

Update offshore grid

Workshop Offshore Wind Farm Zone
Hollandse Kust

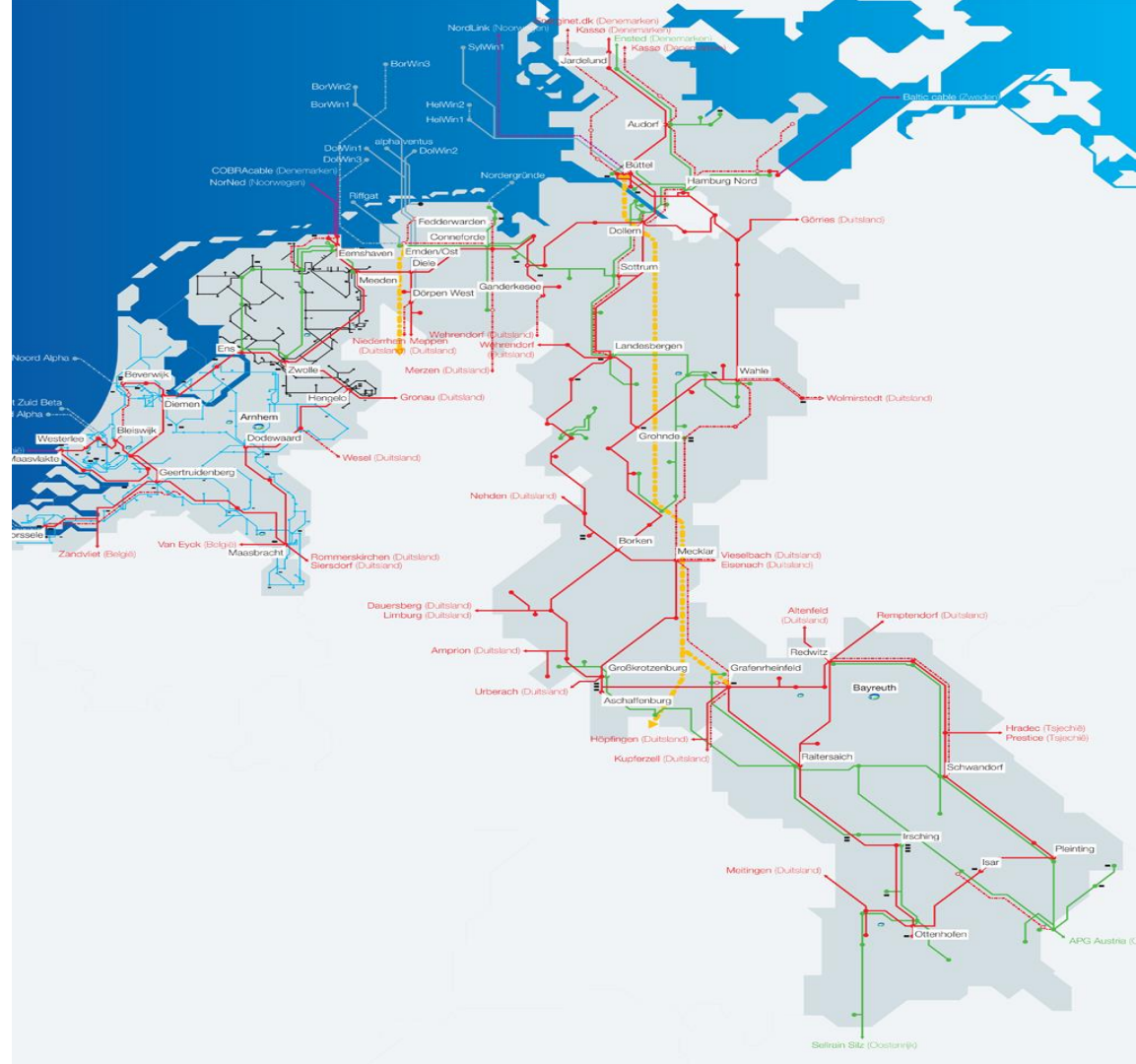
April-18-2019

C1: Public Information

Jaarsma, Saskia

TenneT at a glance

- Europe's first cross-border grid operator for electricity
- Top five grid operator in Europe
- International offshore division
- 23.000 km high-voltage lines
- 4.700 km offshore cable
- 41 million end-users
- ~4.000 employees
- Asset base: EUR 20.4 bn
- Capex 2018: EUR 2.3bn
- Revenues EUR 4.2bn
- EBIT: EUR 800 mln
- 99,9986% security of supply

