PROMOTioN
PROGRESS ON MESHED HVDC OFFSHORE TRANSMISSION NETWORKS

Progress On Meshed HVDC Offshore Transmission Networks

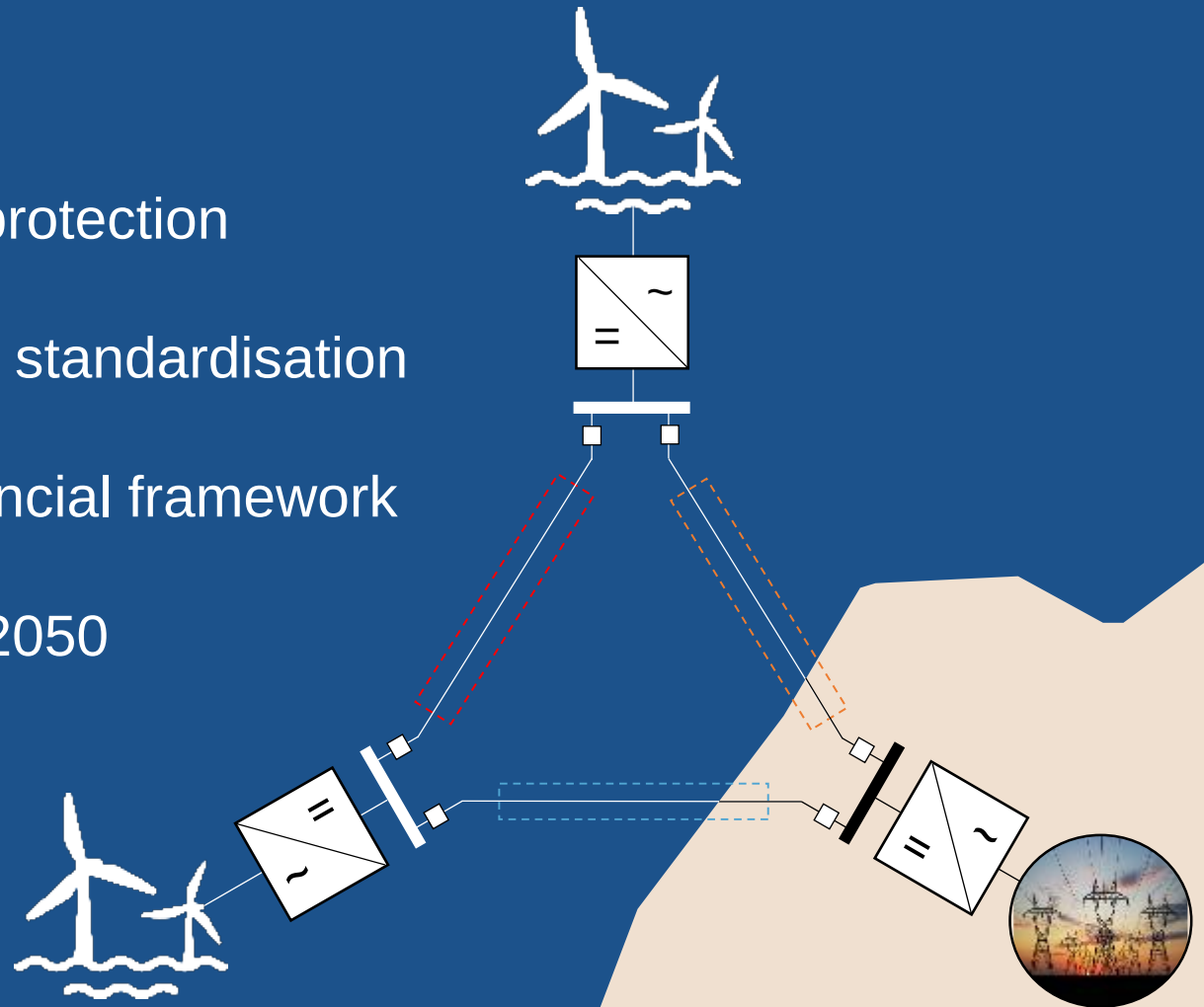
HVDC Workshop - DG Energy | Brussels | 4th of February 2020

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 691714.

