



Going Offshore: Fostering Germany's Energy Transition from the Seas

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German Offshore Wind Energy Foundation

- Founded in 2005 as an independent, non-profit organisation to promote the utilization and research of offshore wind in Germany
- Acquisition of **ownership rights (permit) of alpha ventus** - moderated/accompanied process of Germany's first OWF
- Platform for **offshore wind/maritime industry**, incl. **trade associations, policy-makers and R/D**
- Involved in various **projects** (EU and national)



Offshore wind power established itself in the energy mix

- In 2010, the first test site, *alpha ventus*, was commissioned (12 turbines)
- In 2017, more than 1000 offshore turbines are on the grid
- In 2016, almost 13 TWh of electricity generated – enough for the electricity demand of a major city

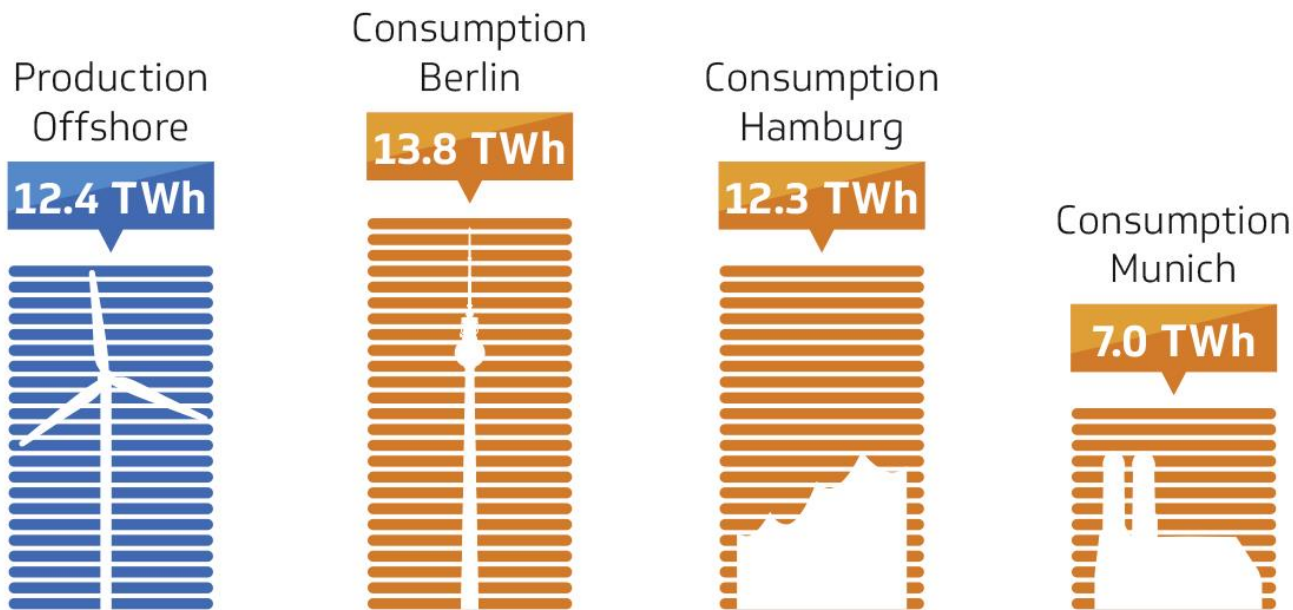


Offshore wind power established itself in the energy mix

12.4 TWh offshore wind energy in 2016

(= energy consumption of roughly 3 million households)

OFFSHORE WIND CAN SUPPLY MAJOR CITIES



Electricity production offshore 2016 and energy consumption of German cities
Source: Agee-Stat 2017, municipal utilities

Infographics: Ahnen&Enkel

Status Quo Offshore Wind Germany: Around 4,700 MW connected to the grid – 17 wind farms in operation



