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Offshore Grid Development From Vision to Reality

PROMOTioN Stakeholder Kick-Off Workshop, Brussels, 29 June 2016

Robert Höness, Siemens AG



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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.

Paving the Way to Offshore Wind

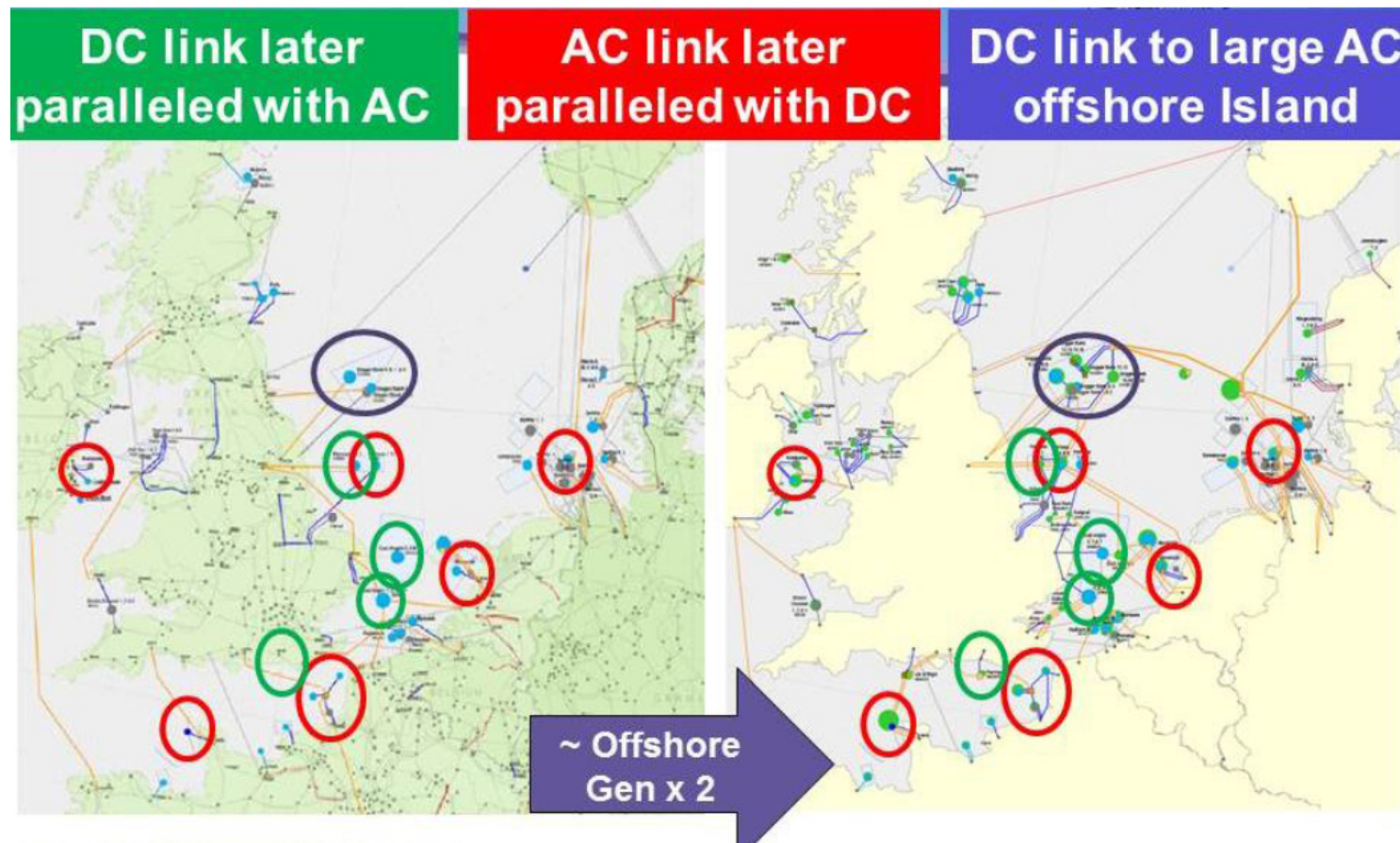
ENTSO-E, "REGIONAL INVESTMENT PLAN 2014, NORTH SEA, Final, Chapter 10.7:

"... all possible solutions (...), be it AC or DC for either integrating offshore wind or for interconnections are a way of integrating the four synchronous areas towards a meshed, or an integrated solution."

