

Where we come from, where we plan to go to:

A brief history of Offshore Wind in Germany – industry and policy challenges to reach 70 GW until 2045

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German Offshore-Wind Initiative



Who we are – German Foundation OFFSHORE WIND ENERGY



- ❖ aims at fostering, promoting and exploring the development of offshore wind & green hydrogen in Germany & Europe
- ❖ **founded 2005** as initiative of the Ministry of Environmental Affairs
- ❖ **independent, nationwide and non-partisan think-tank**
- ❖ **networking & communication platform** for stakeholders from politics, the economy and science
- ❖ broad variety of activities, such as studies, events, projects, stakeholder dialogues, test field preparation, consultancy
- ❖ **Curatorship** represents the **whole range of relevant stakeholders**: operators, TSOs, manufacturer, suppliers, insurance companies, investment trusts & banks, associations, federal & state ministries
- ❖ Core focus areas:

Political & regulatory work

Networking platform & Stakeholder processes

R & D projects

Education & public relations work



Alpha Ventus – Germany's 1st



Project OWE & Green Hydrogen



Offshore-Wind & H2 – transnational Cooperation in the Baltic Sea



Support Project for German SMEs



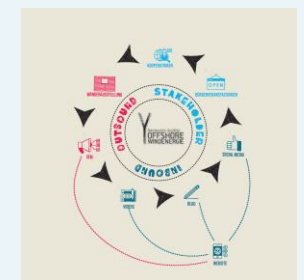
BMBF-‘lighthouse project’ on offshore hydrogen production



Autoflow – thermal image-based rotor blade inspection



Working Group
Offshore wind, military & security



National Test Field
Offshore Wind Energy

Our curatorship at a glance



R&D Landscape in Offshore Wind – Germany & Europe

Funding Bodies:

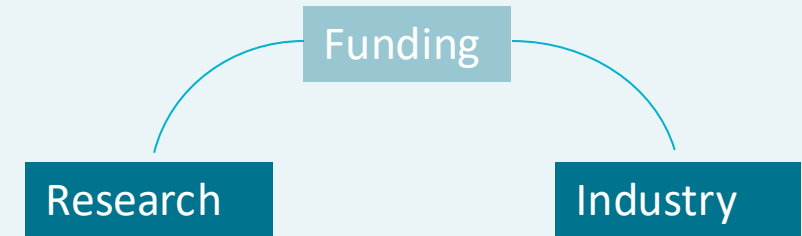


Research Institutes:



Focus Topics:

- ❖ Floating Offshore Wind
- ❖ Grid Integration & HVDC Hubs
- ❖ Digitalization & AI for O&M
- ❖ Sustainability & Circular Economy
- ❖ Hydrogen & Offshore-to-X Integration



Take-away: Germany & Europe provide a structured, multi-level R&D ecosystem – from early-stage research to large-scale demonstration.

AutoFlow

Funding program

7th Energy Research Program

Duration

August 1, 2022–January 31, 2026

Total budget :

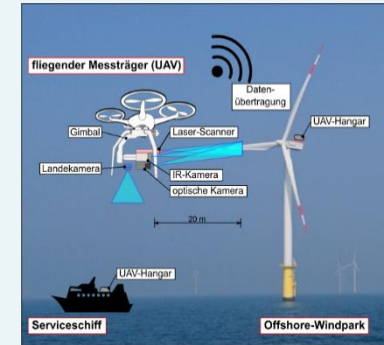
€1,791,184

Funding rate:

100%

Project partners

- **BIMAQ (lead)**
- RWTH Aachen
- Deutsche WindGuard Engineering
- OFFSHORE WIND ENERGY Foundation
- Copting GmbH
- Oecon Products & Service GmbH



