Public

Code Administrator Meeting Summary

Workgroup Meeting 12: GSR030 – Offshore DC Connections

Date: 12 March 2025

Contact Details

Chair: Teri Puddefoot, Teri.puddefoot@nationalenergyso.com

Proposer : Bieshoy Awad, bieshoy.Awad@nationalenergyso.com

Key areas of discussion

Introduction

The Chair welcomed the Workgroup, confirmed quoracy, gave a brief overview of the objectives for the meeting, reminded the workgroup of their responsibilities.

Objectives and Timeline

The chair discussed the objectives and timelines of the modification with the Workgroup and suggestion was made for two more meetings approximately three weeks apart to conclude the remaining details.

Actions

Action 20: Narrative has been compiled, but a survey is still needed to assess the impact on existing cables. Action remains Open.

Action 22: Discussions around associated risks and costs are no longer relevant to the modification. Action Closed.

Action 23: The proposal has moved on and the report will move to review stage for any missed details. Action Closed.

Action 29: Workgroup members discussed the status of the slides from Workgroup 5, agreeing that to ensure they are not uploaded onto the website and to ensure they can be shared in future with relevant people. Action remains Open

Action 32: The Workgroup were requested to provide any additional information regards to Environmental or Economic benefits of the solution should they have any. Action Closed.

Action 37: The proposer provided an update on the action, stating that the diagrams had been checked, however a decision on the number of reasonable links would be required. Action Closed.

Action 39: Further review required in regard to the contacting offshore transmission zone transmission owners still remaining uncertain. Action remains Open.

Action 40: The proposer advised that the missing text had now been rectified and is now being reviewed to ensure justification of content. Action remains Open.

Action 41: The Proposer and TP to review the narrative around the retrospective application of clause 7.8.4. Action Closed.

Action 42: The proposer provided an update stating that the panel discussed the scope of creep and agreed to address this within the workgroup.

Action 43: The Workgroup discussed the feedback details from Workgroup 10, which raised concerns from a member about representation within the Workgroup. Agreement to capture this in the notes and seek panel view.

Terms of Reference

The Workgroup were reminded that the Workgroup Report must demonstrate where Terms of Reference have been met to avoid rejection by the panel. The focus should be on the Workgroup considerations section and awareness of some parts of the template still need tidying up. In particular, thorough review of the solution and Workgroup considerations to ensure that all viewpoints and discussions are accurately captured. This is crucial as you prepare to finalise the document for submission to the panel. The key points for review should include:

- **Proposal Solution**: This section should clearly outline the proposed solution, ensuring that all relevant details and considerations are included.
- **Workgroup Considerations**: It's important to capture everything discussed by the Workgroup, including differing views and any areas of potential disagreement to ensure a comprehensive and balanced representation of the Workgroup's discussions. Reviewing the document thoroughly to ensure accuracy and agreement of all Workgroup members to ensure all are comfortable with content.
- **Finalisation**: The focus should now be on finalising the document in preparation for submission to the panel, ensuring that the document is well-organized, clear, and comprehensive.

The Workgroup discussed changes to the document, including the addition of new sections and the restructuring of issues. The main changes involve the loss of infield risk for offshore DC converters and bipolar arrangements, as well as the impact on the national electricity transmission system related to rock off risk.

In some cases, there may be separation between cables in a trench, which can affect the frequency stabilisation and rock off. The loss of reactive capability due to losing both DC links is significant, as the converters cannot be used as start com without the cables. The impact of losing AC cables is less severe compared to DC cables.

- **Separation between cables in a trench** When cables are not exactly in the same trench, there is some separation which can lead to lower rock off due to frequency stabilization before the second cable gets hit.

- **Loss of reactive capability** Losing both DC links results in losing the reactive capability associated with them, as the converters cannot function as start com without the cables.
- **Impact of losing AC cables** Losing AC cables does not necessarily result in losing reactive compensation, making the impact less severe compared to DC connected wind farms.

The workgroup discussed the implications of mechanical damage to cables and the reconfiguration of converters to maintain capacity. The time scales for fault clearance and the role of DC link capacitors in ensuring sufficient charge.

The Workgroup raised concerns regards to lack of redundancy for reactive capability in Chapter 7 of the SQSS, arguing that there is no concept of loss of reactive capability in the current regulations. While reactive capability loss is not inherently problematic, it could cause voltage excursions if the system needs the full reactive capability of a second converter during a fault. Key points raised:

- **Concerns about Chapter 7 of SQSS** highlights that Chapter 7 does not address redundancy for reactive capability, and there is no concept of loss of reactive power within these regulations. 1 2
- **Voltage control and reactive power** maintaining voltage does not necessarily involve injecting reactive power, and there is no equivalent concept of losing reactive capability in Chapter 7. 3 2
- **Potential voltage excursions** loss of reactive capability from DC links could lead to voltage excursions if the system requires the full reactive capability of a second converter during a fault.

