



MEDOW Academic Training Lecture

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KU Leuven, Belgium

Present:

Universities/Member
Dr. Norman Macleod
MEDOW supervisors and ESRs
Postgraduate students from KU Leuven

Title:

Recent development in HVDC

By Dr. Norman Macleod of Parsons Brinckerhoff

Recorded by Gen Li

The theme of the lecture is to give us a general idea of recent development and challenges in HVDC.

Nowadays, the HVDC technology is developing rapidly for its merits:

- Interconnectors (between asynchronous systems)
 - ✓ System security
 - ✓ Energy trading
 - ✓ Balancing intermittent energy sources
- Embedded links (within a synchronous system)
 - ✓ Relieving congestion in AC corridors
 - ✓ Accessing renewable energy sources
- Off-shore Transmission
 - ✓ Connection to remote wind farms
- The European Supergird
 - ✓ Single European market

However, the HVDC technology is also facing challenges:

- Cost reduction ---- HVDC technology is too expensive to implement in some applications (e.g. off-shore)

- Technology

- ✓ HVDC circuit breaker ---- This is one of the major obstacles for building a DC grid. DC grid protection needs high voltage, fast and reliable DC circuit to interrupt DC fault currents.
- ✓ DC cables ---- At this moment, the highest voltage level of XLPE cable is 500 kV, higher voltage is needed to increase the rated power. Cable is very important for the development of HVDC technology.
- ✓ DC grid protection ---- The DC grid protection strategy is different from AC system protection. No proven strategy is widely accepted now. The protection of HVDC Over Head Line (OHL) is needed to be studied.

Dr. Norman also presented the manufacturing process of VSC cables and how to build an offshore wind farm. DC circuit breakers and converters (MMC) from different manufacturers were introduced as well. During the lecture, the audience discussed with Dr. Norman. The future of HVDC technology needs the efforts from researchers and manufacturers.

