The National HVDC Centre
@ the LCNI Conference 2019
1. Overview
2. 5 Main Projects
3. Research Programme
4. Training, Engagement & Dissemination
The National HVDC Centre at LCNI 2019

The National HVDC Centre is an Ofgem funded simulation and training facility available to support the deployment and de-risking of all GB HVDC schemes.

AC Protection Coordination
12.00 on Day 1 (30th October)

Maximising HVDC for Black Start
15.30 on Day 1 (30th October)

HVDC Centre Impact
12.00 on Day 2 (31st October)
HVDC in GB (2019)
7 HVDC Links - Totalling: 8 GW

HVDC in GB (2028)
Up to 34 HVDC Links - Totalling: 45.45 GW

Source: National Grid Interconnector Register 01 08 2019
HVDC Centre: Building

Located in the centre of Scotland...

...our modern facility provides a bespoke simulation environment.
HVDC Centre: Technology

HVDC Replicas

Caithness
Moray
Shetland

PROMOTioN IEDs

Control Hardware

Protection Relays
HVDC Centre Team

Ben Marshall
HVDC Technology Manager

Simon Marshall
Centre Manager

Ruth Apps
Business Development Manager

Colin Cameron
ICT Engineer

Ian Cowan
Lead Simulation Engineer

Dr Oluwole
Daniel Adeuyi
Simulation Engineer

Habibur Raham
Simulation Engineer

Bharath Ponnalagan
Simulation Engineer
1. Overview

2. 5 Main Projects
   - Caithness-Moray Support
   - HVDC for Black Start
   - NSL Protection Coordination Testing
   - Stability Pathfinder
   - PROMOTioN

3. Research Programme

4. Training, Engagement & Dissemination
Caithness-Moray Support

Supporting the development, commissioning and ongoing operation of Europe’s first multi-terminal project.

Commissioned by: Scottish & Southern Electricity Networks
Maximising the use of HVDC schemes to improve Black Start and system energisation.
The HVDC Centre is supporting the protection co-ordination testing for the new HVDC North Sea Link interconnector to ensure the security and resilience of the GB electricity network.
Stability Pathfinder

Utilising HVDC to improve the stability of the electricity network.

Commissioned by: nationalgridESO
PROMOTioN – Project organisation

**Work packages**

- **WP1** – Requirements for meshed offshore grids - **TenneT**
- **WP2** – Grid topology & Converters - **RWTH Aachen**
- **WP3** – WTG – Converter interaction - **DTU**
- **WP4** – HVDC Grid Protection Systems - **KU Leuven**
- **WP5** – Test environment for HVDC CB - **DNV GL**
- **WP6** – HVDC CB performance characterisation - **UniAberdeen**
- **WP15** – HVDC GIS Demonstrator - **ABB**
- **WP16** – MWC Test bench demonstrator - **RWTH Aachen**

**WP9** – Protection system demonstration - SHE Transmission

**WP10** – HVDC Circuit Breaker demonstration - **DNV GL**

**WP11** – Harmonisation towards standardisation - **DTU**

**WP12** – Deployment plan for future European offshore grid - **TenneT**

**WP13** – Dissemination - SCW

**WP14** – Project Management - **DNV GL**

**The Road Ahead**
1. Overview

2. 5 Main Projects

3. Research Programme
   - Completed
   - Current
   - Future

4. Training, Engagement & Dissemination
Research Programme

Completed Innovation Projects
- Developing Open-Source Converter Models
  - University of Strathclyde
- Stability assessment for co-located converters
  - The University of Manchester
- Design of DC/DC Converter
  - University of Aberdeen

Current Innovation Projects
- Coordination of AC network protection during energization
  - EPRI (Electric Power Research Institute)
- Stability assessment and mitigation converter interactions
  - University of Strathclyde
- Improving Grid Code For HVDC
  - Cardiff University

Future Innovation Projects
- Investigation of Power Oscillation Damping Controls
- Complementing HVDC with synchronous condensers/ancillary equipment
- Assessment of AC protection performance with HVDC

Future Potential NIC Project
- Whole System Functional Acceptance Testing

Scottish & Southern Electricity Networks
**Training, Engagement & Dissemination**

### Training Programme
1. Control Room Training
2. Approved RTDS Training Centre
3. Introduction to HVDC Training
4. HVDC Engineer Training
5. PSCAD/PSSE Training

### Working Group Participation
1. IET ACDC Organisation Committee
2. OFTOs Working Group (ENA)
3. CIGRE (B4.82) Working Group
5. Annual HVDC Operators’ Forum

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The team presenting at the IET ACDC Conference (5-7 February)

Ian delivering RTDS training (30 April–2 May)

PROMOTioN DC Grid Demonstration Event (22 August)

Dave closing the CM Dissemination Event (28 March)

Daniel presenting at the 2019 HVDC Operators’ Forum (26-27 June)
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www.hvdccentre.com