report and Legal text	16 January 2024	**subject to confirmation of 2024 SQSS Panel dates.* *WG6 could take place w.c. 27 Nov 2023 if the WG is ready, WG7 could be delayed if more time needed over Christmas to complete actions, and CAC period could be reduced to 15 days over Easter (extended to 20 days due to the holiday)*	

Actions

Action number	Workgroup Raised	Owner	Action	Comment	Due by	Status
9	WG2	MG	Provide detail on bipole / rigid bipole faults		WG4	Open
11	WG2	TP	Amend timeline		WG3	Open
12	WG3	TP	Send invite for next Workgroup meetings		WG3	Open
13	WG3	BA	A sentence should be added to an appropriate existing guidance note to ensure faults on metallic returns are addressed. Suggested sentence and suggested guidance note where this will sit to be provided,		WG4	Open
14	WG3	DB/BA	Determining an appropriate subsea cable separation distance to avoid a “double strike”. Commissions some independent work to come to a common position on behalf of all parties		WG3	Open

SQSS Infeed Loss Risk Change Proposal

Bieshoy Awad/Fiona Williams– National Grid ESO Code Administrator

Content

- Recap of progress so far
- Proposed text
- Orsted proposal re cable separation
- Work in Progress

Revised Definitions:

DC converter:

Any apparatus used as part of the national electricity transmission system to convert alternating current electricity to direct current electricity, or vice-versa. A DC Converter is a standalone operative configuration at a single site comprising one or more converter bridges, together with one or more converter transformers, converter control equipment, essential protective and switching devices and auxiliaries, if any, used for conversion. In a bipolar arrangement, where there is a common mode of failure that would cause a fault outage on either of the two poles to require the de-energisation of the other pole or where there are operational requirements that would mean that a planned outage on either of the two poles would require the other pole to be unavailable, a DC Converter represents the bipolar configuration. Otherwise, each of the two poles is a separate DC converter.

Revised Definitions:

Taking into account feedback provided by National HCDC Centre

DC High Speed Switch:

A high-speed switching device capable of operating within protection timescales to isolate the earth return of a bipolar DC link from either or both DC Converters of that link

Offshore Transmission Circuit:

Part of an offshore transmission system between two or more circuit-breakers and/or DC high Speed Switches which includes, for example, transformers, reactors, cables, overhead lines and DC converters but excludes busbars and onshore transmission circuits

Potentially, propose a similar revision for an Onshore Transmission Circuit provided that it doesn't have unintended consequences

Change to infeed loss risk

Why?

Assumption made during HND project, facilitates better use of offshore routes and landing points and better optimisation of offshore transmission assets

How?

- Change “normal” to “infrequent” in 7.7.2.1 and 7.7.12.1

Recap of Modes of Failure:

Common Modes of Failure

Electrical/Control
- Mitigated by design
- Guaranteed through definition of a single converter

Mechanical (cable separation)

Risk mitigated by design

Adequate separation and depth throughout the route

What are these parameters?

Other controls
+
A detailed risk assessment according to good industry practice showing an acceptable level of risk

What is an acceptable level of risk?

Risk not mitigated by design but managed through restrictions

Original proposal for mitigation of anchor drag risk

Offshore Cable Circuits Sharing a High Risk Route:

Two or more cable offshore transmission circuits that run within a distance of 250 meters from each other for a distance of 1000 meters where the likelihood of mechanical failure of one or more of the circuits due to an external unplanned event is more prevalent is above one event in 2500 years.

7.8.3 following the concurrent fault outage of any two cable offshore transmission circuits sharing a high risk route, the loss of power infeed shall not exceed the infrequent infeed loss risk;

Question, how to we define the length of the shared route to be considered an issue?

Question, if the 1 event per 2500 years is the likelihood of an anchor drag risk affecting one circuit, how would that translate into the risk of the event affecting two circuits?

If the acceptable risk of a DC trip is once every 1561 years per km, how does this translate for cables?

Orsted proposal for mitigation of anchor drag risk

1. Proposal for bipole separation
2. Proposal for cable separation for 2 separate projects

FRCR frequency response costings

- **Number of HVDC trip** is the assumed HVDC trips per year for a single 1800MW line.
- **Number of 49.5 Hz event** is the expected number of 49.5Hz events based on the current frequency policies.
- **additional_cost (£m)** is the additional Dynamic Containment costs to achieve the same security level with two 900MW lines.