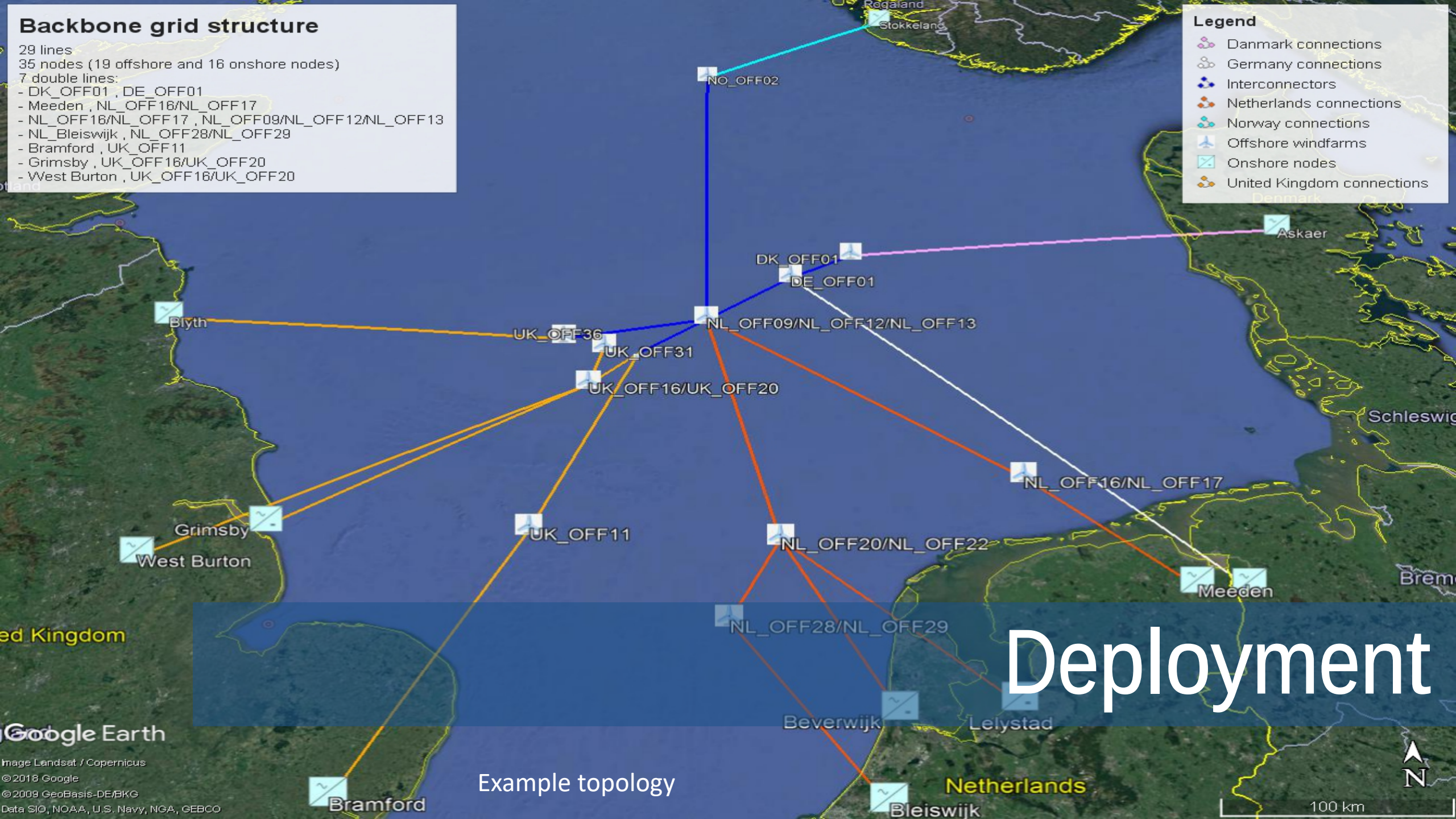
Progress on Meshed Offshore HVDC Transmission Networks

Enabling the North Sea power house

- Develop cost effective & reliable control & protection
- Achieve technology interoperability through standardisation
- Recommendations for EU regulatory & financial framework
- Deployment plan for implementation up to 2050
- Full scale technology demonstrations



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 691714.



