

PROMOTiON

PROgress on Meshed HVDC Offshore Transmission Networks



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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 691714. 24 April 2017



The Project

The Facts

- EU funding programme **Horizon2020**
- Project duration: **4 years** (01/2016 – 12/2019)
- **34 partners** from **11 countries**
- Project coordinator: **DNV GL**
- Largest **funded research project** of the EU within 'Energy' sector
- Total budget approx. **51 mio. Euro**



Objectives

- Identify **technical requirements** and investigate possible **topologies** for **meshed HVDC offshore grids**
- Develop **protection schemes** and **components** for HVDC grids
- Establish components' **interoperability and initiate standardisation**
- **Demonstrate cost-effective** offshore HVDC equipment
- Develop recommendations for a coherent EU and national **regulatory framework** for HVDC offshore grids
- Develop **recommendations for financing mechanisms** for offshore grid infrastructure deployment
- Develop a **deployment plan** for HVDC grid implementation

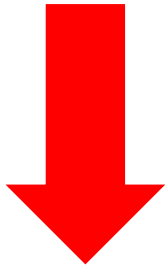




The Background

European Commission energy strategy

By 2030.....



40%

cut in greenhouse
gas emissions
compared to
1990 levels



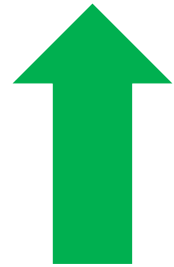
27%

share of
renewable energy
consumption



30%

energy savings
compared with
the business-as-
usual scenario

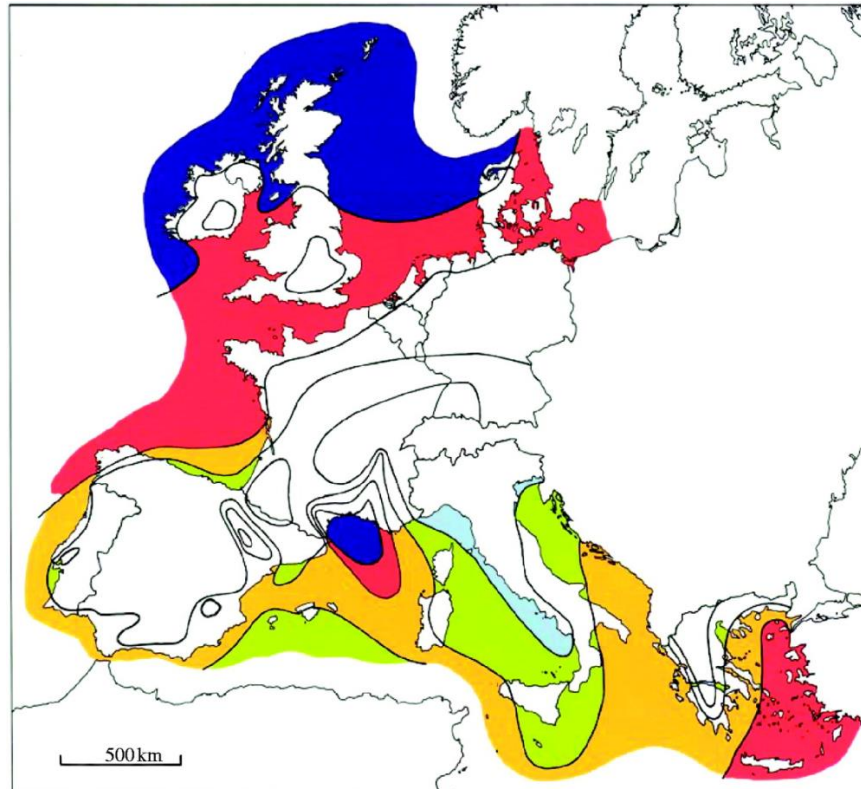







15%

electricity
interconnection
target



European offshore wind energy resources



wind resources over open sea (more than 10km offshore) for five standard heights										
	10m		25m		50m		100m		200m	
	ms ⁻¹	W m ⁻²	ms ⁻¹	W m ⁻²	ms ⁻¹	W m ⁻²	ms ⁻¹	W m ⁻²	ms ⁻¹	W m ⁻²
	>8.0	>600	>8.5	>700	>9.0	>800	>10.0	>1100	>11.0	>1500
	7.0–8.0	350–600	7.5–8.5	450–700	8.0–9.0	600–800	8.5–10.0	650–1100	9.5–11.0	900–1500
