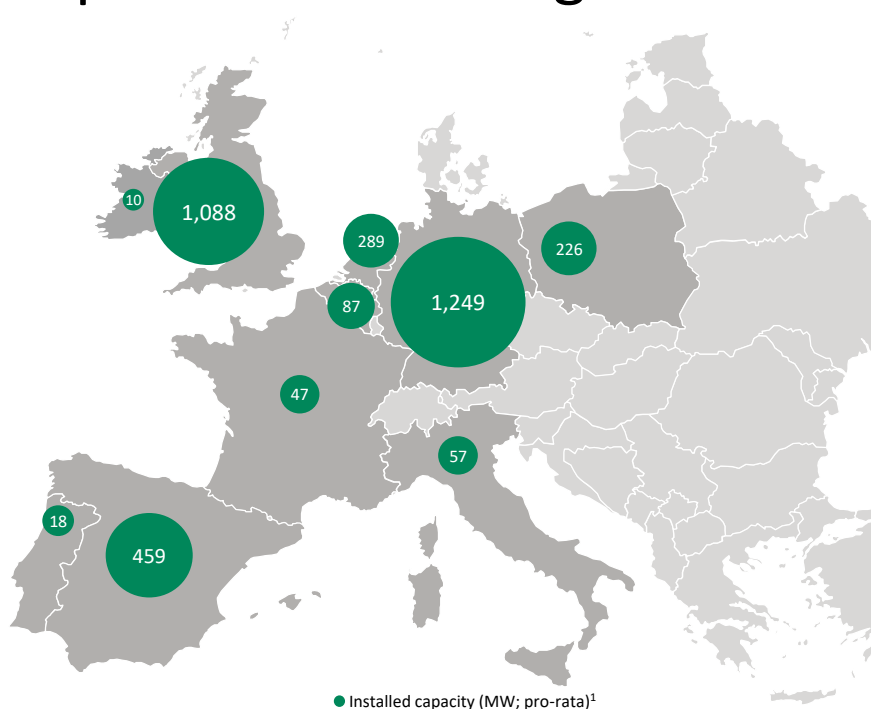
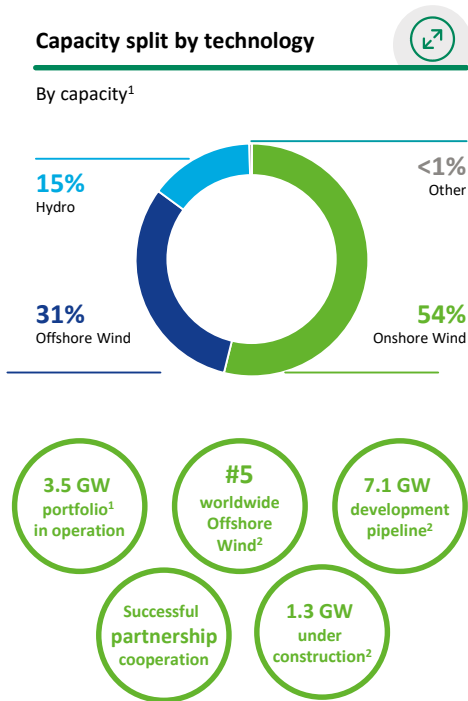


Centralised Grid Model Experience

innogy Renewables· Kate Garth· 12 September 2019



Well diversified European 3.5 GW renewables portfolio with a focus on competitive technologies