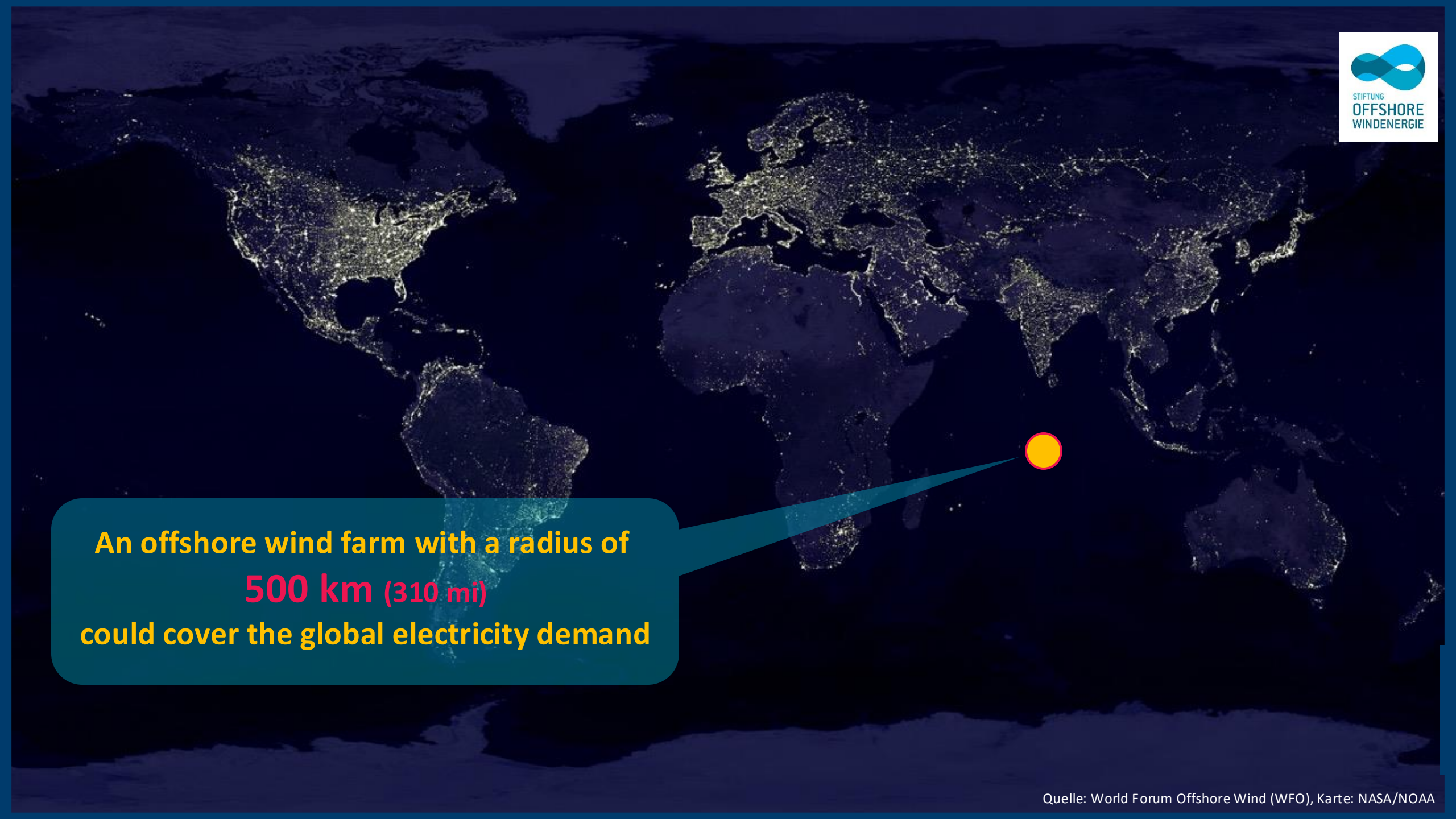
To inspect the rotor blades, the turbines must be shut down, which results in a loss of revenue. Industrial climbers are currently used to determine the aerodynamic condition of rotor blades, requiring ships and/or helicopters to access the turbines.

Fully automated inspection thanks to the latest technology

The **AutoFlow** project aims to **automatically** record and evaluate the condition of rotor blades during the operation of wind turbines. For this purpose, a multi-sensory flight system is used that can perform both **thermographic** and laser-based measurements without interrupting plant operation. The system consists of a thermographic camera, a visual camera, and a laser scanner. The thermographic measurement method for flow analysis on rotor blades is an established method in wind tunnels. The measurement method developed in the project may enable future rotor blade inspections without loss of yield or costly manual inspections by industrial climbers.

A thought experiment to begin with....

- **Fly me to the moon** – 356,000 km (221.000 mi) coastline
- **Seven oceans** cover 70,9% of earth's surface
- **195 countries** – 149 have ocean access
- **Living on the coast** – 40% of the earth's population entail increasing energy demands & rising sea levels due to climate change



An offshore wind farm with a radius of
500 km (310 mi)
could cover the global electricity demand

How would that look in the North Sea or The East Coast?

Gross global electricity production (2018)	27.000 TWh
Full load hours offshore wind turbine (OWT)	3,500 h/a
Nominal demand of installed capacity	7.714 GW
Nominal power per OWT	15 MW
Number of OWTs required	514.286
Power density	10MW/km ²
land demand	771.429 km ²
radius	496 km