	6.0–7.0	250–300	6.5–7.5	300–450	7.0–8.0	400–600	7.5–8.5	450–650	8.0–9.5	600–900
	4.5–6.0	100–250	5.0–6.5	150–300	5.5–7.0	200–400	6.0–7.5	250–450	6.5–8.0	300–600
	<4.5	<100	<5.0	<150	<5.5	<200	<6.0	<250	<6.5	<300

Source: Petersen, E. L. (1993). Wind resources part I: The European wind climatology. In A. D. Garrad, W. Palz, & S. Scheller (Eds.), 1993 European Community wind energy conference. Proceedings. (pp. 663-668). Bedford: H.S. Stephens and Associates.



Political context [I]

MEP Manifesto for regional cooperation (January 2016)

- Signed by **20 Members** of the European Parliament from **9 Member states**
- Builds upon existing structures (NSCOGI)
- **Promotes the** large scale development of offshore windenergy and the **implementation of a meshed offshore grid** in a 7-stage-action plan

*“We believe that the progressive, large-scale, deployment of offshore wind farms and emerging marine renewables, along with the completion of **a meshed electricity grid**, **should be the backbone** of Northern Seas regional cooperation.”*

(Regional cooperation in the Energy Union – Northern Seas as the power house of North-Western Europe; A Manifesto by 20 Members of the European Parliament – January 2016)



Political context [II]

Political declaration for cooperation within the energy sector from 6 June 2016

Objective: Countries bordering the North Seas want to **improve the conditions for offshore wind energy** and achieve a secure and cost-efficient energy supply

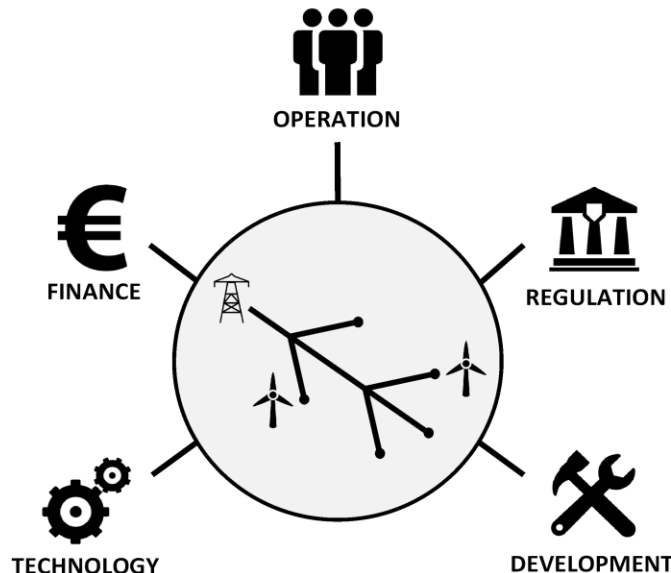
‘Northern Seas Energy Cooperation’

1. Maritime spatial planning
2. **Development and regulation of offshore grids** and other offshore infrastructure
3. Support framework and finance for offshore wind projects
4. Standards, technical rules and regulation of the offshore wind sector