"... any potential offshore grid would need to be built in a modular way. Every step has an impact on both existing as well as future projects which necessitates careful continuous planning creating a minimum level of (financial) certainty for TSO's, suppliers, wind-developers and other stakeholders leading to positive business cases for each of the involved parties. "



Complementary Technologies



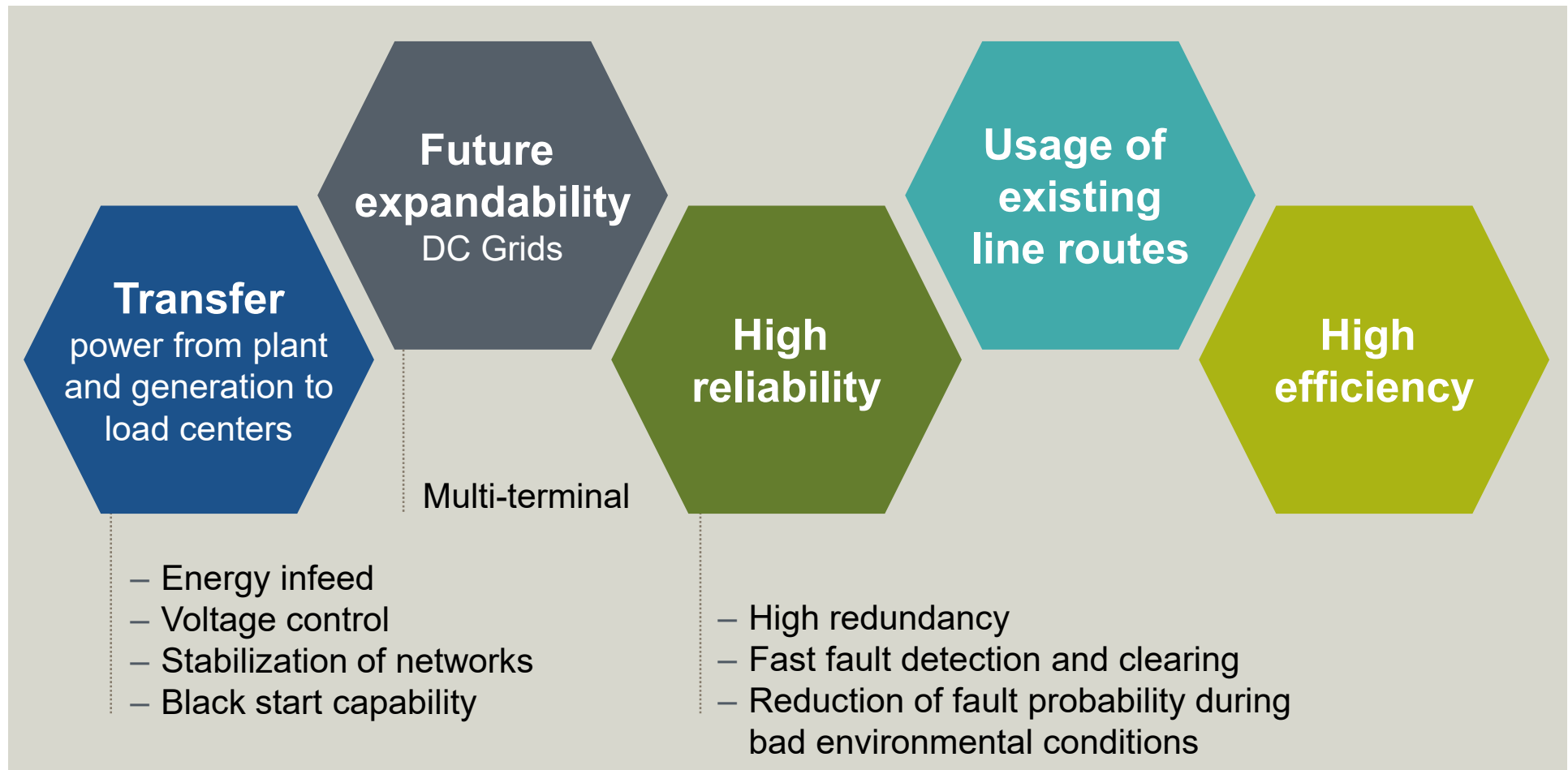
Source: ENTSO-E "REGIONAL INVESTMENT PLAN 2014", NORTH SEA, Final



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Technologies for European Grid Development are to Meet Highest Requirements



HVDC PLUS transmission

A remarkable History of Innovation



Project	Power [MW]	operation	
Trans Bay Cable	400	2010	World Premiere of MMC Technology
HelWin 1	576	2015	World records in connecting offshore wind
HelWin 2	690	2015	
SylWin 1	864	2015	
BorWin 2	800	2015	
Inelfe	2 x 1000	2015	World record in transmission capacity
BorWin 3	900	2019	
NEMO	1000	2019	
Cobra	700	2019	
Ultrahet	2000	2022	World premiere of Multi-Terminal and OHL