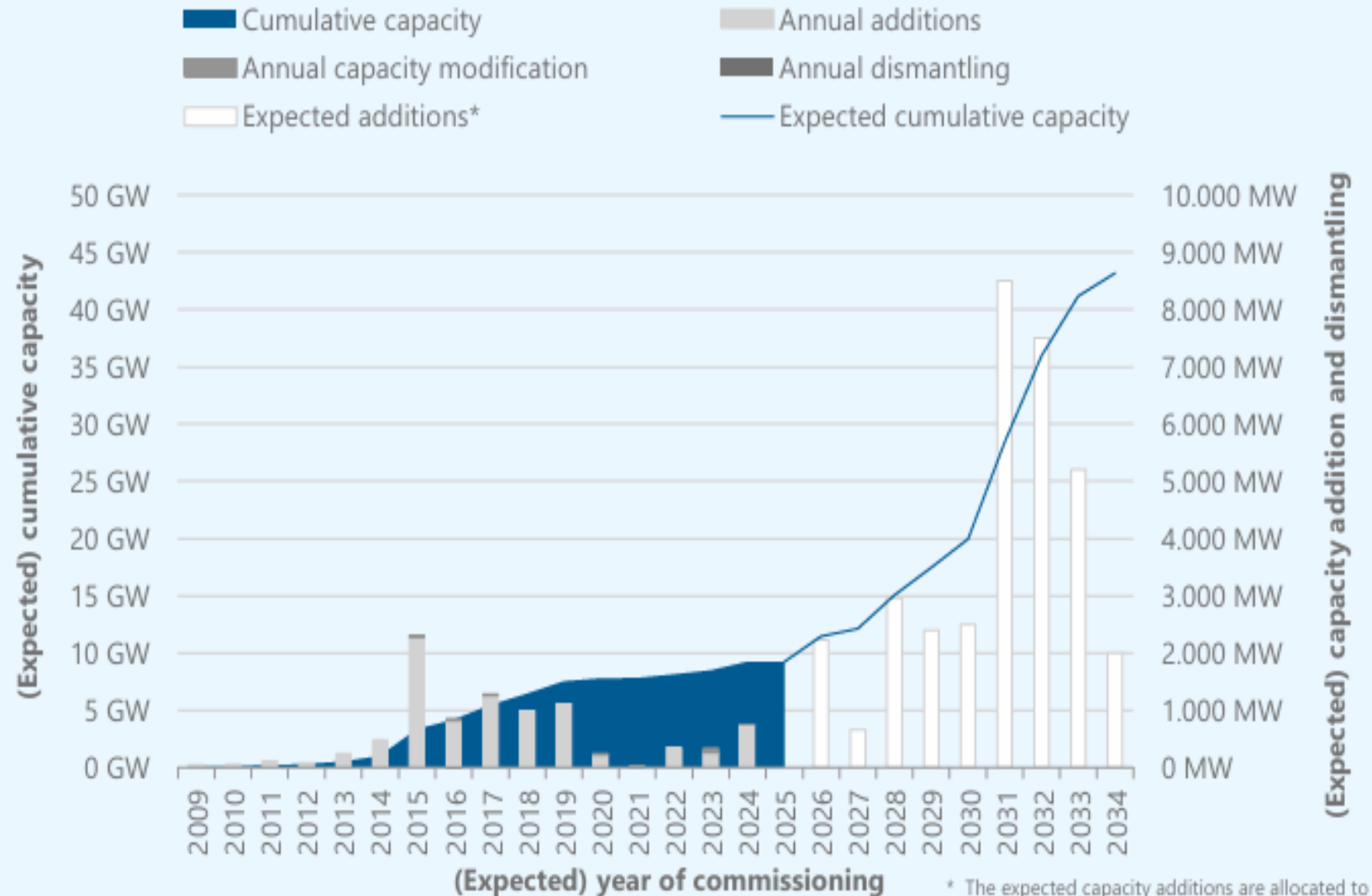
source: World Forum Offshore Wind (WFO)



map: North Sea map-en.png>Typeface: Gentium Book Basic from SIL International, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=48575001>

Expansion of offshore wind energy in Germany

- **Current status: 1,639 offshore wind turbines with a capacity of 9.2 GW**
- **Expansion targets: 30 GW by 2030 (probably be reached by 2032), 45 GW by 2035 (according to FEP), 70 GW by 2045**
- **Offshore wind is the backbone of the energy transition**
- **Offshore wind as a driver of value creation & innovation**



(Expected) development of the offshore wind energy capacity in Germany
(Database: own surveys, MaStR, FEP 2025)

* The expected capacity additions are allocated to the year of the expected full commissioning of the total project. The actual commissioning of sub-projects may differ.

Offshore wind in Europe

UK :

Con. Wind Farms	47
Con. Wind Turbines	2,921
Capacity (MW)	16,577

Netherlands:

Con. Wind Farms	10
Con. Wind Turbines	670
Capacity (MW)	4,739

Denmark:

Con. Wind Farms	17
Con. Wind Turbines	672
Capacity (MW)	2,653

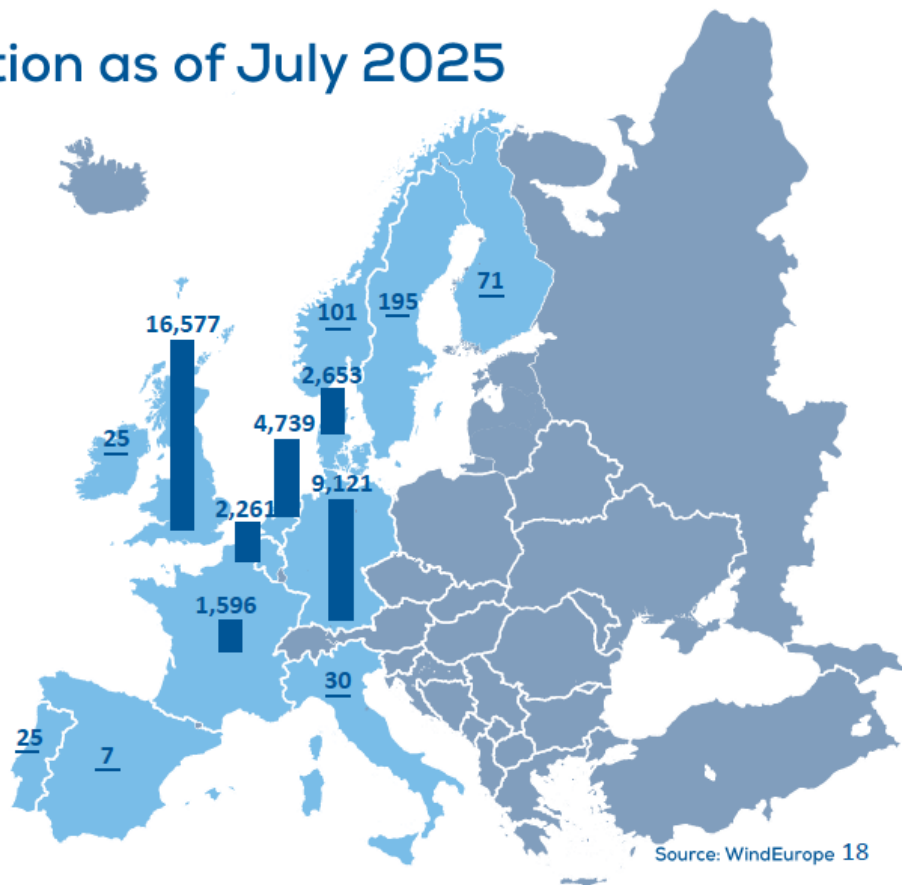
Offshore wind in operation as of July 2025

37,401 MW
capacity

6,664 turbines

140 wind farms

Wind
EUROPE



STIFTUNG
OFFSHORE
WINDENERGIE



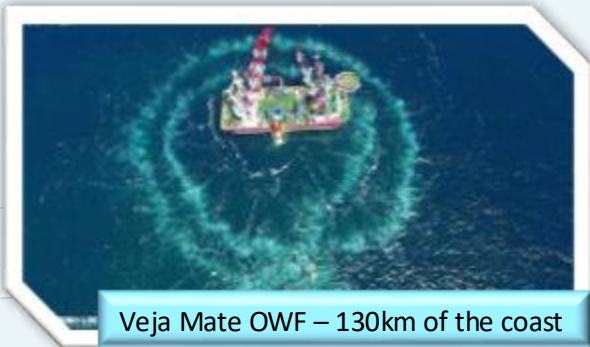
Development of Offshore Wind Energy in Germany



- 1st deep sea OWF worldwide
- 12 x 5 MW wind turbines (6 with jacket, 6 with tripod foundations)
- 45km of the coast of Borkum
- 4100 full load hours 1st 5 years of operation
- 27 – 30m water depths

