Newsletter

Issue 42: Autumn 2025 Edition

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The National HVDC Centre

Welcome to our autumn edition of the HVDC Centre newsletter; where we discuss some of our multi-terminal projects (MPIs and Energy Islands), some of our innovation projects (Network DC and BLADE), along with training, our summer placement programme (pictured above) and welcoming our newest engineer.

Simon Marshall

The Centre at CIGRE

This newsletter marks the start of my tenure as CIGRE working group B4 UK liaison; and I'm looking forward to the opportunity to further support and influence the direction of standardisation and promotion of best practice across HVDC and FACTs devices that CIGRE represents.

The Centre has long been affiliated with CIGRE work across B4, B5 and C4 committees. We have two papers due to be presented to the CIGRE Montreal session; one describing processes and procedures associated with Project Aquila, and another further elaborating upon our real-time analysis of Energy Island infrastructure in collaboration with National Grid Ventures.

One of the strengths of the Centre is we do not undertake such work for the intellectual fun of it. We do it to support partner organisations within the industry. It's through that lens that I also look back with some satisfaction on our influence upon approaches towards small signal analysis, grid forming adoption and offshore performance specifications within our codes and standards in recent months.

It's in leveraging our simulation and peoples' unique capabilities to relevant industry challenges that we add best value.

Ben Marshall

Summer Placements

This summer, we were delighted to host placement students Jia Jing Sang and Kieran O'Donnell at The National HVDC Centre as part of SSEN Transmission's Summer Placement Programme. With access to our cutting-edge simulation facilities and guidance from our expert team, they contributed to ongoing projects, gained valuable industry experience, and explored how the HVDC Centre and SSEN Transmission support the energy transition to net zero.

A highlight of the programme was when Jia Jing and Kieran organised a visit to the Centre for all summer students (pictured above), a fantastic achievement that showcased their leadership and teamwork. We were proud to provide a platform for them to share our facilities and culture with others.

At the HVDC Centre, we strive to be a place where young engineers can grow, contribute, and be inspired. If you're interested in working with us, please follow our LinkedIn page.

A huge thank you to Jia Jing and Kieran for their enthusiasm; we wish them every success in the year ahead!

Shangen Tian

To find out more, please contact us to discuss or to arrange a visit:
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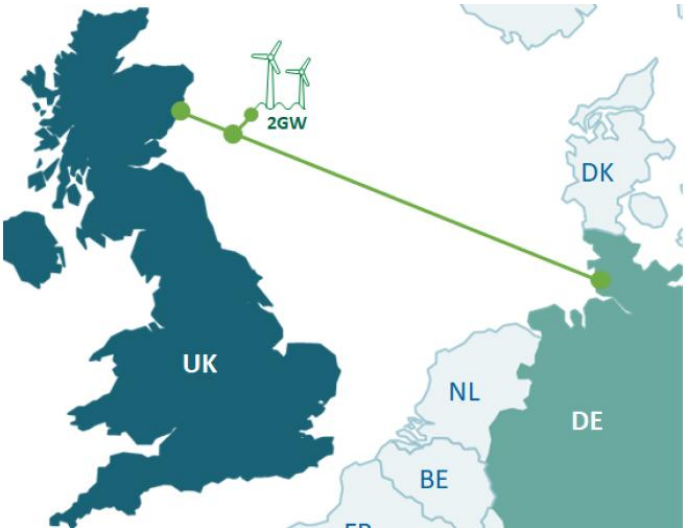
The National HVDC Centre

De-Risking Multi-Terminal Rigid Bipoles

Multi-Purpose Interconnectors (MPIs) or Offshore Hybrid Assets (OHAs) are fast becoming the foundation of Europe's strategy for an integrated, resilient, and decarbonised offshore power grid. Projects such as Nautilus, EuroLink, and LionLink combine cross-border interconnectivity with large-scale Offshore Wind Farm (OWF) integration, which offers efficiency and cost benefits, saving cables and converters otherwise needed with only point-to-point solutions.