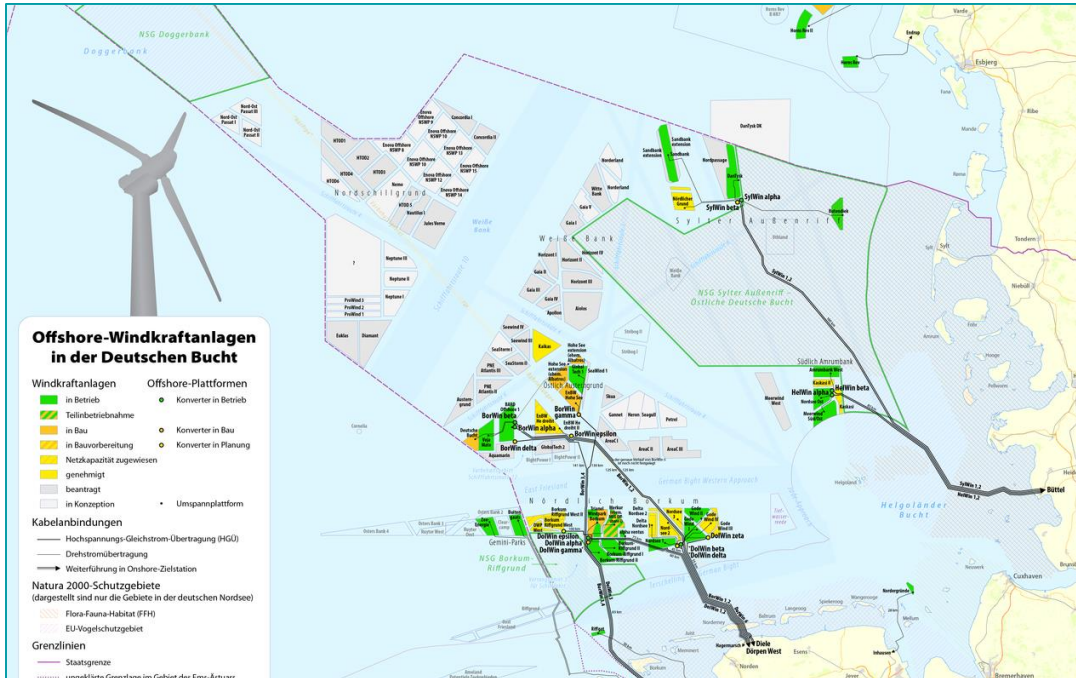
¹ As of 31 December 2018; pro-rata view. innogy has further renewable capacity of 0.4 GW in consolidated participations related to the Grid & Infrastructure and Retail segment.

² Pro-rata view as of 31 December 2018.

THE GERMAN APPROACH

“D to C with a T...”

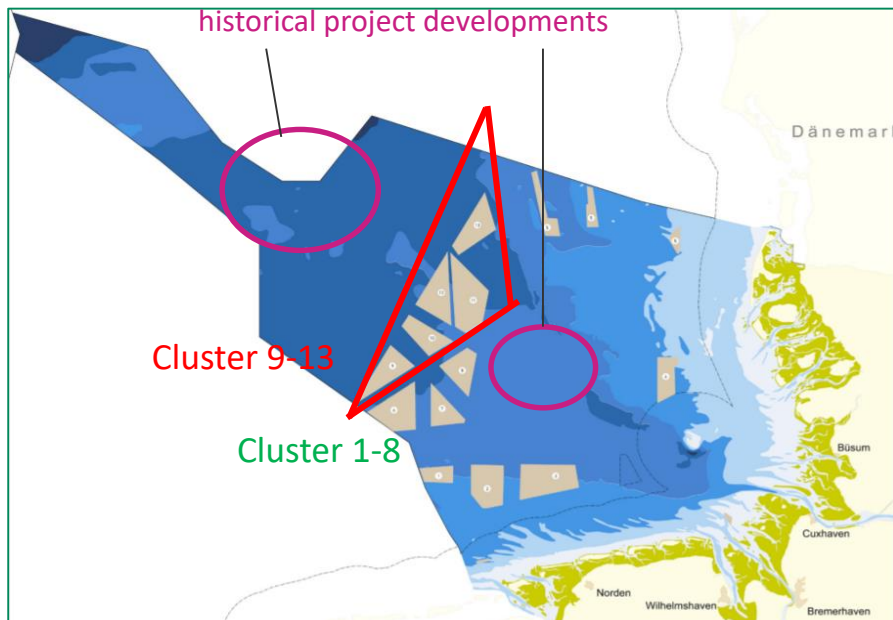
The original decentralised approach



Exclusive Economic Zone North Sea

- Historically multiple projects across the North Sea had been developed and started process of permitting and grid application with TSOs