Challenges for deployment of meshed offshore HVDC grid

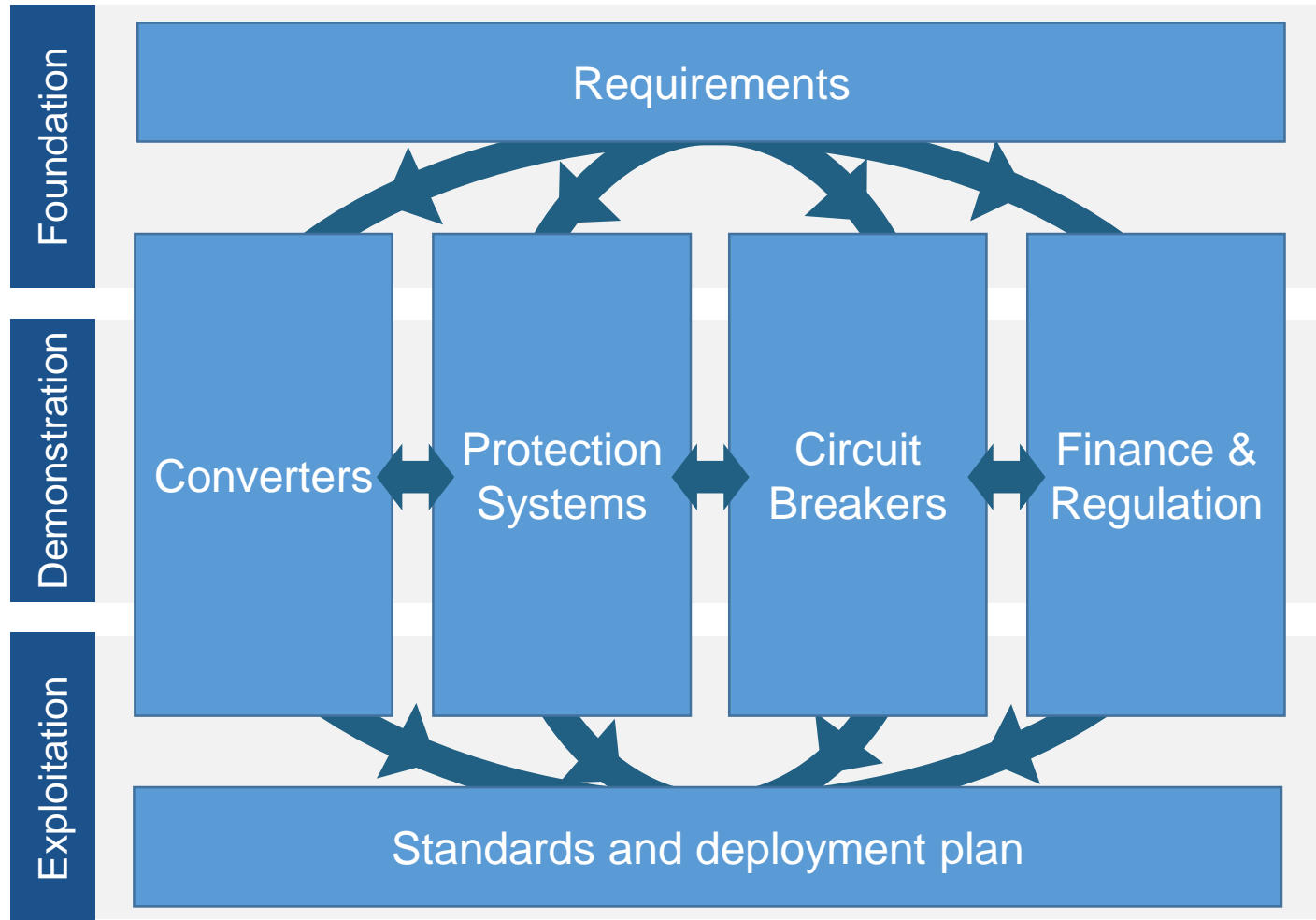
- Cost effective and reliable converter technology
- Grid protection systems
- Financial framework for infrastructure development
- Regulation for deployment and operation
- Agreement between manufacturers, developers and operators of the grid