Such HVDC connections are more cost-effective if executed in a rigid bipole configuration, without a Dedicated Metallic Return (DMR) cable. This saves on cable material and laying costs but gives a lower level of system resilience.

The HVDC Centre recently completed a feasibility study for a multi-purpose HVDC interconnector between Germany and the UK in collaboration with WindGrid, who focus on the development, construction, ownership and operation of electricity transmission infrastructure. The studies in real-time EMT simulation used in-house, vendor-agnostic models developed through previous projects like Aquila and adapted for the proposed rigid bipole design.

The simulation results indicate that the proposed design and operational strategy for the project is feasible. Nevertheless, there are other issues to be investigated, such as OWF and interconnector frequency response, provision of other ancillary services, and the finer details of OWF islanding control and neutral voltage control. These are planned to be addressed in the coming year in the "HVDC Wind Connect" SIF project.

Mohamed Elgenedy

HVDC Centre Training

On 4 September 2025, we hosted another successful "Introduction to HVDC and Project De-risking" training course with attendees from Ofgem, all three TOs and NESO, plus others. Feedback was overwhelmingly positive, with several attendees noting the clear and engaging presentations. One of the Ofgem attendees described the Centre as "a huge positive for Scotland, truly world-leading."

"Introduction to HVDC and Project De-risking" training courses are planned for 27 November and 4 December. In addition, the Centre aims to deliver a one-day training course on replicas and real-time simulation before the end of the year. Please check our website for more information and to register for upcoming events.

Mohamed Elgenedy

Energy Islands at CIGRE Montreal

The Centre's collaborative work with National Grid Ventures (NGV) on Energy Islands will be presented at the upcoming CIGRE Symposium in Montreal, highlighting the key findings from simulations of multi-terminal HVDC interconnectors, focusing on fault performance of modular multilevel converters (MMCs) and offshore wind farms.

It compares DC fault isolation methods using both DC and AC circuit breakers and evaluates fault ride-through strategies for the non-faulted pole in bipolar configurations. This follows a paper at the CIGRE Paris Session in 2024, also in collaboration with NGV, which assessed operational challenges of four-terminal Multi-Purpose Interconnectors (MPIs) in low short-circuit conditions.

This research contributes to the growing body of knowledge on offshore transmission networks, which are essential for enabling large-scale renewable energy sharing across borders. Building on the success of the MPI and Energy Island projects, the Centre and NGV are now exploring opportunities for Energy Island Phase 2. The next phase will focus on deeper analysis of control and protection strategies for complex HVDC systems in multi-terminal configurations, supporting the development of future-proof offshore grid solutions.

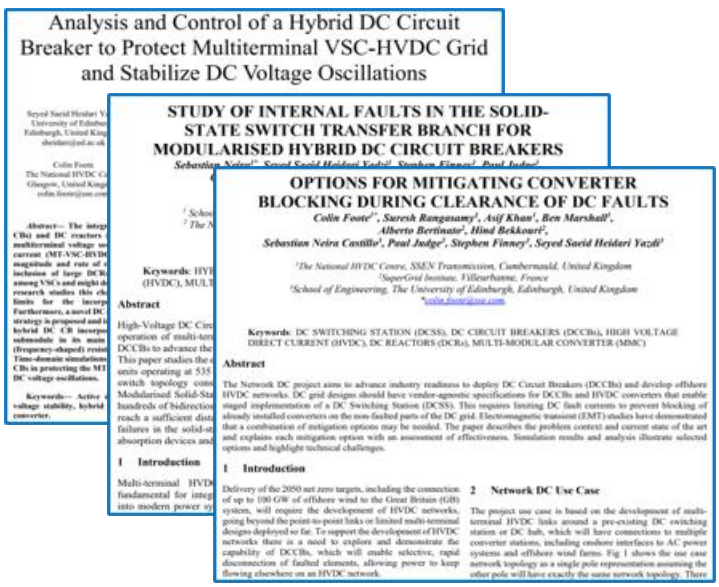
Asif Khan

The National HVDC Centre

Network DC (SIF)