Deployment

Example topology

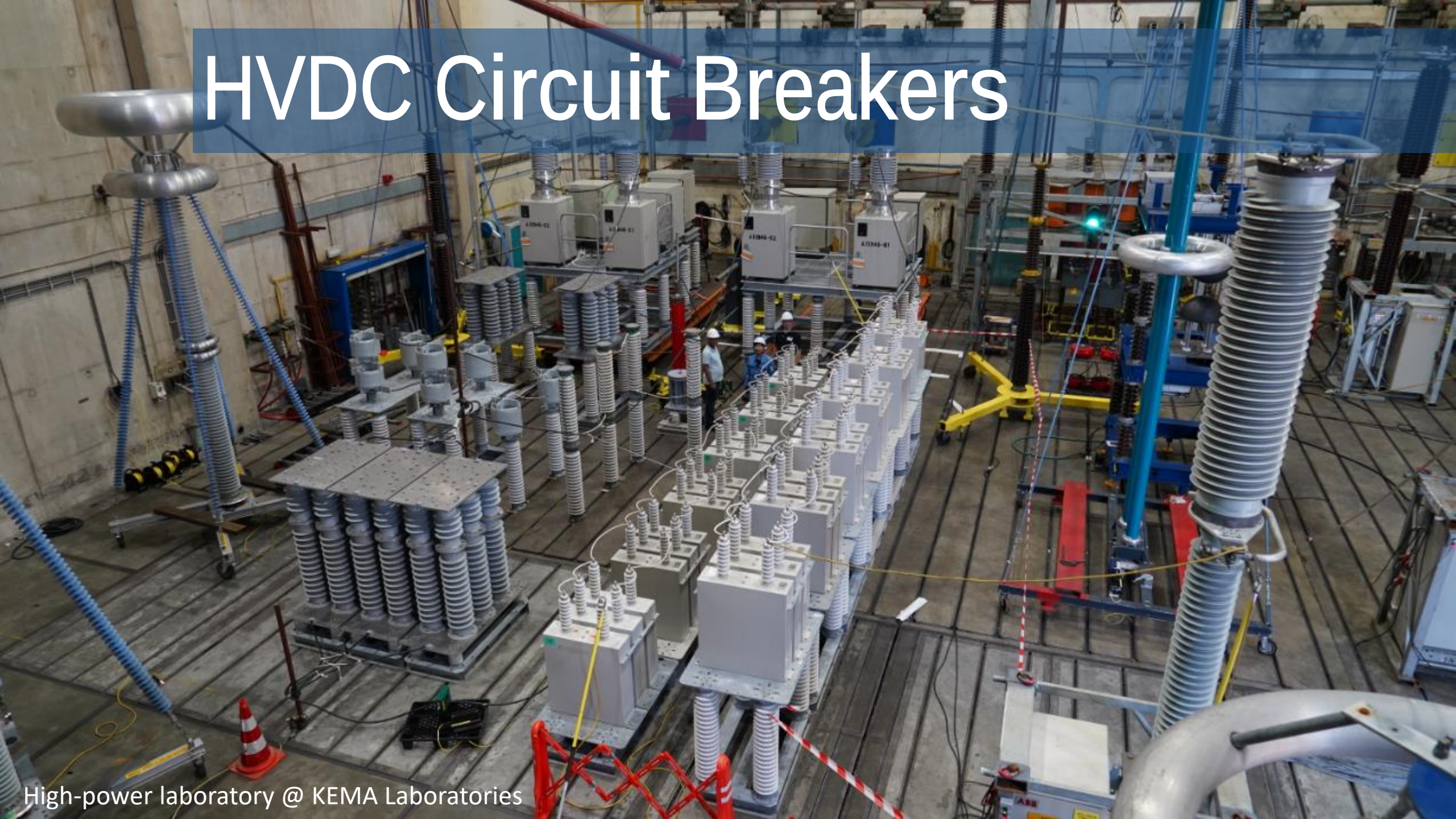
HVDC Grid Control

MMC Test Bench Lab
@ RWTH Aachen University

HVDC Grid Protection

Control Room @ The National HVDC Centre

HVDC Circuit Breakers



High-power laboratory @ KEMA Laboratories

HVDC Gas Insulated Systems

High voltage DC laboratory @ KEMA Laboratories

Technical Recommendations

- Need to agree on **common HVDC grid characteristics**
  - Standardisation of voltage classes!
  - Need to be enable TSOs and developers to procure single converter station
    - How to specify DC side behaviour?
    - How to deal with contractual requirements such as availability guarantees?
  - Avoid need for exchange of technical information between OEMs
  - Develop HVDC system grid code - Minimum requirements for future compatibility

- Need for **pilots** – intermediate steps to DC grid development
  - Full scale first of a kind technology applications
  - Short term projects
    - South-West Link - Hansa Power Bridge DC Connection
    - WindConnector DC Circuit Breaker
    - Bornholm Island DC hub – CleanStream

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 691714.