The Structure

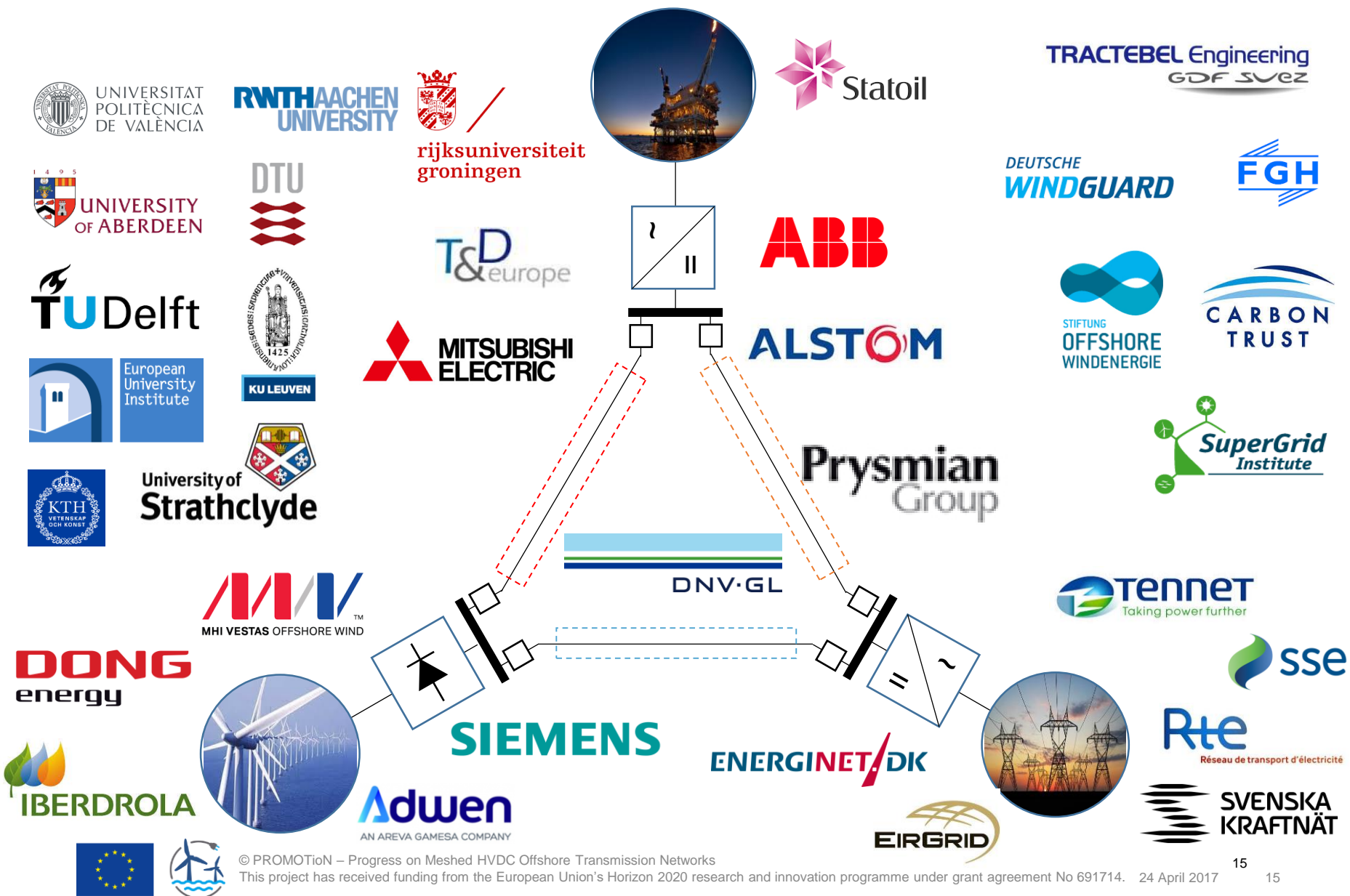
Project Structure – Coordination & dissemination





