

Introduction

Since our last newsletter, we have completed three major milestones at the Centre:

- 1) We have delivered our first operator training course (*the first in a programme of such courses*),
- 2) We have delivered our first external report (*for the Eastern Link project*); and
- 3) We have completed the UAT for the RTDS® system.

At the same time the team has focused on supporting the FST for the Caithness-Moray control and protection system, and undertaken studies to support and de-risk the project.

I also attended an excellent tutorial run by RTE in France, where they shared their experience of operating a VSC scheme (*thanks to Sébastien Dennetière and his team*).

Finally, from all the team here at the Centre, we wish you a joyful festive season, and our sincere thanks for your support over the last year.



Simon Marshall

This is the eleventh Newsletter for The National HVDC Centre, which aims to share the activity and learnings from the Centre.

Note from the Technical Director

The UK Energy markets have had an exciting few months. From KEPCO bailing out UK Government's nuclear ambition for construction of a nuclear power station in Cumbria, to Ofgem's rejection of a proposed subsea link; the notion of unlikely and likely has seamlessly alternated. Perhaps, what is at display is the uncertainty in such capital projects.

Ofgem's rejection of the 60MW DC link between the Shetland Islands and the Scottish Mainland is due to recent changes in EU's Industrial Emissions Directive (IED). The tougher emissions target will only apply to Lerwick Power Station in 2030. Also, eligibility of remote islands to compete in next CfD auction has prompted Ofgem to believe that security of supply could be provided by Lerwick station with some additional measures.

PROMOTiON project has successfully tested a mechanical DC Circuit Breaker (DCCB) at DNV-GL laboratory. The prototype 80kV DCCB successfully interrupted 16kA of current within 8.5 ms breaker opening time, and absorbing 1.5 MJ of energy. The RTDS® model of the DCCB will be used for simulation studies at the HVDC Centre.

Yash Audichya
Technical Director

Operator Training

The National HVDC Centre recently hosted Operators from SHE Transmission's Control Room for an introductory session on the operation of HVDC links; in preparation for the completion of the Caithness-Moray scheme.

The half day course began with sessions on HVDC fundamentals, components and

real time simulation. This was followed by a hands-on session where the operators could interact with an HVDC scheme in real time using our simulator.

Both the effect that changing settings of the HVDC scheme had on the network and the effects of network events, such as faults, had on the HVDC scheme could be explored with support from the simulation engineers.

Ian Cowan
Simulation Engineer



HVDC Capability Report

The Centre completed its first external report last month, the "HVDC Capability Report" for the Eastern Link Project.

This report aims to determine what HVDC technology will be feasible to deliver for the Eastern Link, through assessing the current and anticipated capability of the HVDC market.

The full report has been submitted for acceptance; once the report has been approved, a version will be made publically available.

Ian Cowan
Simulation Engineer



Finalist



FINALIST

We are proud to have been selected as a finalist for Utility Week's annual award for Capital Project Management. This recognises the project team's achievement of delivering the new Centre under budget, ahead of plan and with no safety incidents.



Services

We offer a range of services, including:

- **Studies;**
- **Training;**
- **Support;** and
- **Facilities.**

Please see our website for details of how you can use our services:

www.hvdccentre.com

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Why not follow us on Twitter @SSEN_FN where we will be tweeting live updates using #NationalHVDC

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Spittal Fault Level Studies

The Spittal end of the Caithness-Moray link is subject to a wide range of fault levels which can potentially reach low levels. This is due to the variable nature of the renewable generation in the region combined with the relatively weak AC connection to the rest of the MITS (Main Interconnected Transmission System).

As a result of this, the Centre was commissioned to investigate the extreme cases and look into key correlations which can readily identify these instances. Further to this, suggestions for potential methods of artificially increasing the fault level were sought. Work is currently underway to examine fault levels under a multitude of scenarios and the impact of different installation locations for fault level increasing equipment.

Ian Cowan

Simulation Engineer

Simon Marshall

Centre Manager

RTDS® UAT



As part of the acceptance procedures for the RTDS® system, we conducted User Acceptance Testing (UAT) of the new NovaCor™ hardware, to ensure that the system met the functional and performance requirements.

The UAT cases consists of scenarios which were built internally at The National HVDC Centre to verify: the simulation capacity of the new hardware, successful execution of large simulation cases with multi-rack configuration and the integration of the NovaCor™ system with the PB5 based racks.

The simulator passed all of the scenarios successfully.

Tarun Sharma

Simulation Engineer

Our Focus Areas

At the Centre, we focus on understanding complex HVDC schemes, and in particular:



- **Control Interactions:** De-risking control interactions between converters, and with other active controlled equipment;
- **Multi-Vendor:** Facilitating multi-vendor HVDC schemes;
- **Multi-Terminal:** Facilitating multi-terminal solutions, through developing expertise in their control and operation;
- **Training:** Training and developing engineers in the planning and operation of HVDC schemes;
- **Operational Diagnosis:** Diagnosing and resolving operational issues; and
- **Innovation:** Innovating and supporting the deployment of new HVDC technologies.

Progress on Caithness-Moray-Shetland Replica Panels

Factory Service Testing (FST) of the Caithness-Moray-Shetland control and protection replica panels is underway, with the final round of testing planned for January & February 2018.



Our simulation engineers will witness this testing at ABB's test facilities in Ludvika (Sweden), following which the replica panels will be dispatched to The National HVDC Centre (in April 2018).

The Centre Team have developed a real-time model of the transmission network, which will allow our simulation engineers to study a range of phenomena in the integrated AC-DC system; helping to de-risk the project during commissioning and operation.

Paddy McNabb

Simulation Engineer

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The National HVDC Centre