The Workgroup discussed the requirements of the SQSS (Security and Quality of Supply Standards) in relation to voltage limits and reactive power capabilities.

- **Voltage and Reactive Power Requirements** highlighted the need to stay within acceptable voltage limits and the importance of reactive power capabilities to meet peak requirements. However, there was confusion about whether the loss of reactive capability affects voltage compliance.
- **Scenario Explanation and Diagram Proposal** suggests explaining the worst-case scenario of voltage limit violations due to inadequate reactive power and proposes adding a diagram to clarify the issue.
- **Implementation and Risk Management for New Cables** would emphasise the need for mechanical protection to minimise damage risk. Suggestion of The Crown Estate and existing TOs (Transmission Owners) could provide necessary information for designing new cables, and the consideration given to risk level of existing cables.

The Workgroup discussed the generation connection capacity requirements, voltage control, reactive power, and the impact of faults on the electrical system. Key points raised:
Voltage Control and Reactive Power - maintaining voltage does not necessarily involve injecting reactive power, however Chapter 7 of the SQSS did not address the loss of reactive capability due to system trips.

Scenario Analysis - a scenario was discussed involving DC legs with a capability of ±600 megabars and the implications of losing one cable on voltage limits during outage planning. He describes the need for the second converter to provide maximum reactive capability to maintain voltage within limits.

Classification and Compliance the classification of large HPDC systems and their impact on reactive power loss. The Workgroup discussed the process of redefining circuits and reviewing compliance positions following mechanical damage to multiple cables.

Risk Assessment and Criteria raised concerns for the lack of specific criteria for compliance and the subjective nature of risk assessments.

Impact on Existing Projects raised question of significant impact on existing projects and gathering of public feedback on this issue.

Retrospective Application the proposal currently includes a retrospective application of the new criteria, with the intention to manage risks consistently for both existing / new assets and this approach is consistent with the usual practice under the SQSS.

Impact on Other Codes discussions in the Workgroup highlighted the need for changes to the STC to clarify procedures for classifying and declassifying shared subsea cable routes and managing non-compliance. Also, the consideration of the impact on the Grid Code, especially for offshore transmission users.

Scenarios and examples the proposer presented a number of scenarios to illustrate the impact of shared subsea cable routes on system compliance and operational costs, emphasising the restrictions would apply proportionally to the capacity of affected wind farms.

In conclusion, the Workgroup called for further discussion to address the unresolved issues and gather feedback from stakeholders with the aim to ensure that the proposed changes are practical and effective in managing the risks associated with the subsea cable routes.

Next Steps

The proposer and chair outlined the next steps for the Workgroup, including the finalisation of the Workgroup Consultation Report, addressing any missing information and preparing for the next Workgroup. Emphasising the importance of reviewing the Workgroup Consultation Report, particularly the workgroup considerations section, and ensuring all comments and discussions are captured.

Proposer to look at sanitising the section on retrospective application to remove specific project names and sensitive details.

Actions

Action Number	Workgroup Raised	Owner	Action	Due by	Status
44	WG12	BA/BM	Develop text regards loss of reactive capability and ensure accuracy	WG13	Open
45	WG12	BA	Create and share with Workgroup a diagram explaining worst-case scenario related to voltage limits and reactive capability	WG13	Open
46	WG12	ALL	Workgroup to review and decide if Annex 3 (including draft proposal for STC) should be deleted from the report.	WG13	Open
47	WG12	TP	Add a section in the report for Workgroup Consultation questions and gather suggestions from responses	WG13	Open
48	WG12	ALL	Review the Workgroup Consultation Report, focussing on the justification of the 1800MW section and provide feedback	WG13	Open
49	WG12	BA/NN	Nicola expressed concerns about the process of reclassifying and declassifying cables based on risk assessments. Consider how to develop a more structured approach to the assessment process.	WG13	Open

49	WG12	BA	Draft email to Panel to gain their views on the representation within the Workgroup to avoid issues on the day of submission.	WG13	Open

Attendees

Name	Initial	Company	Role
Teri Puddefoot	TP	NESO	Chair, Code Administration
Karen Stanton-Hughes	KSH	NESO	Tech Sec, Code Administration
Bieshoy Awad	BA	NESO	Proposer
Ben Marshall	BM	National NVDC Centre	Workgroup Member
George Arvanitakis	GA	XLinks	Observer
Gideon Miti	GM	Compliance Team	Observer
Marko Grizelj	MG	Siemens Energy	Workgroup Member
Mick Clowns	MC	RWE	Observer
Nicola Barberis Negra	NN	Orsted	Workgroup Member
Roddy Wilson	RW	SSEN Transmission	Workgroup Member
Steve Baker	SB	NESO	Workgroup Member / NESO Representative
Xia Ping Zhang	XZ	Birmingham AC	Workgroup Member