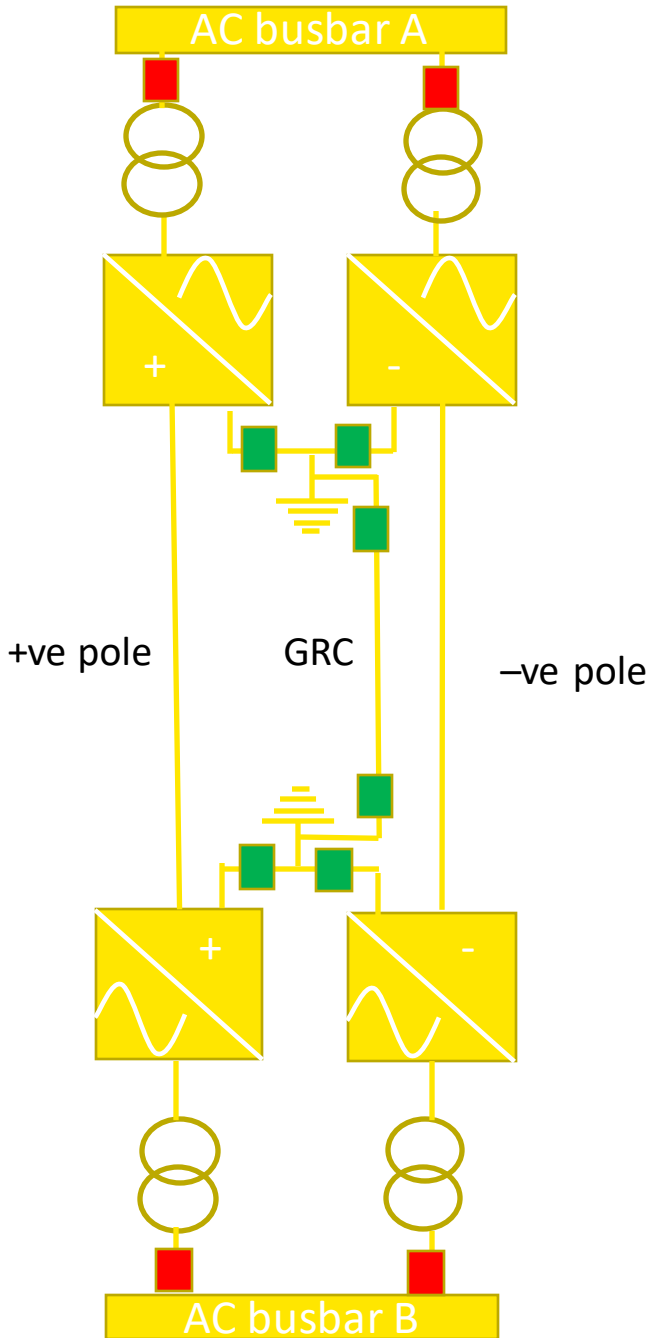
Number of HVDC trip	Number of 49.5 Hz event	Percentage of time additional response to be procured	additional_cost (£m)
0	1.59019151	0	0
1	1.931744021	0.179764479	6.698
2	2.273296532	0.235553456	8.772
3	2.614849043	0.262732701	9.792
5	3.297954065	0.289451281	10.778
10	5.00571662	0.313350928	11.679

For ref: Fault statistics data (probability) for comparison with anchor drag risk:

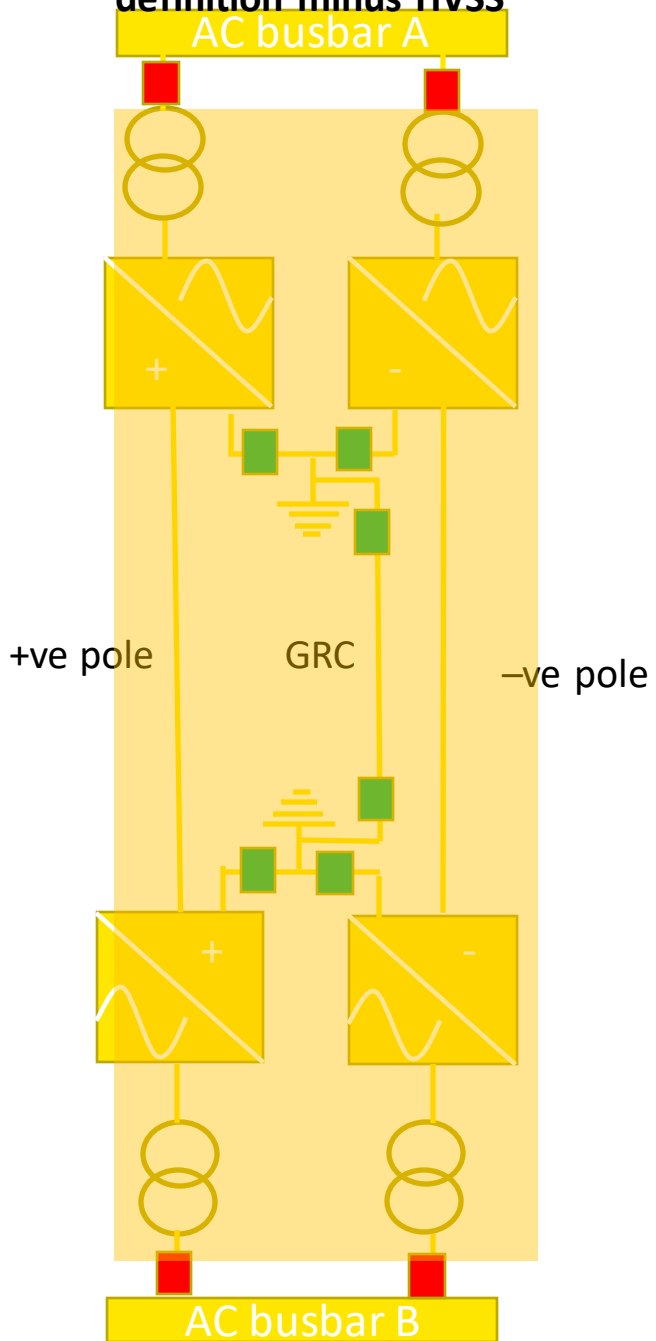
Voltage	132kV	275kV	400kV	All	No. of years between 2 consecutive faults/km
SC trip	1.40%	0.50%	0.42%	0.63%	159.8664
DC trip	0.16%	0.04%	0.03%	0.06%	1561.205
Busbar/mesh corner trip	0.51%	0.72%	0.78%	0.69%	145.082
cable	0.00%	0.06%	0.25%	0.09%	1067.807

