

# COBRACable Interconnector

EC Workshop: Horizon 2050 power system  
and the role of HVDC technologies in a highly  
decentralised RES generation



February-4-2020

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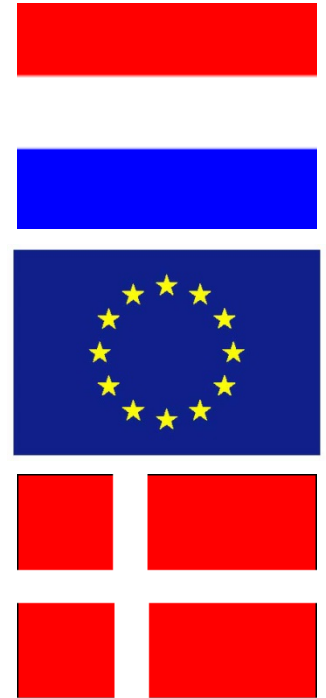


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# Key facts COBRAcable



- HVDC Interconnector between Denmark (Endrup) and the Netherlands (Eemshaven)
- Transmission capacity of 700 MW
- Joint project of Energinet.dk and TenneT
- Socialised cable
- EU: Project of Common Interest and Recovery Grant
- In operation 2019
- > 600MEUR



# Objectives



- Facilitating transport of renewable energy



- Lowering the cost of the transition to sustainable energy

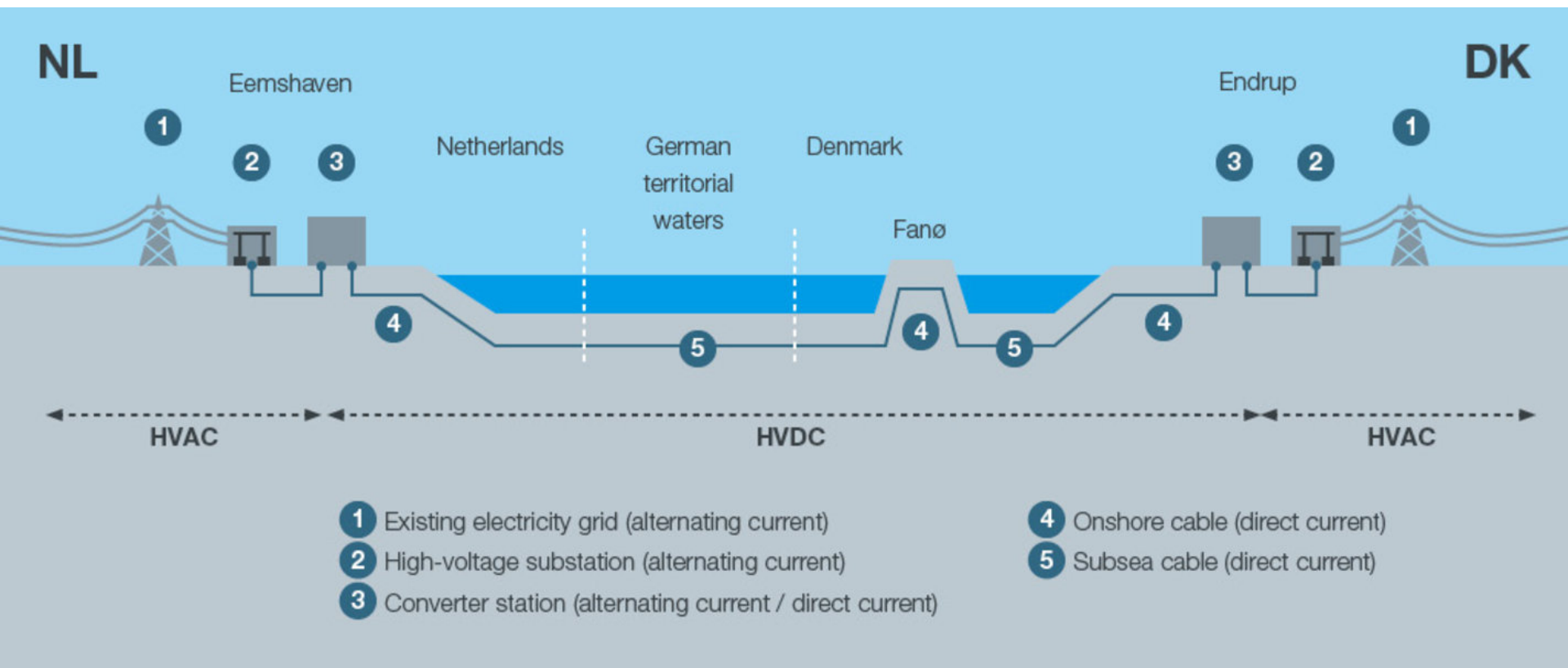


- Enhancing security of supply in Northwest Europe

- Creating a strong interconnected European electricity grid and enhancing the level playing field



# Technical concept



# COBRACable characteristics



Capacity:	+/- 700 MW, +/-230 Mvar (four-quadrant)
Voltage:	+/- 320 kV
Converter:	VSC MMC symmetrical monopole (Siemens)
Cable:	325 km XLPE (Prysmian)

Prepared for future connection of offshore windfarms

→ Multi-terminal operation

# COBRAcable characteristics



- Utilisation of inherent reactive power capabilities from operator level
- Fast and unlimited power flow reversals
- STATCOM operation
- Several ancillary services – control functions
- Very low transmission losses
- Operation without interstation communication
- Multi-terminal operation is investigated
- No overload capabilities
- No blackstart capability
- No filters or capacitor banks



# Development approach

- Interconnectors are business case driven developments
- Identical solution on both sides to reduce costs
- Several technical options to the main contract
- Maintenance (mainly) by own personnel
- Highly functional technical specifications
- Setting performance parameters determines optimum technical design, redundancy in critical components, spare parts, etc.
  - nominal transmission capacity
  - guaranteed losses,
  - guaranteed availability and reliability,
  - failure rates for critical components





# Lessons learnt

- Functional contractual requirements:
  - facilitate tender procedures and enhance competitiveness among tenderers, but:
  - leads to different interpretations and extensive technical discussions for optimising solution during execution phase
- Different countries lead to different expectations
  - HMI standardised or project specific
  - Detailed design for C&P system is challenging
- Balancing between functional requirements and specific solutions
  - Depending on knowledge, culture and experience of “Mother”-companies
  - Involvement of Maintenance and Operations departments

# COBRACable converter station (Eemshaven)



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