CAPACITY OF OFFSHORE WIND TURBINES IN THE GERMAN NORTH AND BALTIC SEAS



First Tender results in Germany - a paradigm shift

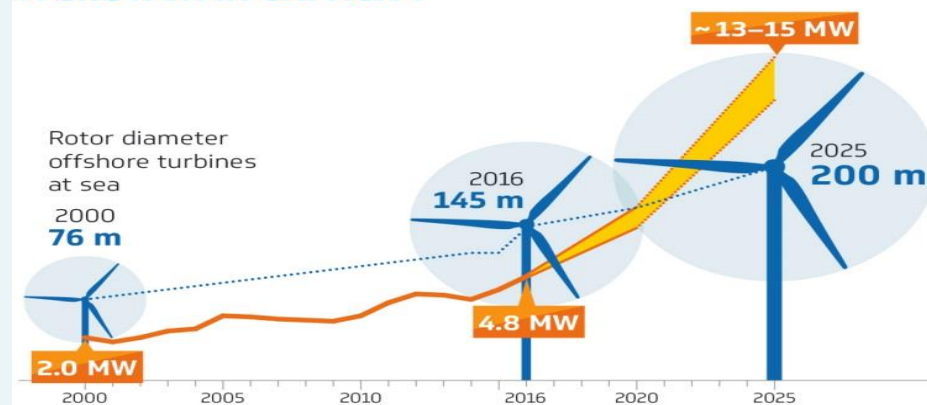
Project	Owner	Capacity	Award price (€/MWh) – Support on top at the market price	Planned commissioning
He Dreiht	EnBW	900	0	2025
OWP West	DONG	240	0	2024
Borkum Riffgrund West 2	DONG	240	0	2024
Gode Wind 3	DONG	110	60	2024

Reasons for the dramatic price reductions

Technological developments

- Further progress in offshore technology is expected, which will reduce the average cost
- By 2024/2025 turbines with a capacity of 13-15 MW are expected to be commercially available
- The number of turbines used would thereby be reduced, which further reduces costs

A GROWTH IN CAPACITY

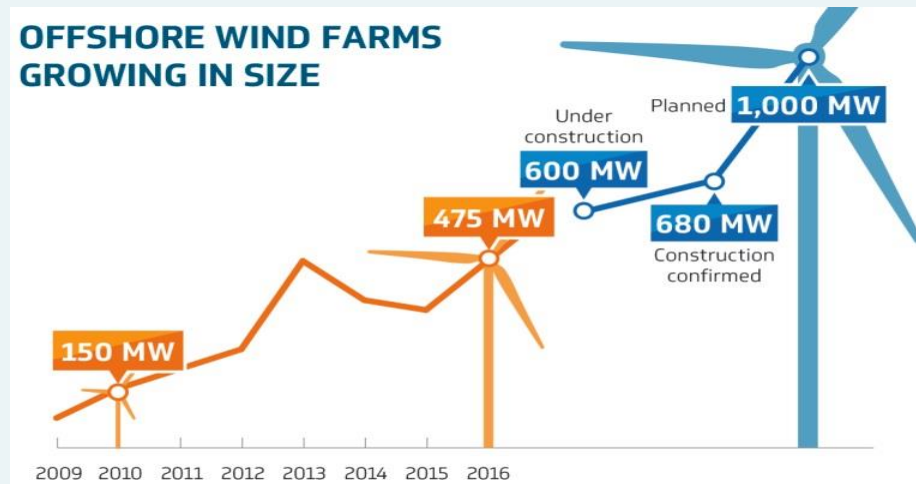


Reasons for the dramatic price reductions

Economies of scale

- Wind farms are increasing in size, Currently under construction: e.g. 1200 MW farm, Hornsea UK – cost reductions by using economies of scale
- The combination of individual projects (OWP West, Borkum Riffgrund West 2) to a large-scale project or the construction near other wind parks (He Dreht and Hohe See) leads to cost-reducing synergy effects