Voltage	132	275	400
single circuit	4216.967	6101.662	12094.64
Double circuit	2108.484	2563.373	4227.012
busbar/mesh cornor	455	609	706
cable	244.5135	479.4718	237.0412

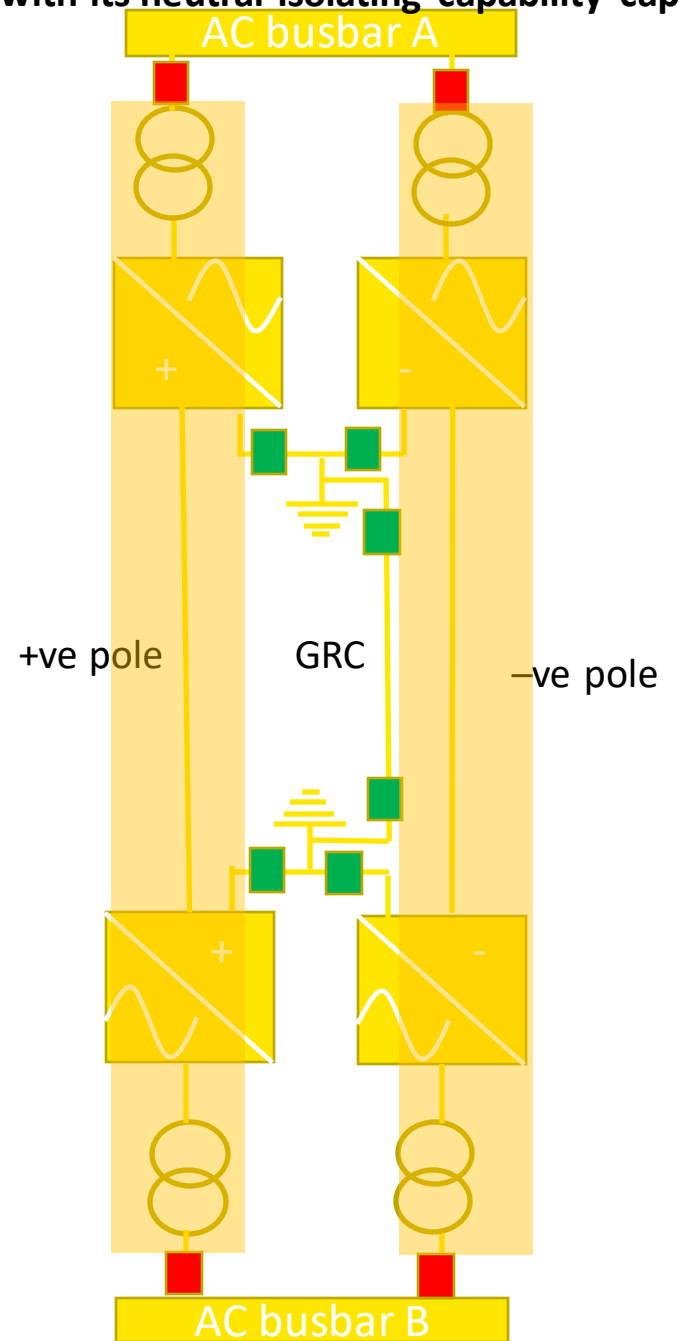
Illustrative bipole

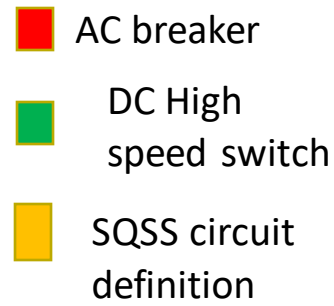


Illustrative bipole circuit definition minus HVSS



Illustrative bipole circuit definition with HSS included with its neutral isolating capability captured in text