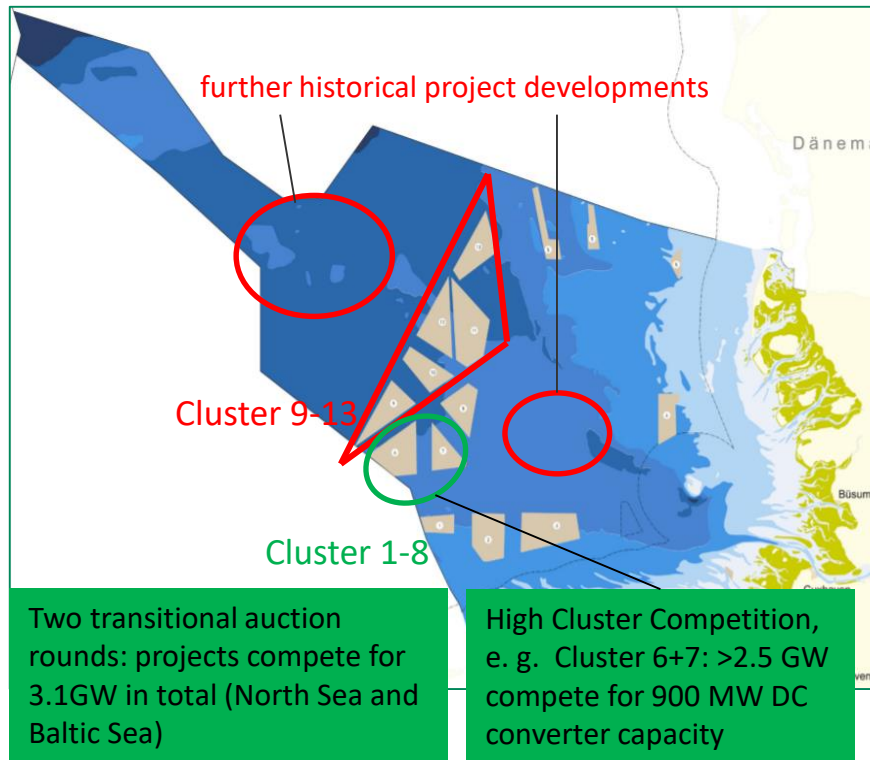
Phased transition from a decentralised to a centralized model



Exclusive Economic Zone North Sea

- In 2012 a **systematic grid planning regime** was introduced
- Grid development in the North Sea focused in 8 clusters,
- All other permitting procedures were suspended by Federal Marine Authority

