



Welcome to the Summer edition of our newsletter; as we are enjoying a partial reopening of the Centre (with a range of mitigations in place). In this newsletter we are excited to share some of the latest developments in our projects, along with news about the future of the Centre, and our ongoing dissemination activity.

On 3 July, we were delighted to receive Ofgem's determination on the future of The National HVDC Centre.

This determination provides certainty and direction for the Centre's activities across the RII0-T2 period and an endorsement from Ofgem of the importance of these activities in supporting our net zero targets. *Ofgem's determination can be found here:*

<https://www.ofgem.gov.uk/publications-and-updates/decision-future-operation-hvdc-centre-following-end-nic-funding-period>

At such a significant milestone in the Centre's life, it's worth pausing and taking stock. Back in 2013, when the MTTE project was conceived, we had limited sight of how broadly the Centre would support the industry: ranging from supporting Distributed ReStart in its analysis of new and novel black start using convertors and conventional

resources, to designing the approaches for integrated offshore networks (with both OWIC and the ESO).

The National HVDC Centre is currently a key member of a consortia supporting the ESO in developing the designs and control principles that will enable integrated offshore connections to meet 2030 and 2050 environmental targets; this marks the beginning of a journey of increasing HVDC and convertor installation which will increase in pace over the next 5 years and beyond. *Details of this project can be found here:* <https://www.nationalgrideso.com/future-energy/projects/offshore-coordination-project>

Just as we look back to 2013 and see the beginnings of the Centre so different to today, I am sure we will do the same in 5 years time, and we will continue to work with you all to shape that future.

Ben Marshall

Technical Webinars

The National HVDC Centre delivered the following technical webinars to industry stakeholders.

- 16 & 24 April 2020: Real-Time Simulation for De-risking HVDC. Co hosted with RTDS Technologies. *Slides and recording available at:* <https://www.hvdccentre.com/rtds-webinar/>
- 13 May 2020: Demonstration of DC Grid Protection. Co-hosted with PROMOTioN WP9 Partners. *Slides and recording available at:* <https://www.hvdccentre.com/demonstration-of-dc-grid-protection-promotion-wp9-13-may-2020/>
- 30 June 2020: Offshore Co-ordination Project Conceptual design & unit cost for technology. Hosted by National Grid ESO. *Slides available at:* <https://www.nationalgrideso.com/document/172396/download>

- 8 July 2020: Considerations for Development and Integration of HVDC in GB. Hosted by Cigre UK. *Slides available at:* https://drive.google.com/file/d/1TMwiFPlr5W-5KAYz_R4EjaFIUeOwAqI3/view

Also, coming-up:

- At the IEEE PES 2020 General Meeting virtual conference (3-6 August 2020), Ben will present on real-time testing environments for utilities;
- At the CIGRE 2020 e-session (31 August to 1 September 2020), Daniel will present a paper on the key considerations for multi-vendor extension and testing of HVDC schemes; and
- As the PROMOTioN project comes to its conclusion there are many upcoming online events. On 9 September will be our final demonstration event.

To find our more, please contact us to discuss or to arrange a visit:

01236 687240 | info@hvdccentre.com | hvdccentre.com

Completed Innovation Projects

In 2019, The National HVDC Centre funded three innovation projects to support the de-risking of HVDC projects in GB. The Centre is pleased to share the outputs from these projects.

Stability Assessment and Mitigation of Converter Interactions (Phase 1)



The University of Strathclyde developed frequency domain network/converter models for small signal stability analyses and time-domain validations of stability assessments when obtaining frequency domain HVDC converter models. The key outcomes of the project are recommendations for specifications and operation requirements of converter models and advice to HVDC projects connecting to the GB network on stability issues. *Project associated reports are available at:* <https://www.hvdccentre.com/hvdc-stability-assessment/>

Coordination of AC network protection during HVDC energisation



EPRI investigated how relay/protection types impacts AC network protection during HVDC energisation, especially when the network short circuit strength is low. In this project, a case study on the Scottish transmission system is considered to study the implications for protection devices operating in the unique scenario where the network is restored from a HVDC scheme. *All reports are available at:* <https://www.hvdccentre.com/ac-protection-dc-energisation/>

Improving Grid Code for HVDC schemes



Cardiff University studied and tested improved specifications and requirements for the operation and integration of HVDC schemes on the GB network. The outcomes of the project provide guidelines for the recommended operational regions for a safe and stable HVDC interconnection without jeopardising the power system security and reliability. *All reports are available at:* <https://www.hvdccentre.com/hvdc-grid-code-compliance/>

Habibur Rahman

Distributed ReStart

Distributed ReStart is a Network Innovation Competition (NIC) funded project in partnership with National Grid ESO, Scottish Power Energy Networks (SPEN) and TNEI. The project explores how Distributed Energy Resources (DER) in the GB network could be used to restore power in the highly unlikely event of a total or partial blackout of the GB's transmission system.



The National HVDC Centre has been selected by SPEN to perform dynamic simulation of these restoration scenarios using real time digital simulation. The Centre will perform Hardware-in-the-Loop testing of the newly developed innovative Wide Area Controllers that would be used to control the distribution network assets across different sites for Black Start in case of partial or full blackout. *More information are available here:* <https://www.nationalgrideso.com/innovation/projects/distributed-restart>.

Bharath Ponnalagan

New Innovation Projects

In June 2020, the Centre's Technical Advisory Board approved funding of two additional innovation projects to support de-risking of HVDC projects in GB.

Composite Testing of HVDC-connected Offshore Wind Farms



RTEi in collaboration with the Centre and ESO will undertake analytical studies to illustrate EMT phenomena, identify composite interactions between wind farms and HVDC system and provide a methodology to conduct EMT studies over the lifetime of a project. *Details available at:* <https://www.hvdccentre.com/composite/>

Stability Assessment and Mitigation of Converter Interactions (Phase 2)



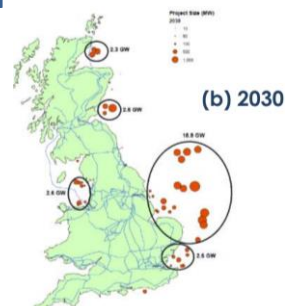
The University of Strathclyde will assess stability of classic HVDC converters and variable speed wind turbines, using the impedance modelling methods and tools developed across the 2019 Phase1 project. *Details available at:* <https://www.hvdccentre.com/stability-phase-2/>

It is expected that the projects will be completed by March 2021.

Oluwole Daniel Adeuyi

Offshore Wind Integration

The Offshore Wind Industry Council (OWIC) transmission group sought guidance from the Centre on options for de-risking integrated offshore transmission approaches in GB. The Centre, in consultation with industry stakeholders, led the publication of a report, which identifies that:



- Integrated offshore transmission is technically feasible for projects at design stage;
- Solutions can be built in stages to meet offshore wind growth and benefit the onshore grid; and
- Bipole HVDC with return cable option appear to offer greater flexibility and less export cables.

The full report was published on 25 June; *and is available at:* https://www.hvdccentre.com/wp-content/uploads/2020/06/De-risking-Integrated-Offshore-Networks_v2.0_25June2020.pdf

Furthermore, the HVDC Centre is part of a consortium with EPNC and led by DNV-GL delivering the Offshore Coordination Project, set up by the ESO (with support from Ofgem and BEIS) to assess the optimal approaches for offshore networks and improved outcomes for consumers.

Details of ongoing activities and upcoming webinars available at: <https://www.nationalgrideso.com/future-energy/projects/offshore-coordination-project>

Oluwole Daniel Adeuyi

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