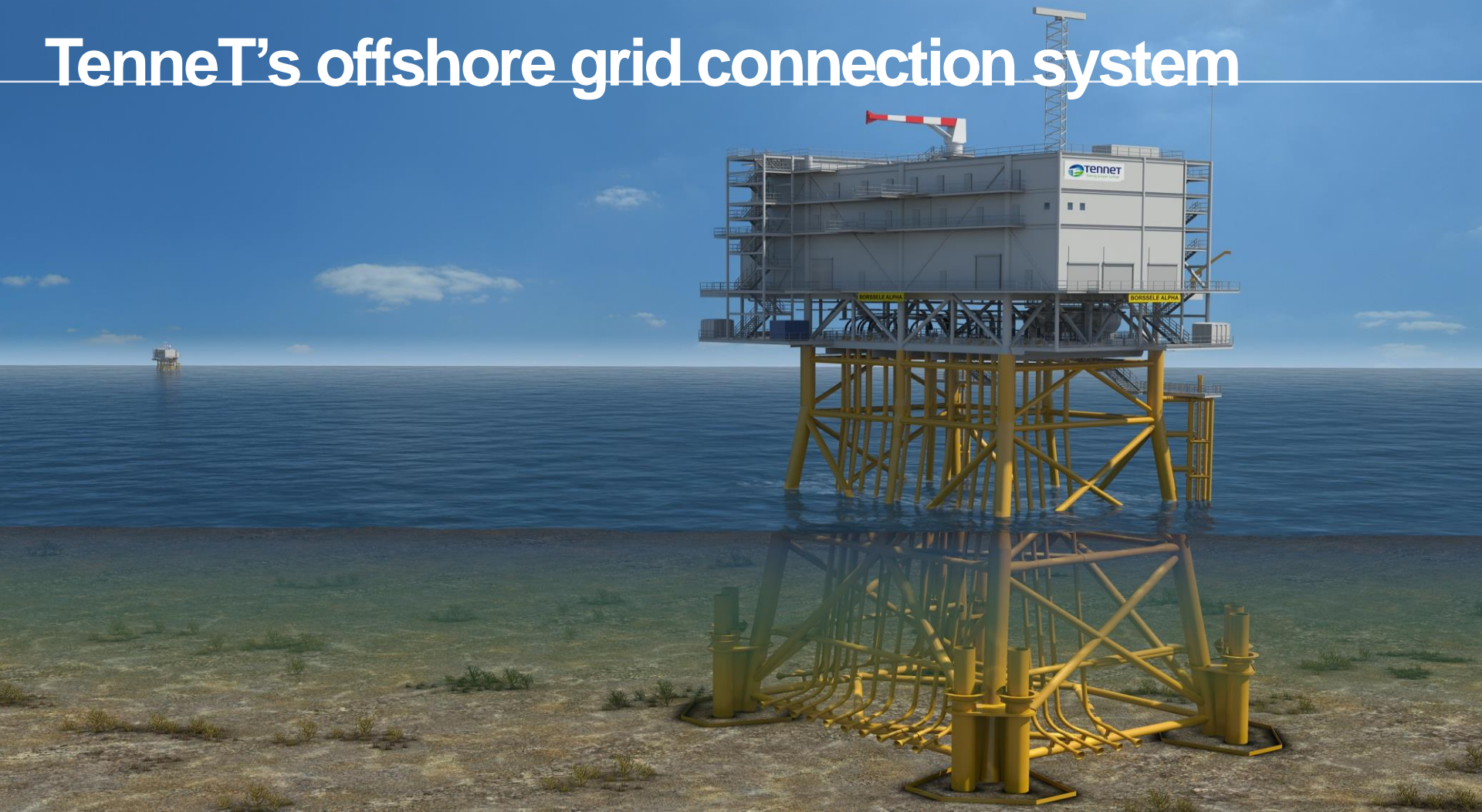


Phase I: 2019-2023

- 3.500 MW: 5 x 700 MW
- Standardised AC concept
- Lean design
- Lowest possible LCOE