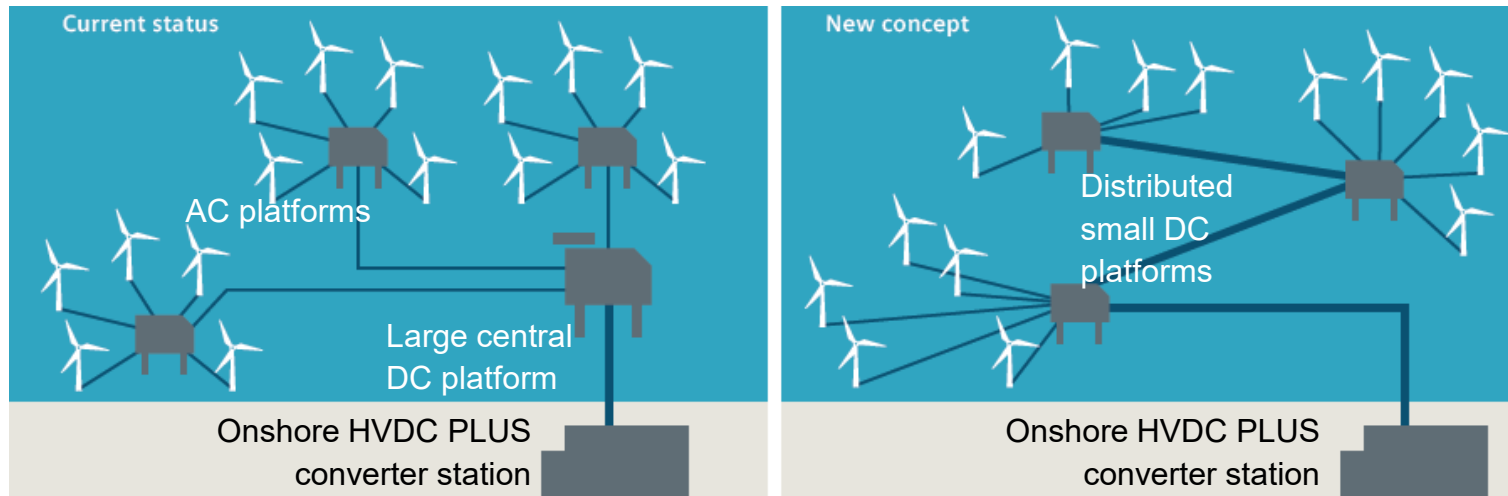


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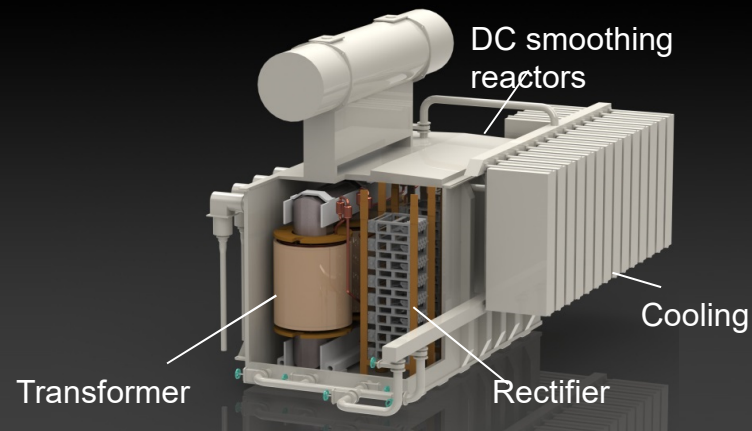
Robust Solutions at Affordable Cost

The Next Generation of Offshore Wind

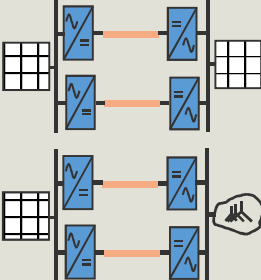
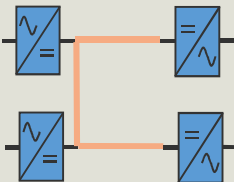
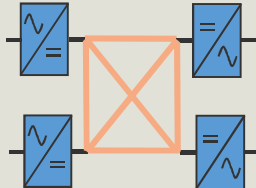


Diode Rectifier Unit (DRU)
connecting the AC windpark grid to the DC
multi-terminal network