The phased transition – conditions applied

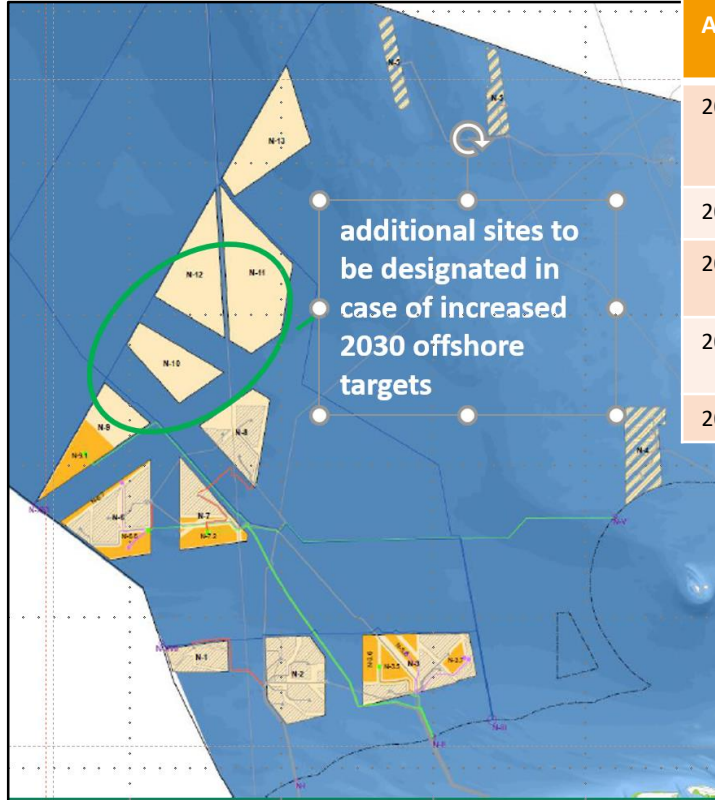


- In 2017, the **new Wind Offshore Law** “WindSeeG” introduced.
- A **phased transition approach** was taken to reduce developer issues

Grace period: projects with unconditional grid consent and COD before 2021 could proceed under the old regime

Transition Tender phase: two competitive rounds in 2017 and 2018

The 2019 Site Development plan provides visibility of grid development and auctions until 2030



Auction Year	COD Year	Sites in the auction	Site Capacities	Grid Connection
2021	2026	N-3.7 N-3.8 O-1.3	225MW 375MW 300MW	NOR-3-3 NOR-3-3 OST-1-4
2022	2027	N-7.2	900MW	NOR-7-2
2023	2028	N-3.5 N-3.6	420MW 480MW	NOR-3-2 NOR-3-2
2024	2029	N-6.6 N-6.7	630MW 270MW	NOR-6-3 NOR-6-3
2025	2030	N-9.1 Part 1	600MW	NOR-9-1