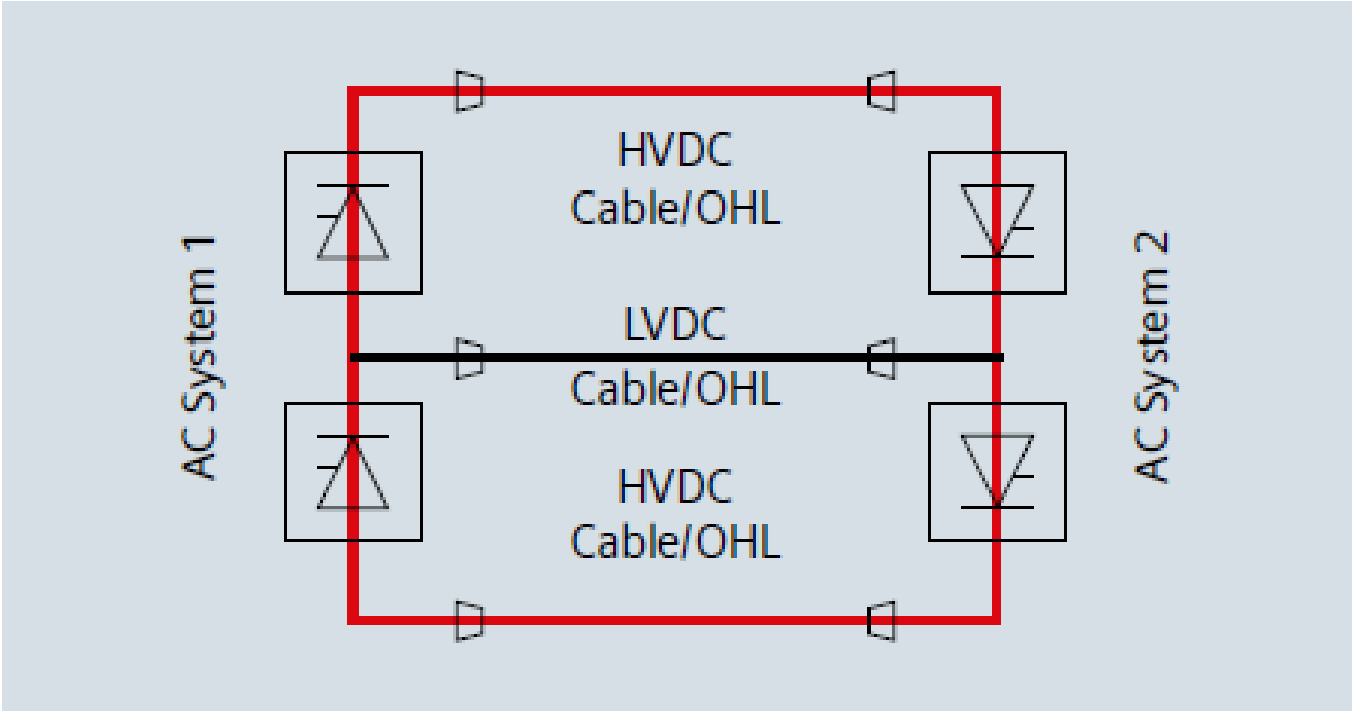




Is the N-1-1criteria sufficiently robust to ensure faults on metallic returns are addressed – feedback required

To be discussed by workgroup

7.8.2 following a *fault outage* of a single cable *offshore transmission circuit* during a *planned outage* of another cable *offshore transmission circuit* the further *loss of power infeed* shall not exceed the *infrequent infeed loss risk*.



Terms of Reference

Teri Puddefoot – ESO Code Administrator

Terms of Reference

Workgroup Term of Reference	Location in Workgroup Report (to be completed at Workgroup Report stage)
If there is no reliability data available, consider alternative ways of assessing the risks and the benefits for the increase of the loss of infeed risk.	
Consider risk-based approach for the specification of any restriction on the loss of infeed risk associated with multiple cables sharing the same route.	
Consider retrospective impact on existing cables.	

Workgroup Consultation Considerations

Teri Puddefoot – ESO Code Administrator

Any Other Business

Teri Puddefoot – ESO Code Administrator

Next Steps

Teri Puddefoot – ESO Code Administrator