



## Case Study: North Sea Link Protection Coordination Testing

The HVDC Centre supports the protection co-ordination testing for the new HVDC North Sea Link interconnector to ensure the security and resilience of the GB electricity network.

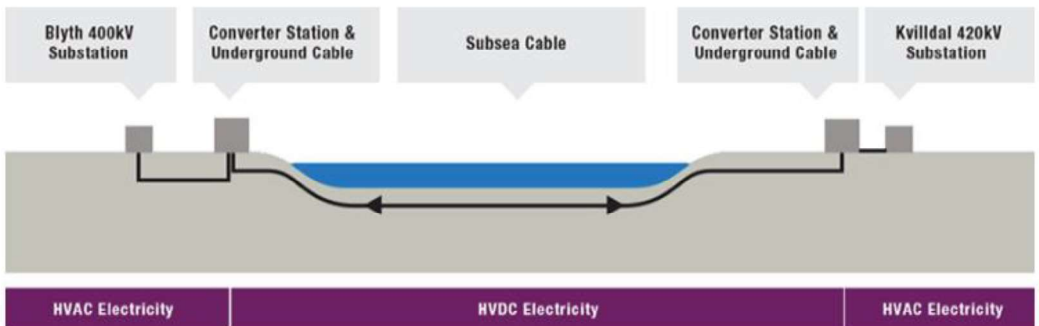
**The North Sea Link (NSL) is a new HVDC interconnector connecting Blyth in the north east of England, to Kvitldal in Norway.**

The introduction of a new HVDC interconnector onto the Grid network requires the surrounding AC network protection to be reconfigured, so that they operate appropriately to protect the network in the event of a fault.

Conventional protection setting calculations and protection testing would not reveal any unforeseen protection coordination problems near HVDC Converter Station.





Hence, to be confident that the reconfigured protection relays operate correctly, the HVDC Centre is testing them in a Real-Time (Hardware-in-the-Loop) simulation environment. The Real-Time Simulation environment in the HVDC Centre includes RTDS® and Power amplifiers.

Scottish Power Energy Networks (SPEN) and National Grid Electricity Transmission (NGET) considered it a critical requirement to test and validate the reconfigured protection system prior to NSL connecting to their transmission network; and commissioned The National HVDC Centre to undertake these protection studies.



## Testing Scenarios

To undertake these studies the HVDC Centre combined the following elements in their RDTs® simulation environment at the Centre, so that testing scenarios could be undertaken:

-  9 protection relays from the Eccles, Blyth and Stella West substations;
-  A model of the NSL Interconnector (provided by ABB);
-  A model of the series compensator (provided by GE); together with
-  Models of the AC network (provided by the ESO and Scottish Hydro Electric Transmission).

## Predicted Outcomes

The output from these studies is a set of recommendations on the protection and control of the reconfigured network.

The HVDC Centre sees such validation studies as becoming increasingly important to ensure the security and resilience of the GB electricity network as more HVDC links are connected.



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