DC Circuit Breakers will make possible new designs and operating strategies for HVDC connections as they develop into much more complex and sophisticated networks. However, DCCBs are an innovative technology untested in the GB and European markets. The Network DC project is investigating and demonstrating the use of DCCBs and developing industry knowledge on the available designs and their expected reliability and costs. The HVDC Centre is leading on demonstrating performance of DCCBs with detailed testing of generic and proprietary models and hardware to explore protection and control philosophies for DC grids.

The project recently went through a Stage Gate review with Ofgem. This highlighted the strong technical progress made by the HVDC Centre working in collaboration with the University of Edinburgh and SuperGrid Institute, resulting in a set of reports evidencing a robust protection and control concept, with comprehensive studies confirming the feasibility and resilience of DCCBs under diverse fault conditions. The findings provide a robust foundation for the next phase of the project, which is planned to involve real-time testing of proprietary OEM models of DCCBs, hardware-in-the-loop validation, and continued OEM collaboration on DCCB designs and functional specifications. The DCCB specification and the key features of the control and protection philosophy for the DC grid will continue to evolve as the project progresses to its end goal of enabling the use of DCCBs in proposed transmission network development in GB.


Analysis and Control of a Hybrid DC Circuit Breaker to Protect Multiterminal VSC-HVDC Grid and Stabilize DC Voltage Oscillations

STUDY OF INTERNAL FAULTS IN THE SOLID-STATE SWITCH TRANSFER BRANCH FOR MODULARISED HYBRID DC CIRCUIT BREAKERS

OPTIONS FOR MITIGATING CONVERTER BLOCKING DURING CLEARANCE OF DC FAULTS

The project has also resulted in co-authored papers at the IET ACDC and IEEE PowerTech conferences, illustrating the HVDC Centre's ongoing commitment to knowledge dissemination and industry engagement.

Colin Foote

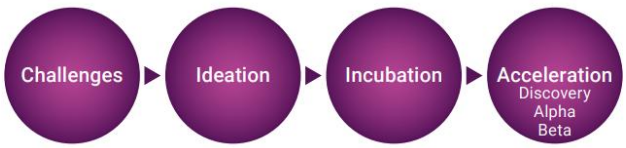
BLADE (SIF)

Innovate UK ofgem

On 9 September, the SIF BLADE innovation project convened a consortium update meeting in London, marking a key milestone in its Beta phase. The session brought together delivery partners to share interim progress across the project's work packages, with a particular focus on the technical feasibility of black start restoration from offshore wind farms.

Adam Scott presented the HVDC Centre's latest contributions to WP8, highlighting PSCAD simulation efforts assessing energisation and restoration feasibility from HVDC-connected offshore wind. These studies are central to understanding the dynamic behaviour and control challenges of such systems under black start conditions.

Complementary updates explored broader dimensions of the project, including cost-benefit analysis, the operational challenges posed by wind energy availability, and the evolving landscape of restoration planning. NESO provided valuable insights into current practices for instructing local joint restoration plans, developed in collaboration with GB Transmission Owners and Distribution Network Operators.



The SIF innovation process

The meeting underscored the collaborative momentum driving SIF BLADE forward, as partners continue to refine technical, economic, and procedural pathways for integrating offshore wind into future restoration strategies.

Adam Scott

Welcome

The HVDC Centre is delighted to welcome **Ben Rooney** to the team. Ben joins the HVDC Centre on the Graduate Programme, as a graduate from Newcastle University's Power Systems Group where he focussed on HVDC reliability studies and modelling techniques as a research assistant.

He holds a Bachelor of Engineering degree in Electrical Power Engineering with experience working for TNEI Group on HVDC projects and studies as part of the Grid Connections team.