TenneT's offshore grid connection system



Enriched standard in 2018: Nature Inclusive Design



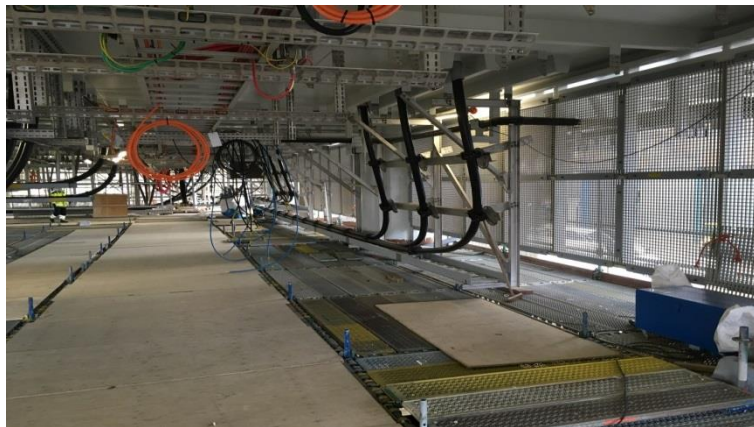
Project update



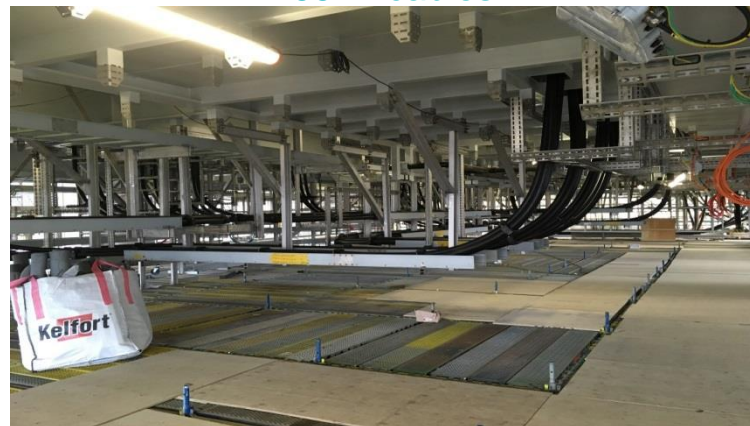
Borssele Alpha



220kV cables



66kV cables



LV cables

Borssele Alpha



Topside Alpha



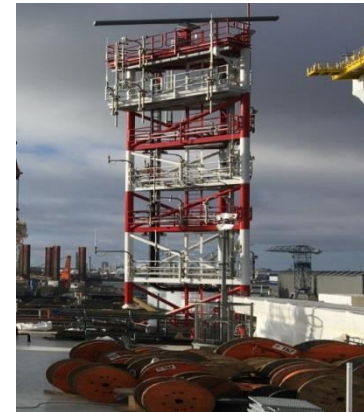
Roof Deck



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Antenna Mast – installation



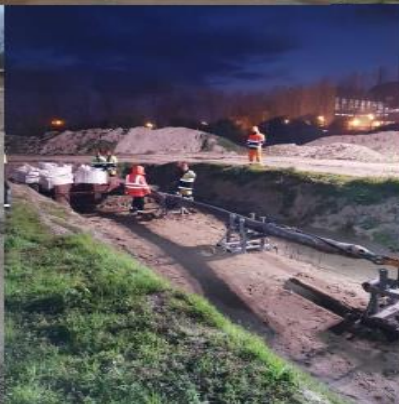
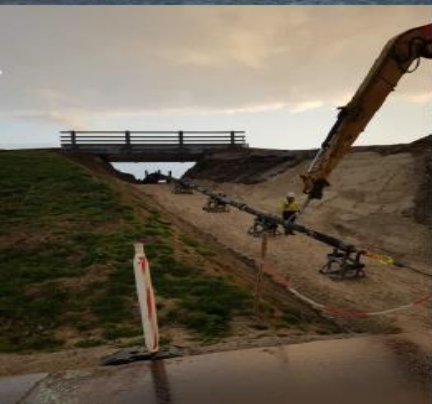
Main Crane installation