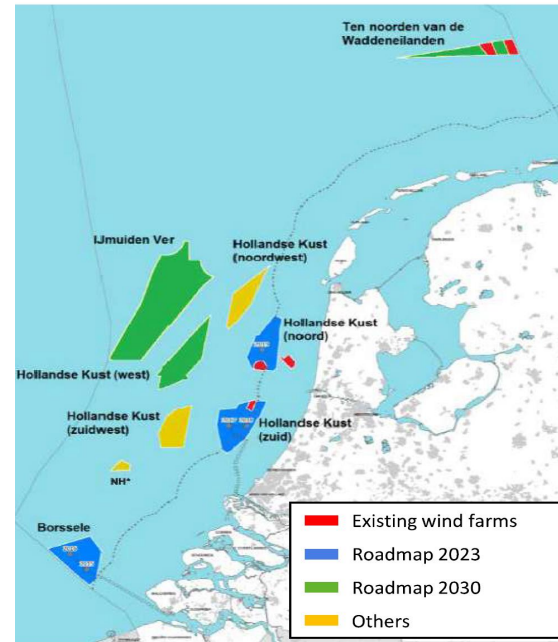
THE DUTCH APPROACH

D to C without a T

Decentralised to Centralised



Sites in grey had reached final stage of permitting in 2014



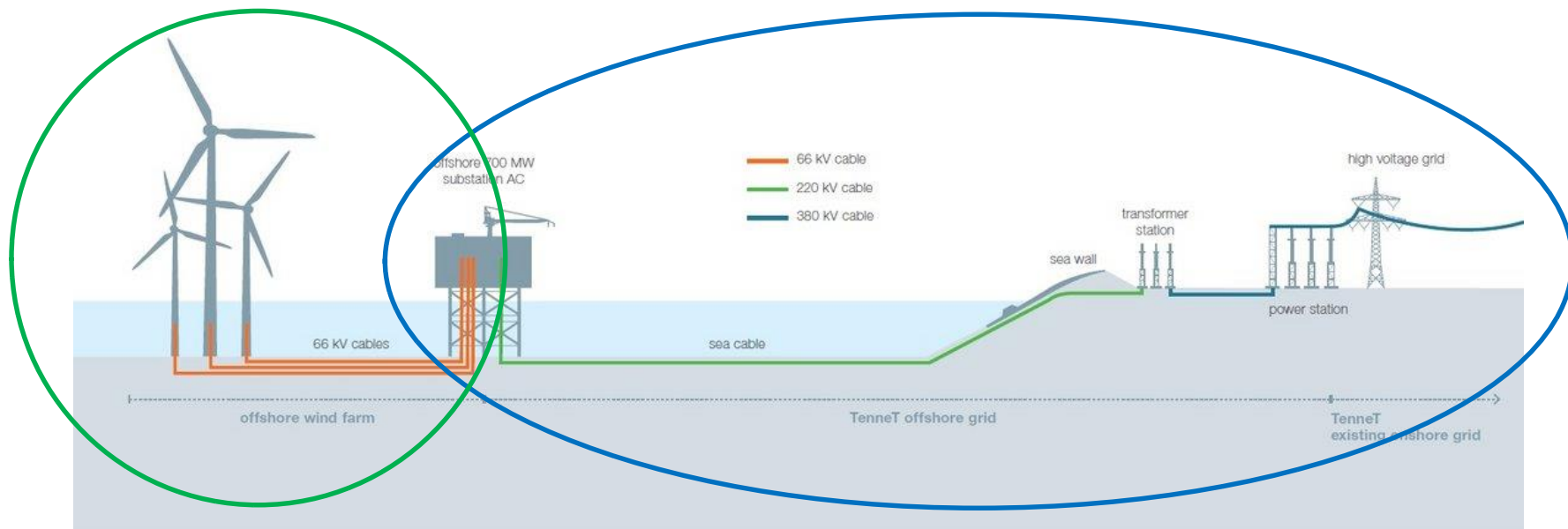
2019 position

Dutch approach

TSO responsibility :