OFFSHORE WIND FARMS GROWING IN SIZE



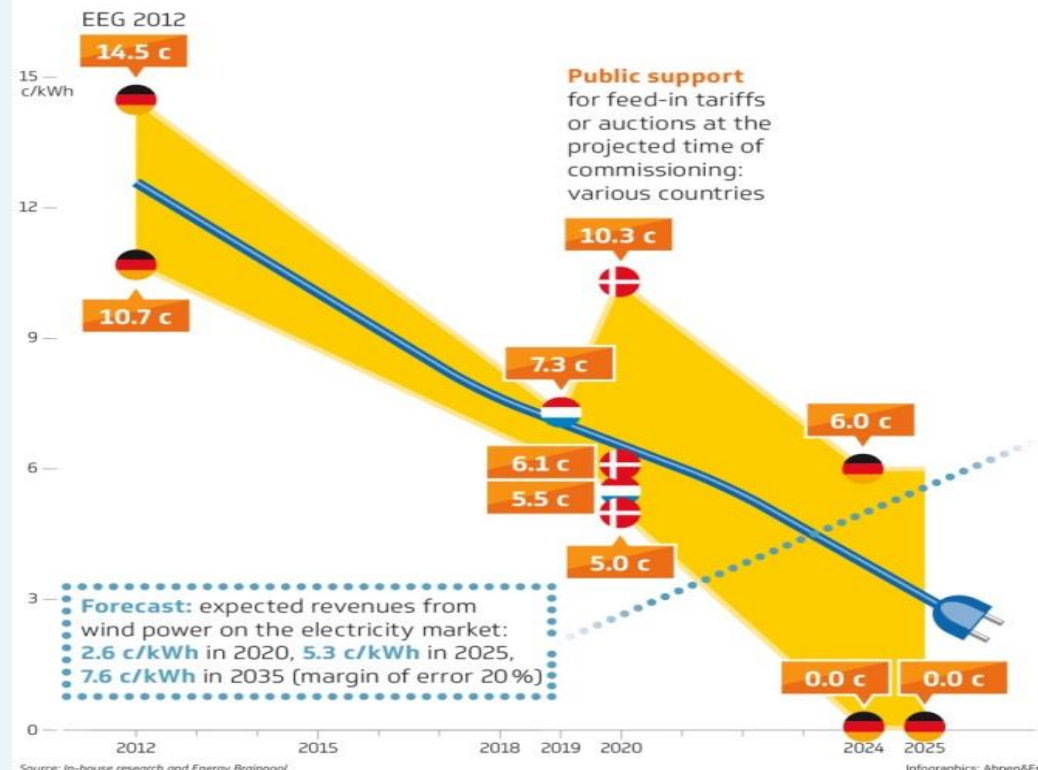
Average size of new offshore wind farm projects
Source: WindEurope 2017

Reasons for the drastic price reductions

Electricity price development assumptions

- Experts forecast an electricity market price of 5.3 c/kWh in 2025 and 7.6 c/kWh in the year 2035

PUBLIC SUPPORT RAPIDLY DECREASING



First Tender results in Germany: Conclusions and Industry Requests

- The dramatic drop in prices to a maximum of 6.0 cents/kWh reflects, above all, the rapidly lowering costs through industrialization and a steep learning curve in the industry
- The federal government is required to increase the expansion targets for offshore wind energy: We are calling for at least 20 GW by 2030 and 30 GW by 2035
- Bold measures for grid expansion and the implementation of sector coupling must now be taken quickly to take advantage of the now clear positive prospects of offshore wind energy
- Offshore wind energy has proved to be at the core of a low-cost and sustainable energy transition in the near future



Offshore wind power is the backbone of the Energy Transition

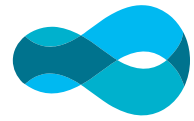
- Offshore wind produces steady and reliable quantities of power
- Good predictability supports security of supply
- Energy yield from turbines at sea twice as high as onshore
- Given optimal expansion, offshore wind can provide around 30% of electricity consumption by the year 2050 (IWES)



Grids: Indispensable to the Energy Transition

- Historically, electrical grids were designed for a small number of conventional power plants (close to consumption centres)
- Energy transition requires rapid expansion and redesign of the existing grid
- Grid expansion makes sense under every scenario
- Innovative transmission concepts and sector coupling provide opportunities to bypass bottlenecks in the grid