C1: Public Information



**Pull-in
BA-20-10
completed
Saturday 13 April
2019 at 06.00 hrs**

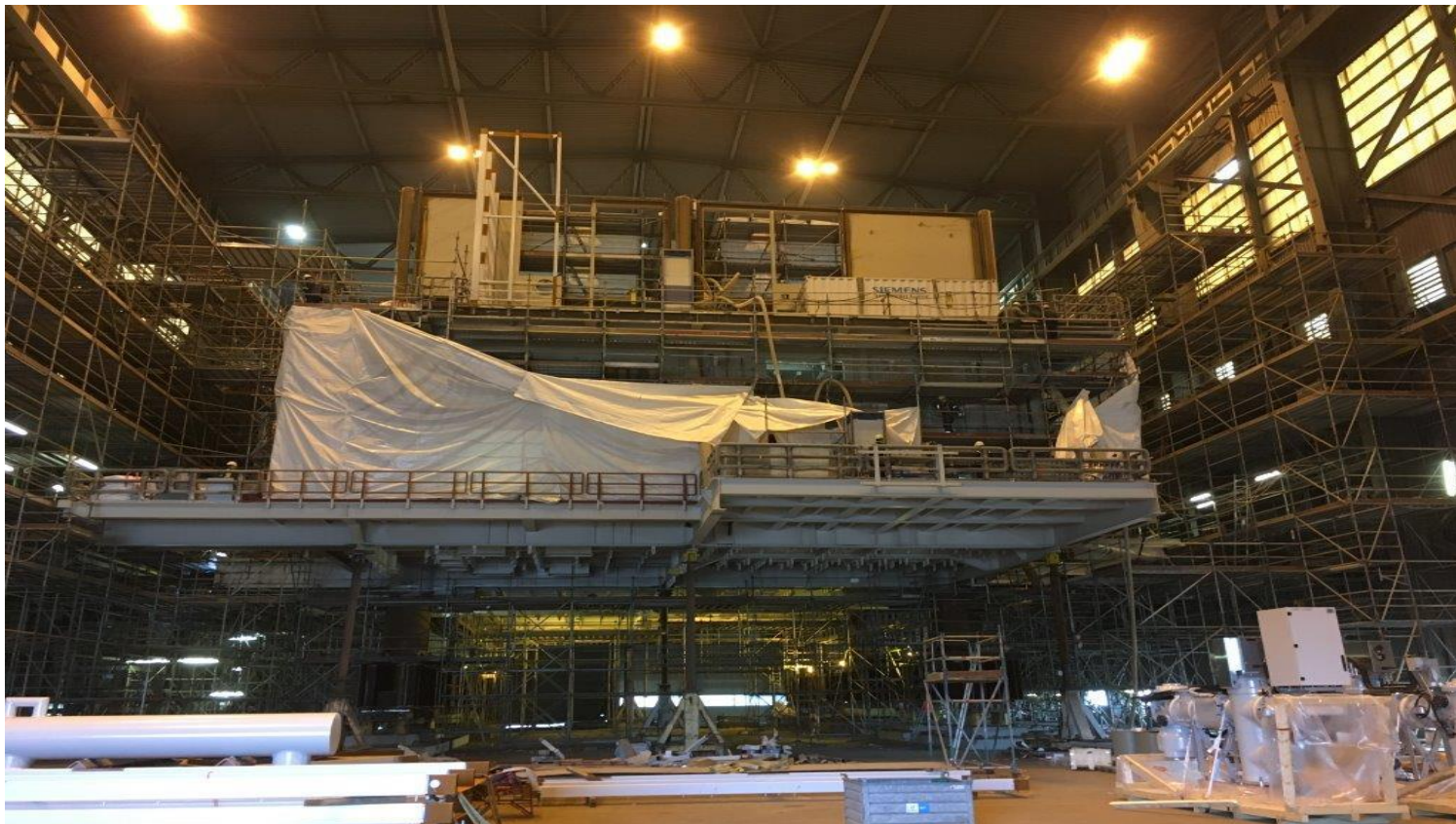




**Honte crossing BA-20-10 completed
Sunday 14 April 2019 at 13.34 hrs**



Borssele Beta



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C1: Public Information

Borssele Beta



April-18-2019

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C1: Public Information

Hollandse Kust (zuid)



Coast landing Maasvlakte: Preparatory activities at Maasvlakte for onshore station and HDD 220 kV cable drilling.