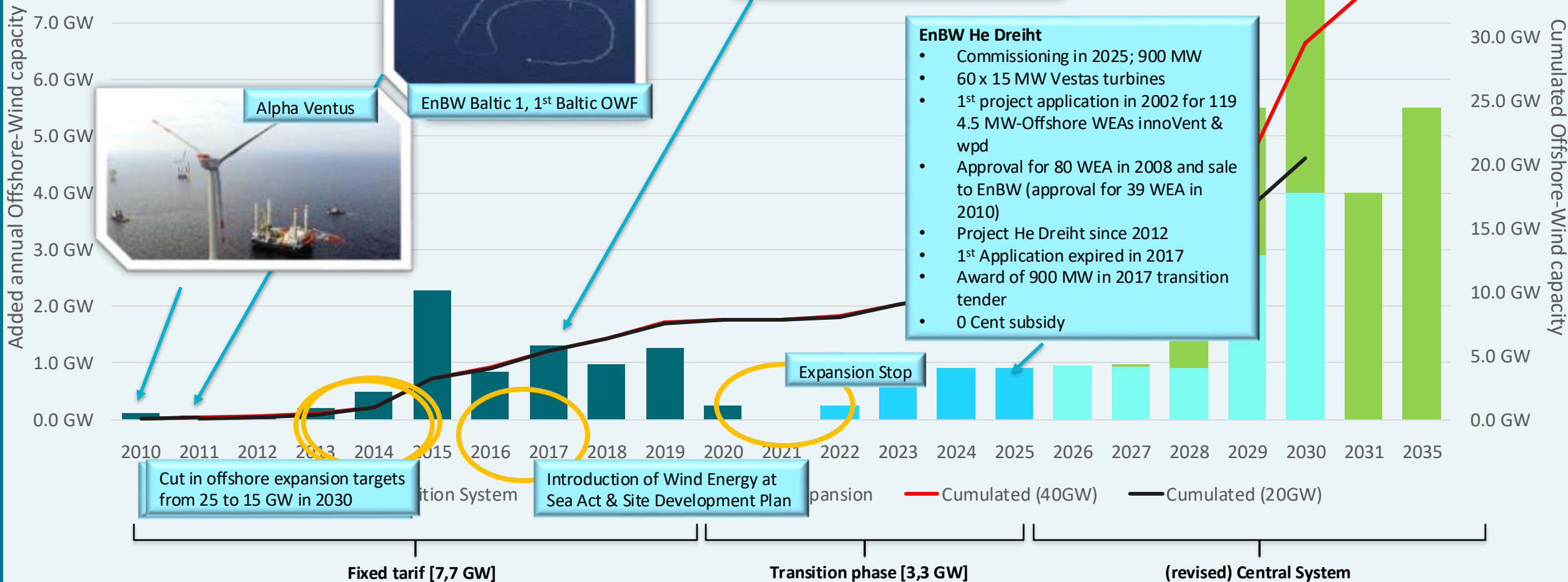


EnBW Baltic 1, 1st Baltic OWF



Veja Mate OWF – 130km of the coast

Offshore Realization Agreement
(Nov 22): 50 GW in 2035
2045: ~ 28% contribution to
energy mix



Development of Offshore Wind Energy in Germany

Development of subsidy regime

1st phase: OWFs commissioned before 01.01.2020: two

Stakeholder Engagement

1st phase: small engineering offices & project developers / wider range of turbine manufacturers

2nd phase: energy utilities; consolidation to 3 manufacturers

3rd phase: oil & gas companies; entrance of Chinese suppliers?!

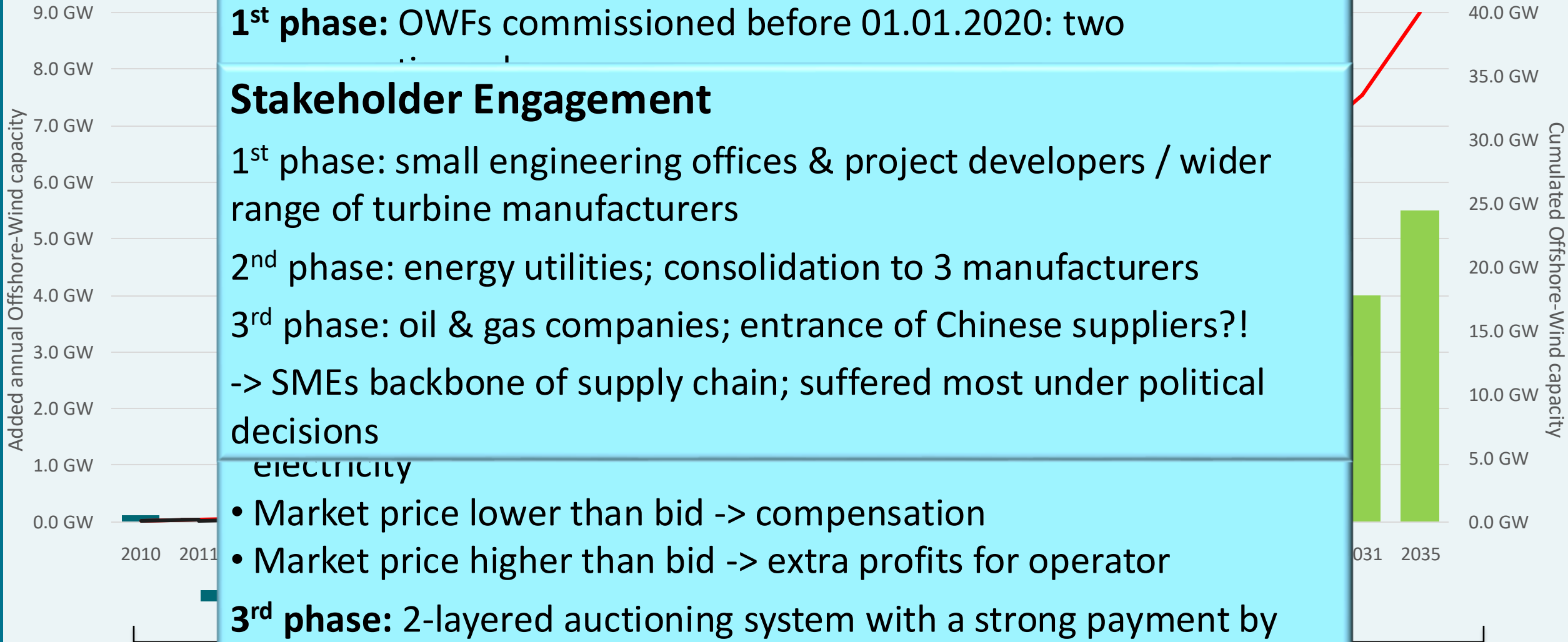
-> SMEs backbone of supply chain; suffered most under political decisions

electricity

- Market price lower than bid -> compensation

- Market price higher than bid -> extra profits for operator

3rd phase: 2-layered auctioning system with a strong payment by bidder focus



Amendment of Wind Energy at Sea Act (2) – Auctioning & Support System



“Pre-examined” sites

- (uncapped) payment (60%)
 - 4 qualitative criteria (10% each):
 - **Reconcilability with nature protection** (focusing on foundation types & installation methods)
 - **Volume of PPAs by Lol or contract**
 - **Decarbonisation criterion** focusing on share green power in production of major wind components
 - **Trainee to workforce ratio** for bidders and in bid associated companies
- > 1.8 GW in the tendering process until Aug 1st
- > “Entry rights” on 3 of 4 sites