- Nominal power: 200 MW
- Nominal voltage AC: 66 kV
- Nominal voltage DC: 106,7 kV
- Size fits for transport by road and ship
- Bio degradable and low flammable ester insulation



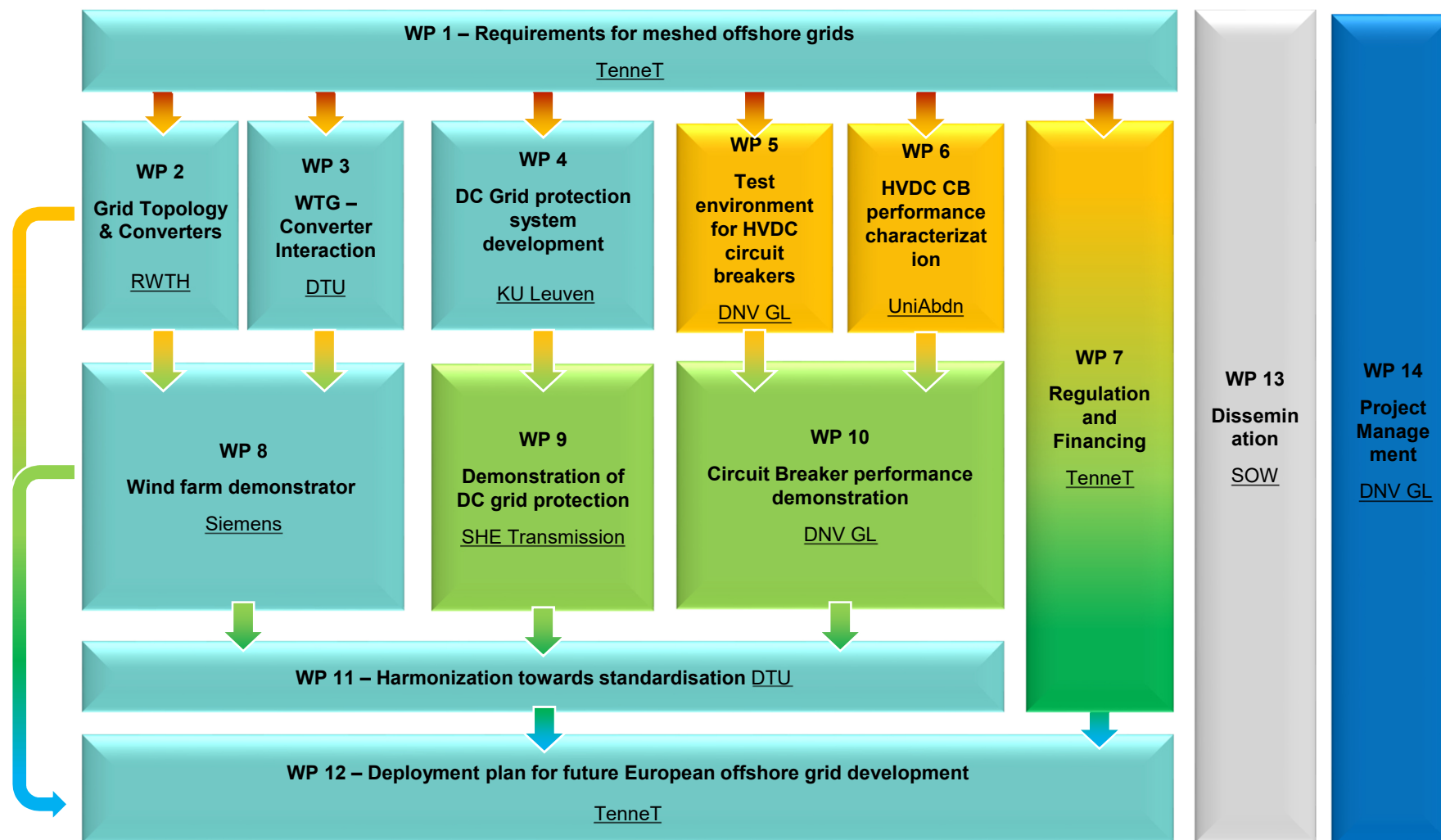
Evolution of Technologies

Point-to-Point Connections			Multi-Terminal System	HVDC Grid	
Interconnectors	Grid Access e.g. Wind Parks	Multi-Feed / "Supernode"	Radial Topology	Meshed Grid	Supergrid
					
Trans Bay Cable	Borwin II Helwin I, II Sylwin	INELFE future wind park connections	Ultrahnet	?	?
Today			> 5 years		



Siemens Involvement in PROMOTioN

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