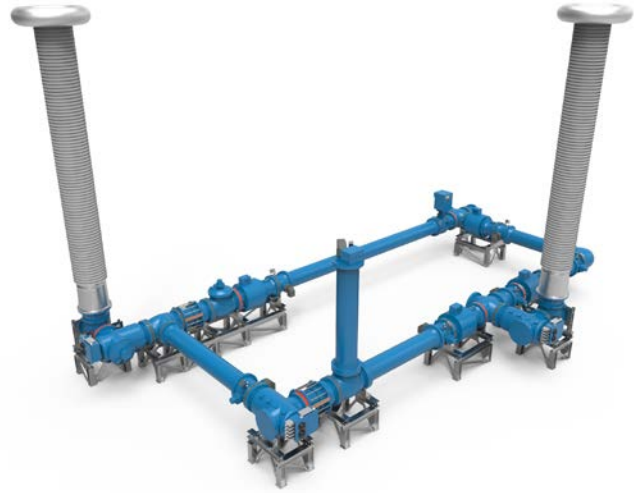
Further research

- HVDC grid & **hub topology** & infrastructure
- **Interoperability** of controls and protection
- Offshore wind farm advanced capabilities – enhancement and system **integration**
- Integrated **AC/DC system** studies – Generator to consumer
  - Development of **tools** for representation of large HVDC systems and integrated system studies
  - Analysis of **interaction** between AC and DC systems for different time frames and contingencies
  - Development of **control concepts** for integrated system operation
- DC **switchgear** development (faster, lighter, cheaper)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 691714.

Demonstrations

- 27th of February 2020
- Arnhem, Netherlands
- Demonstration of:
  - 350 kV HVDC gas insulated system
  - 350 kV HVDC Hybrid circuit breaker
- To attend, please contact:
  - info@promotion-offshore.net



ABB

KEMA Labs

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 691714.

Save the Date!
PROMOTioN Final Conference - 26 & 27 May 2020

- **Royal Museum of Fine Arts of Belgium,** Rue de la Régence 3, Brussels

- **Lunch-To-Lunch** event
- **High-level** panels and speakers
- Presentation of **PROMOTioN results**
- **Parallel** break-out **sessions**
- **Poster** Session and exhibition of hardware pieces

→Up to **250 attendees**

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 691714.

APPENDIX

DISCLAIMER & PARTNERS

COPYRIGHT

The opinions in this presentation are those of the author and do not commit in any way the European Commission

PROJECT COORDINATOR

DNV GL Netherlands B.V.
Utrechtseweg 310, 6812 AR Arnhem, The Netherlands
Tel +31 26 3 56 9111
Web www.dnvgl.com/energy

CONTACT

Cornelis Plet
Cornelis.plet@dnvgl.com
+31 6 115 240 83

PARTNERS

DNV GL Netherlands B.V., ABB AB, KU Leuven, KTH Royal Institute of Technology, EirGrid plc, SuperGrid Institute, Deutsche WindGuard GmbH, Mitsubishi Electric Europe B.V., Affärsverket Svenska kraftnät, Alstom Grid UK Ltd (Trading as GE Grid Solutions), University of Aberdeen, Réseau de Transport d'Électricité, Technische Universiteit Delft, Statoil ASA, TenneT TSO B.V., Stiftung OFFSHORE-WINDENERGIE, Siemens AG, Danmarks Tekniske Universitet, Rheinisch-Westfälische Technische Hochschule Aachen, Universitat Politècnica de València, SCiBreak AB, Forschungsgemeinschaft für. Elektrische Anlagen und Stromwirtschaft e.V., Ørsted Wind Power A/S, The Carbon Trust, Tractebel Engineering S.A., European University Institute, Iberdrola Renovables Energía, S.A., European Association of the Electricity Transmission & Distribution Equipment and Services Industry, University of Strathclyde, ADWEN Offshore, S.L., Prysmian, Rijksuniversiteit Groningen, MHI Vestas Offshore Wind AS, Energinet.dk, Scottish Hydro Electric Transmission plc, SCiBreak AB

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 691714.