Hollandse Kust (zuid)



Hollandse Kust (noord)



Phase II: 2024 - 2030

- Continuation near-shore 700 MW AC concept
- Introduction new standard far-shore 2GW HVDC concept



Planning	Capacity	Wind area	AC / DC
2024/2025	1,4 GW	Hollandse Kust (west)	AC
2026	0,7 GW	Ten noorden van de Waddeneilanden	AC
2027/2030	4,0 GW	IJmuiden Ver	DC

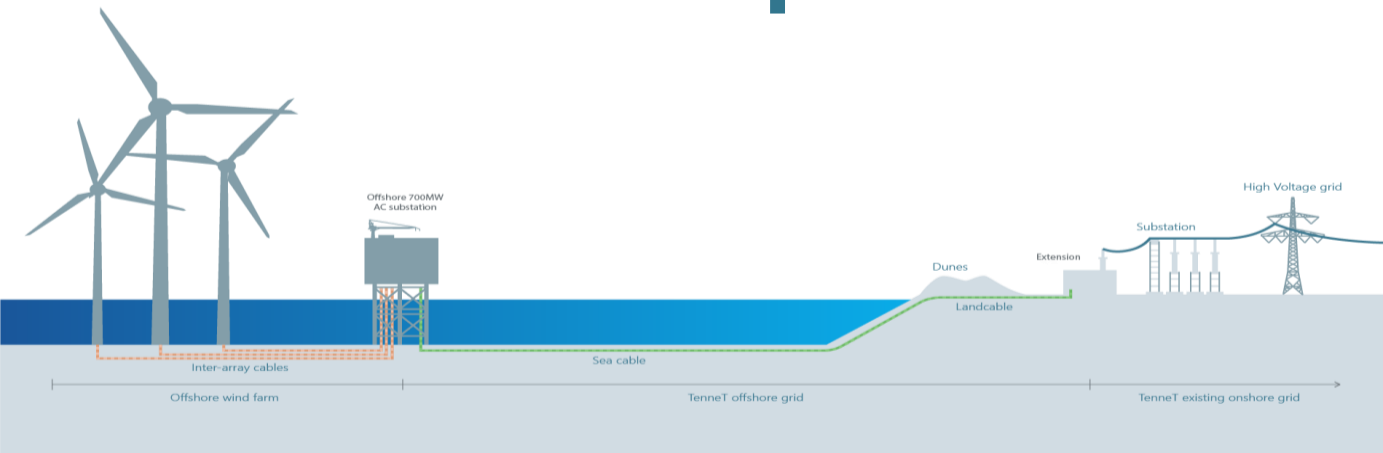
TenneT connecting +6,1 GW



- Drivers in the development of the new grid concept:

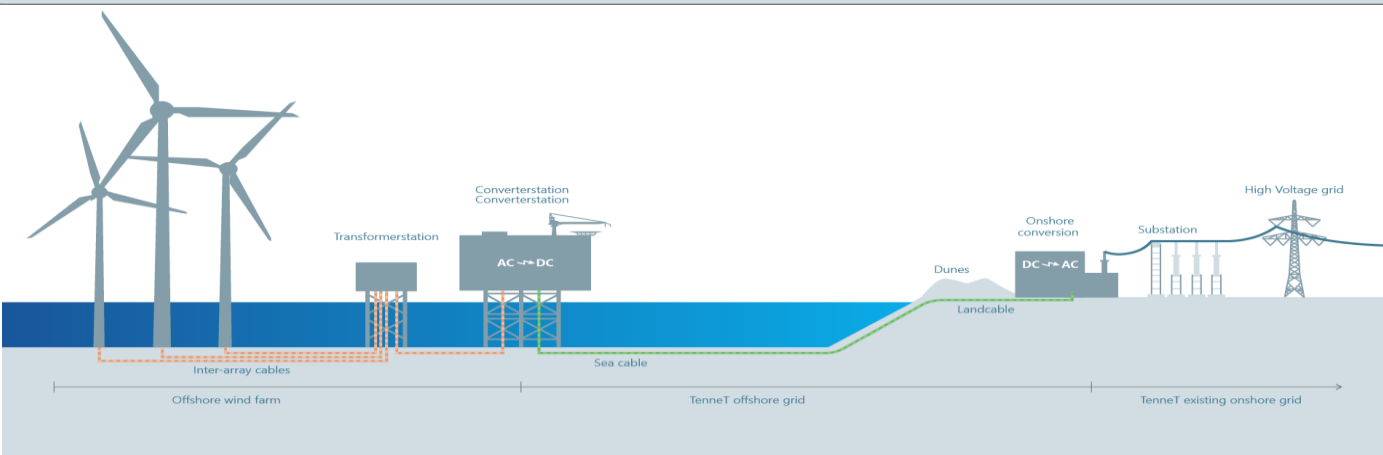


Current concepts



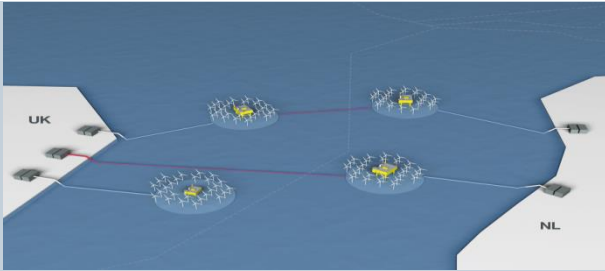
700 MW AC platform

- 700 MW
- Near the coast



DC platforms in Germany

- Up to 900 MW
- 320 kV DC cable
- Separate offshore platforms



WindConnector



Connecting Oil & Gas platforms



Platform or island



Additional offshore wind

Grid concept IJmuiden Ver Animatie Platform

<https://www.youtube.com/watch?v=1sYmeNAUc2A>

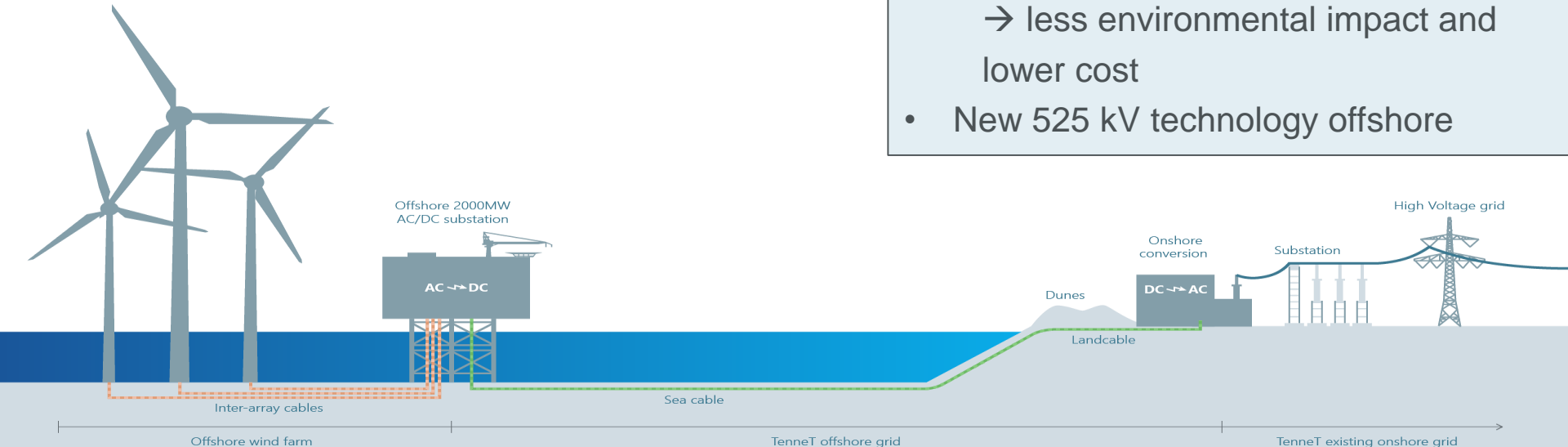


Grid concept IJmuiden Ver



DC platform IJmuiden Ver

- 2 GW connections
- Less cables and less platforms
→ less environmental impact and lower cost
- New 525 kV technology offshore



Mutually developing the 2 GW standard



The previously successful consultation process with early involvement of offshore wind farm developers will be applied for the further design of the 2 GW standard.



Start consultation process April 2019

Thank you for your attention!



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Taking power further