“Not-pre-examined” sites

- sliding market premium
 - “Negative bidding” in case of more than one 0-Cent-bid (150.000 Euro per MW)
 - 90% of revenue for lowering electricity prices; 5% maritime nature protection; 5% nature-friendly fishery
- > 7 GW in the tendering process until June 1st
- > several 0-Cent-bids on all sites
- > online bidding process led to two winners (bp and TotalEnergies) and a total of 12.6bln € in payments

Major controversies on:

- Uncapped bidding
- Selection and definition of qualitative criteria
- Introduction of a limit per bidder
- Missing indexation

A mixed picture - results of the 2023 & 2024 offshore wind auctions

2023

BP and TotalEnergies win German auctions with bids worth EUR 12.6 billion for offshore wind farms with a capacity of 7 GW

= 1,8 **Mrd.€**/ GW

2024

EnBW and TotalEnergies are paying EUR 3 billion for 2.5 GW of non-centrally pre-investigated sites, while RWE is paying only EUR 250 million for 4 GW of centrally pre-inspected areas.

= 1,2 **Mrd.€**/ GW (EnBW/ Total Energies)

2025

TotalEnergies wins the German auction for 1 GW of non-centrally pre-investigated site (9.4) for EUR 180 million

= 180 **Mio.€** / GW)

Political Landscape – Does Germany want to reduce its climate targets?

What does the new government think of the *Energiewende*?



At an industry summit, German Economics Minister Katherina Reiche spoke in favour of international harmonization of climate targets, implying a reduction of the German targets from 2045 to 2050.

“We will commission a monitoring project to review the expected electricity demand and the status of security of supply, grid expansion, the expansion of renewable energies, digitalization and hydroelectricity by the 2025 summer break as a basis for further work at.” – Due to mid August

DOMESTIC SUPPLY CHAIN

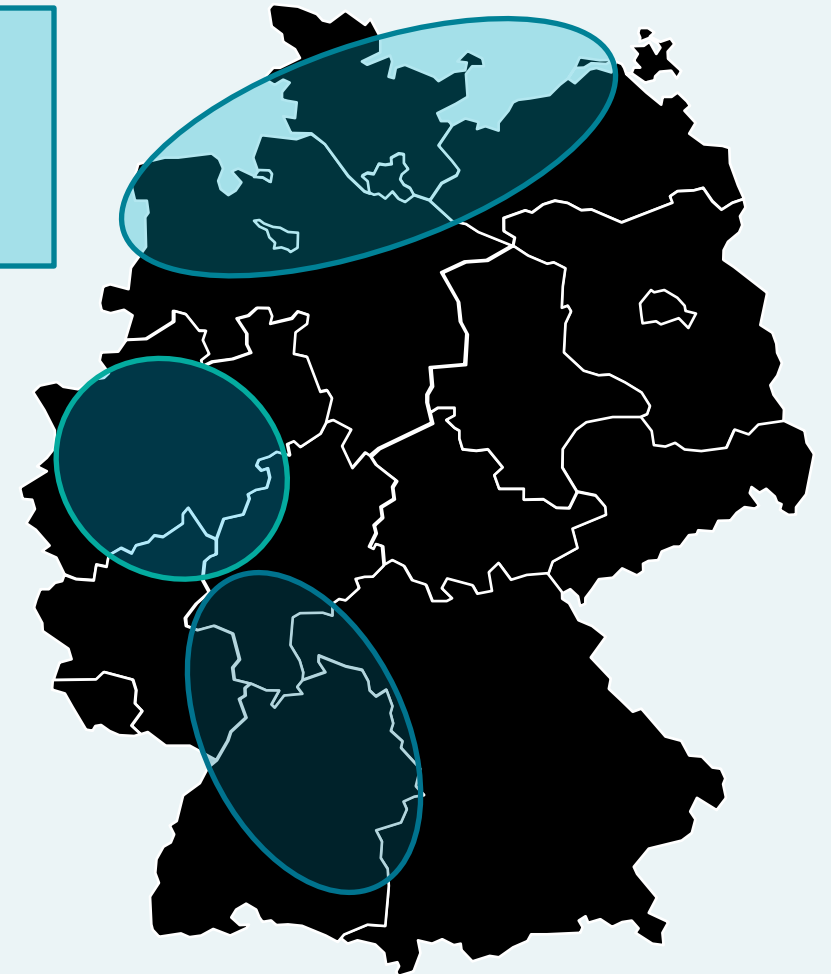
Regional distribution of OFW industry by numbers of employees in different parts of the supply chain:

Project development & planning
Manufacturing
Transport and installation
Operation and maintenance
Decommissioning and repowering

Research & development
Financing & insurance
Sub-supplier

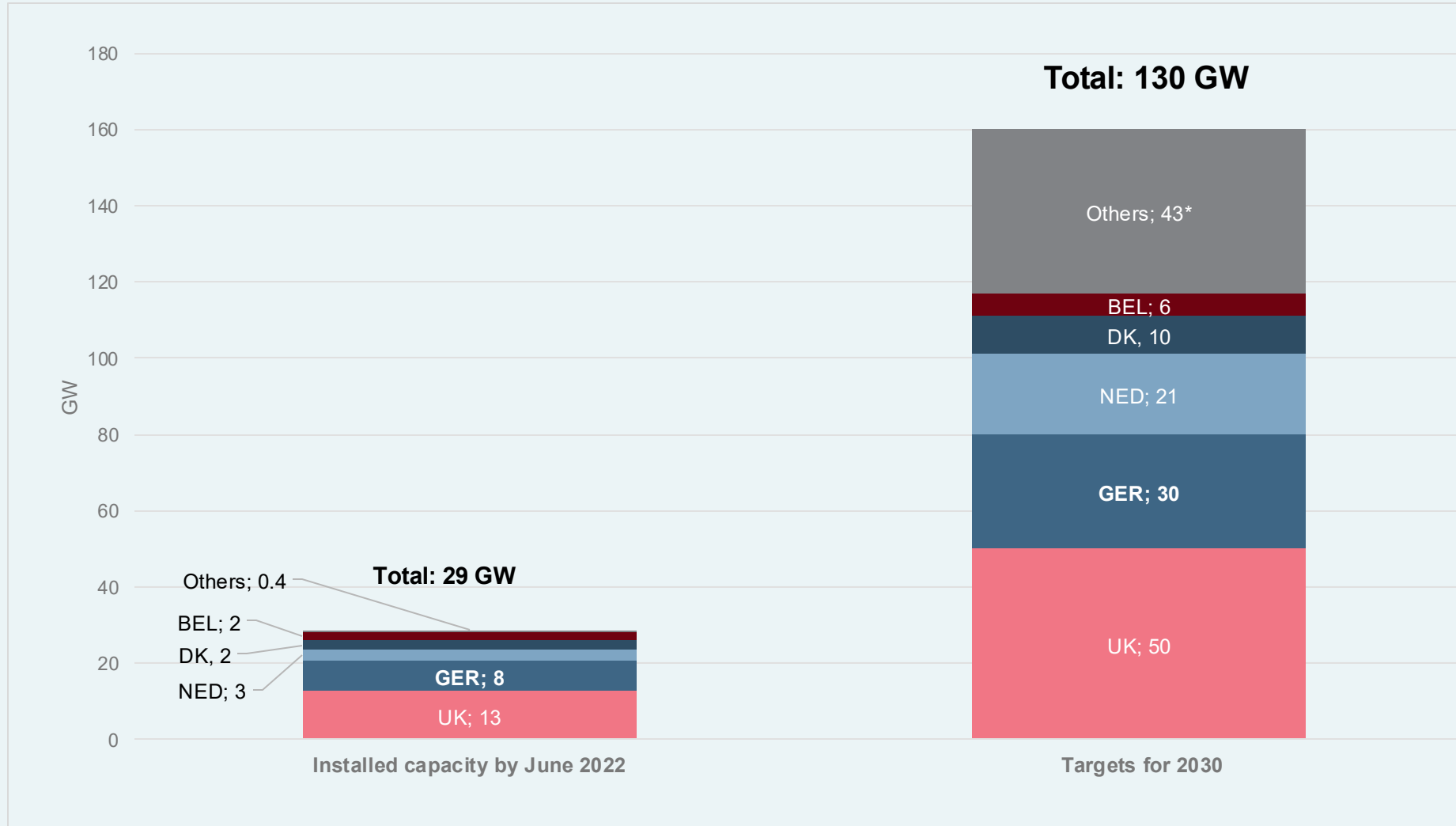
Engineering
Research & development
Sub-supplier

