

## De-risking of MTDC technology

### *Study committee B4*

### PS1-7 – Multi-Terminal & Hybrid (LCC+VSC) HVDC Systems

Question 1.11: Paper 10520 proposed a DC-side connection, via HVDC circuit breakers, of adjacent point-to-point HVDC links to de-risk VSC MTDC systems. *Are there other projects around the world to help de-risk MTDC systems?*

Staffan Norrga, SWEDEN

# De-risking MTDC technology – European projects

- Past projects: **BestPATHS**, **Twenties**
- **PROMOTioN** project 2016-2020
  - Protection systems for MTDC
  - Testing of full-scale DCCBs
- Current projects:
  - **Ready4DC** – coordination effort 2022-2023
  - New project (55 MEUR) to run 2023-2026
    - Will cover MTDC protection with focus on interoperability.

*DCCB alternatives investigated for the selective DC-side protection in PROMOTioN*

**Hybrid DCCB**



Illustration: 350 kV 16 kA  
Indoor  
2 ms breaker operation time  
Tested up to 350 kV, 20 kA  
Dimensions: 7 x 5 x 11 m

**Mechanical DCCB with active current injection**

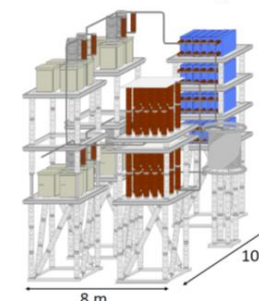


Illustration: 320 kV 16 kA  
Both in- and outdoor  
8 ms breaker operation time  
Tested up to 160 kV, 16 kA  
Dimensions: 8 x 10 x 9 m

**Voltage source converter assisted resonance DCCB**

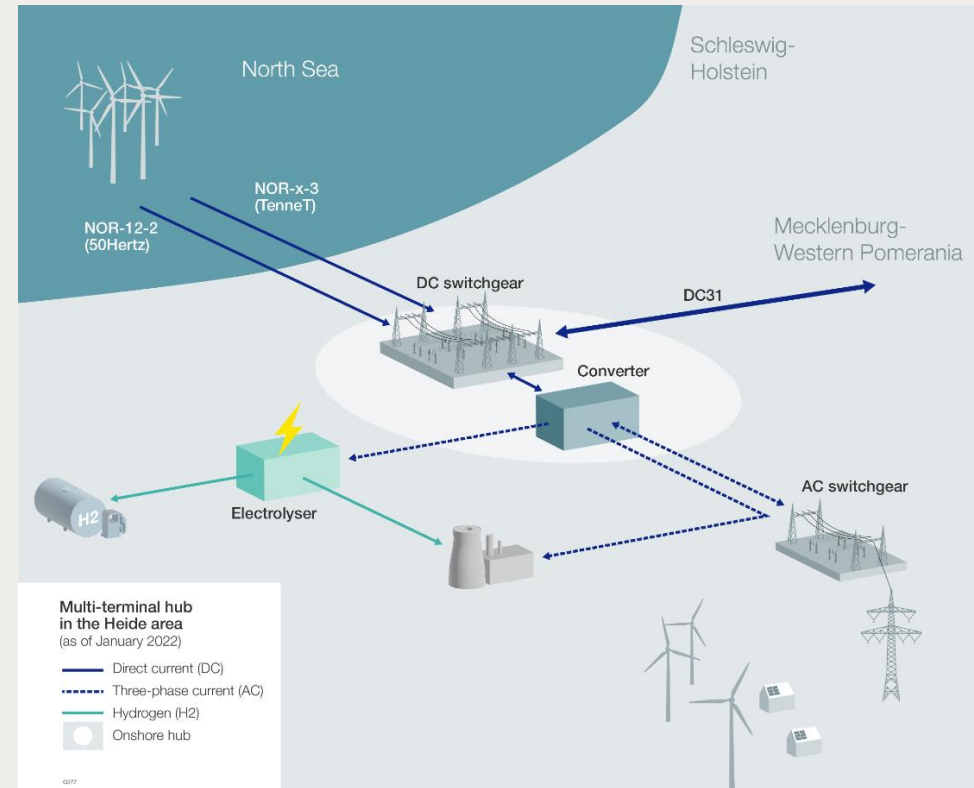


Illustration: 320 kV 10 kA  
Indoor  
2 ms breaker operation time  
Tested up to 80 kV, 12 kA  
Dimensions: 2 x 7 x 8 m

# De-risking MTDC technology – German Grid Development plan

## Example: Heide West Project

- Collaboration between TenneT and 50 Hertz GmbH
- Will include DC switching station
- DC switching station needed to fulfill grid code
- Included in German NEP



© TenneT 2021

Group Discussion Meeting

# MTDC projects in China

- *Example: Zhangbei project*
- Four-terminal HVDC grid with selective protection
- In operation since 2020
- First meshed HVDC grid
- Not true multivendor solution (all controllers from one vendor)