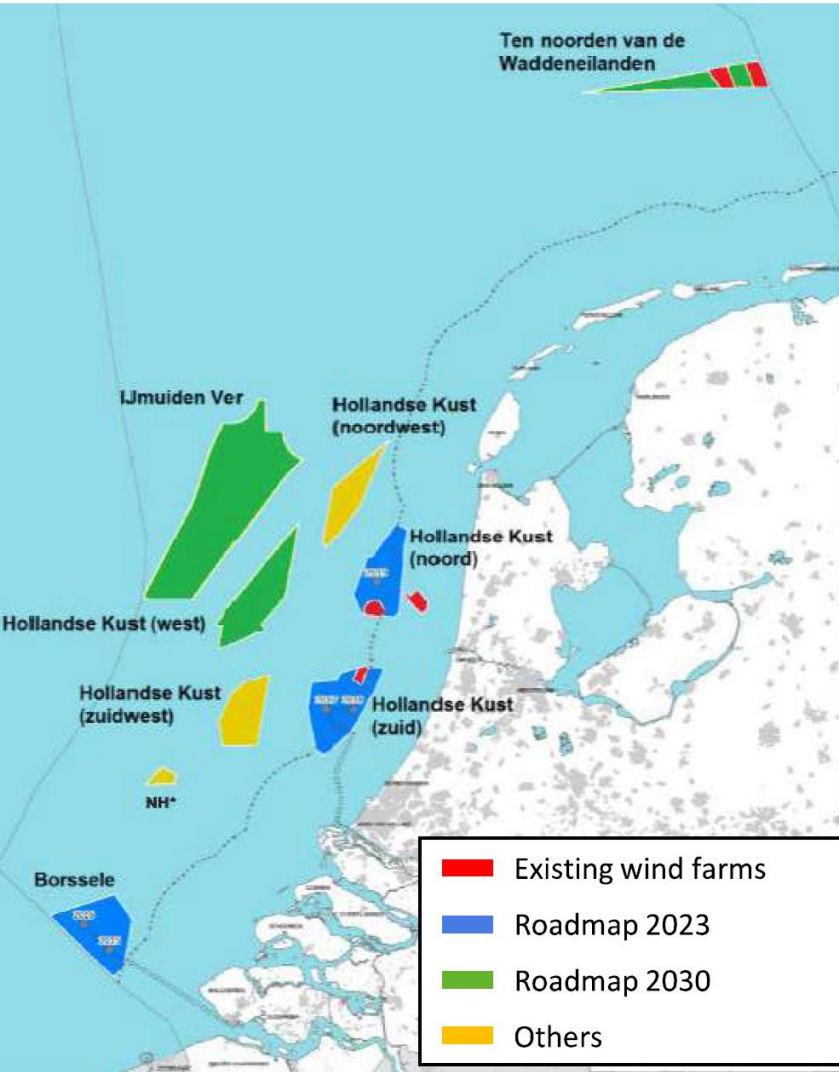
Developer

TSO



<https://offshorewind.rvo.nl/file/download/55039494>





Tender	Wind Area and wind site(s)	Capacity (GW)	Expected year of operation
Roadmap 2020:			
Q1 2016	Borssele, sites I and II	0,7	2020
Q4 2016	Borssele, sites III, IV and V	0,7	2021
Q4 2017	Hollandse Kust (zuid), sites I and II	0,7	2022
Q1 2019	Hollandse Kust (zuid), sites III and IV	0,7	2023
Q1 2020	Hollandse Kust (noord), site V	0,7	2024
Total:		3,5	
Roadmap 2030:			
Q2 2021	Hollandse Kust (west), site VI	0,7	2025
	Hollandse Kust (west), site VII	0,7	2025
Q4 2022	Ten Noorden van de Wadden	0,7	2026
Q4 2023	IJmuiden Ver, site I	1	2027/2028
	IJmuiden Ver, site II	1	2027/2028
Q4 2025	IJmuiden Ver, site III	1	2029/2030
	IJmuiden Ver, site IV	1	2029/2030
Total		6,1	

Other Jurisdictions – US experience (Massachusetts)

BIDDING BONANZA! Trump Administration Smashes Record for Offshore Wind Auction with \$405 Million in Winning Bids

Three companies claim winning bids for Massachusetts offshore wind. Areas could support approximately 4.1 gigawatts of commercial wind generation, enough to power nearly 1.5 million homes.

- This is just the first step...
- Developers still need to organise grid connection and route to market.

Source – US Department of the Interior – Press Release 14/12/2018

Developers are competing on cost

- not site conditions or technologies
- synergies through other projects / LCOE assumptions
- reduces risk of sunk devex cost

Enables Cost Reductions

- standardised development and cost efficiency through economies of scale for grid
- long term certainty reduces investor risk

Planned approach – ensures wider alignment

- enables spatial planning and other geographical issues to be managed
- enables subsidy / volumes to be managed

However...

- decentralised, developer led projects will focus on best sites and will seek to deliver efficiently to reduce cost
- risk of development hiatus if centralised approach not specified from start and / or need for clear transition period and rules
- TSOs may not deliver on time - what happens at zero subsidy?

Implications for Irish offshore grid development

Every country has its unique challenges but...

- Close and timely collaboration between Government, Regulator, the offshore industry, TSO and DSO is essential
- A centralised and aligned model for grid will take time to develop and implement
- Appropriate transitional arrangements will be needed to avoid further hiatus and meet 2030 targets

Clarity on implications is required

Network planning needs to be strategically managed
Transitional projects crucial for 2030 targets

2030 TARGETS:
GRID IS CRITICAL

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