+ Interconnected to EU market



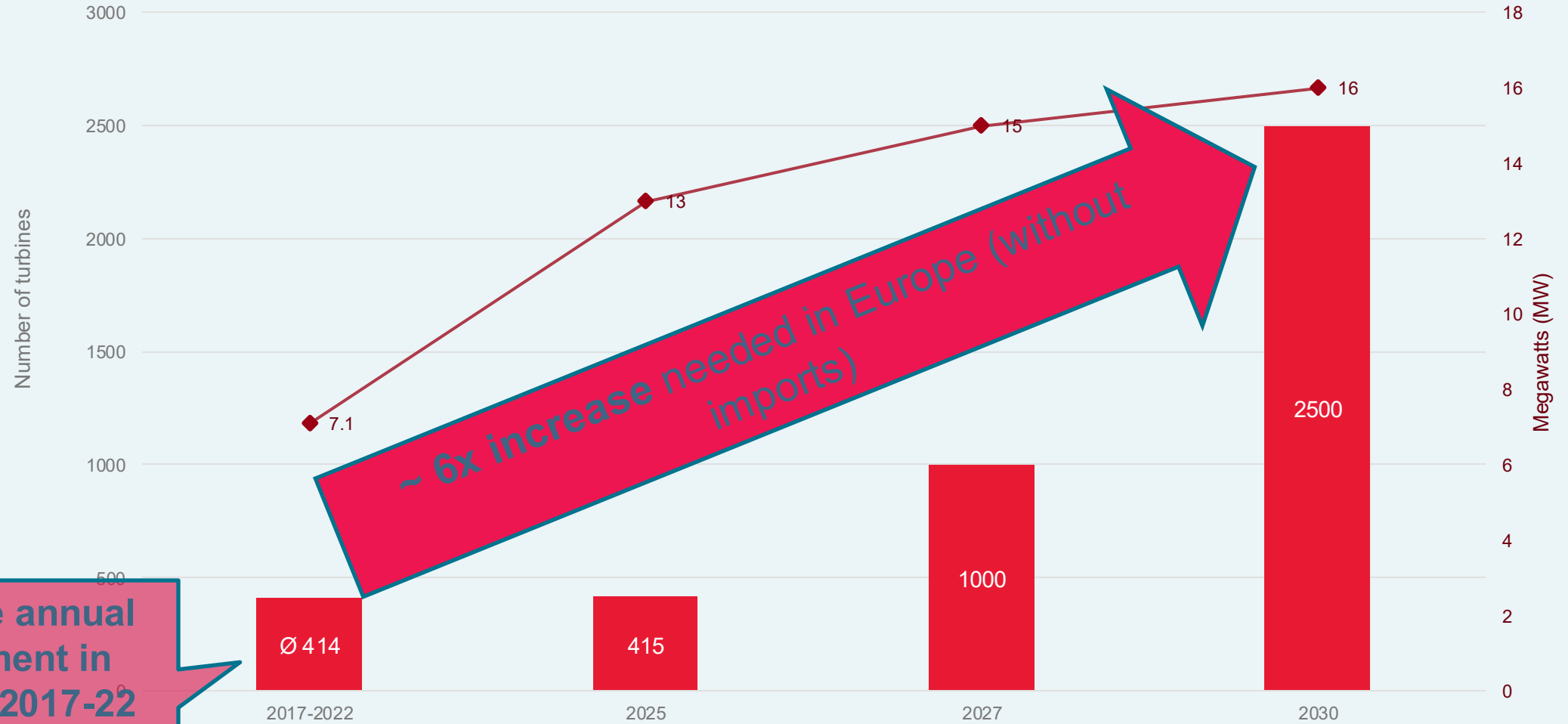
Source: Own illustration based on wind:research
(2022)

European Capacity and Targets



*Approximation by WindEurope 2022b that includes: Poland (5.9 GW), Spain (3 GW floating by 2030), Portugal (3-4 GW by 2026), Norway (30 GW by 2040), France (40 GW by 2050), Italy (3.5 GW), Ireland (7 GW), etc.

SUPPLY CHAIN CAPACITIES NEEDED BY 2030



Average annual deployment in Europe 2017-22

■ Europe - Annual number of turbine installations needed/ expected

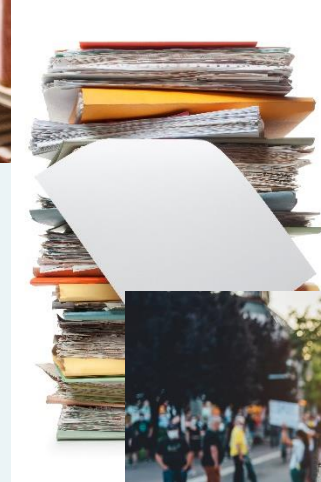
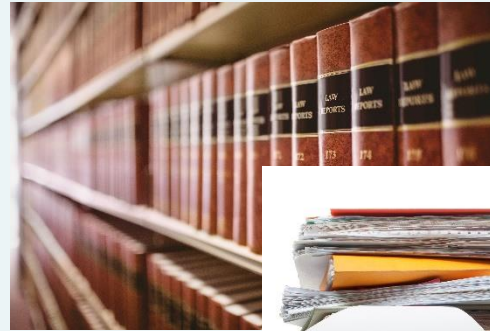
◆ Expected average turbine nameplate capacity installed

Complex answers – need to be given on European and national level



Lessons Learned

- ❖ Stable regulatory framework
- ❖ Reduction of bureaucracy
- ❖ Include the public
- ❖ Prevent a “race to the bottom”
- ❖ Suitable auction design



Thank you for your attention!

Happy to get in touch...



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