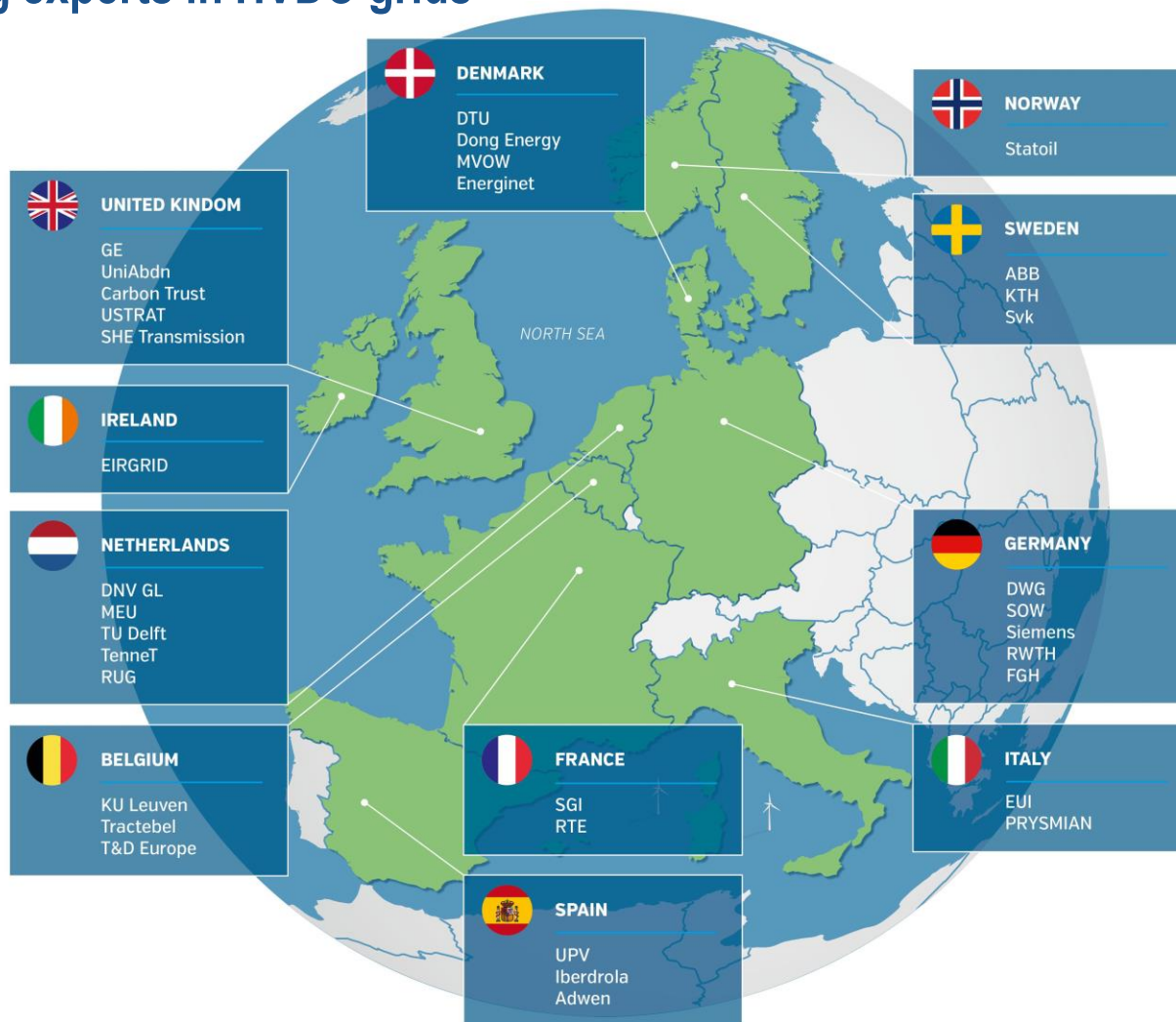
The Partners

PROMOTiON – Integrated Plaza, Hannover Fair, 24 April 2017



European Partners

34 leading experts in HVDC grids



Current project developments

- **Publication on regulatory and technical topics** until June 2017, amongst others:
 - Deliverable „**Draft Roadmap for meshed HVDC offshore grids**“
 - Deliverables on **Financing and Regulation** (legal, economic and financial barriers)
 - HVDC circuit breaker **test circuits** and **protection schemes**
- **PROMOTioN @ Offshore Wind Energy London 2017**
 - **7 June 2017, ICC Capital Suite, Room 16 – ExCel**

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APPENDIX

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