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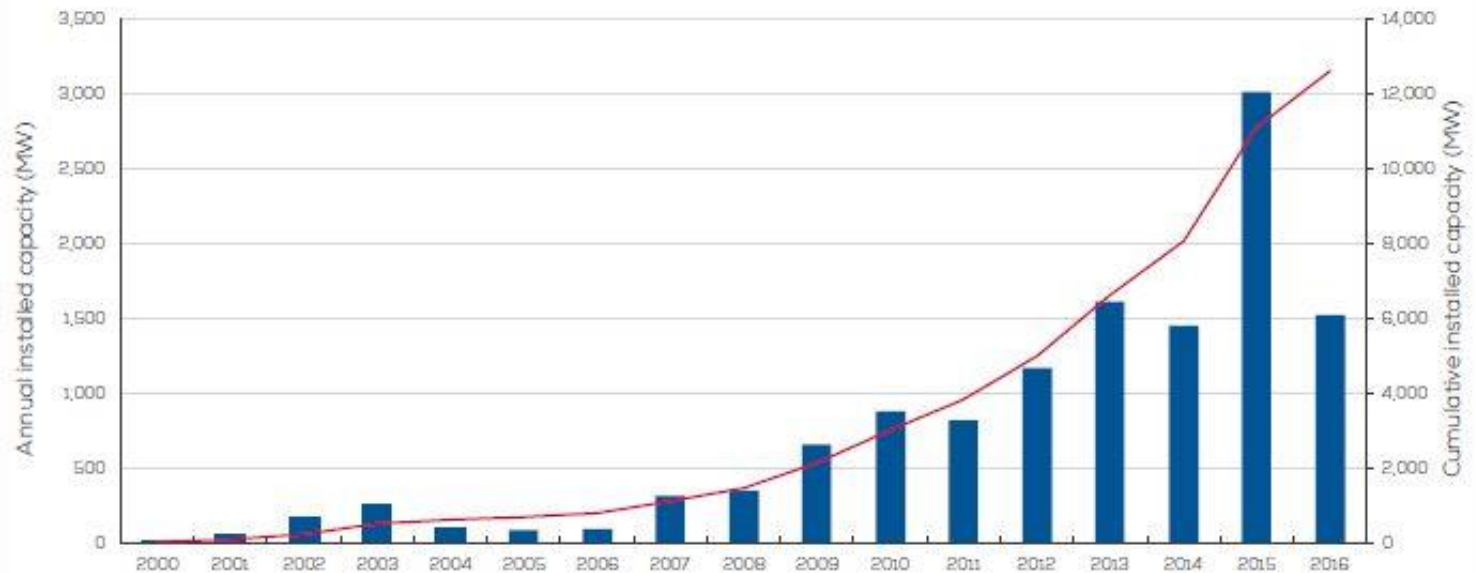
Development of offshore wind energy in Europe



Europe installed 1,558 MW of new offshore wind in 2016 with cumulative capacity reaching 12,631 MW

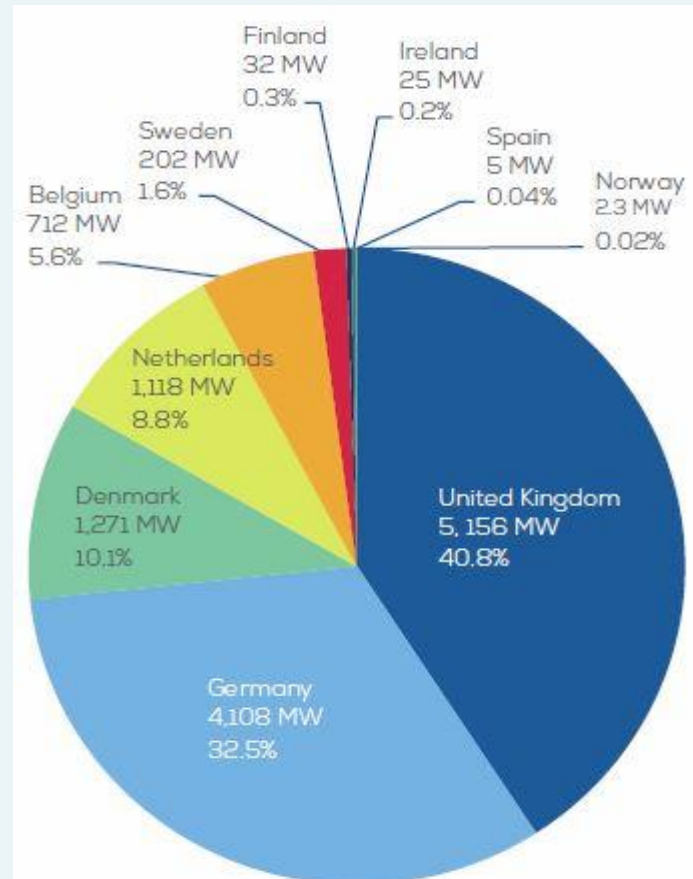
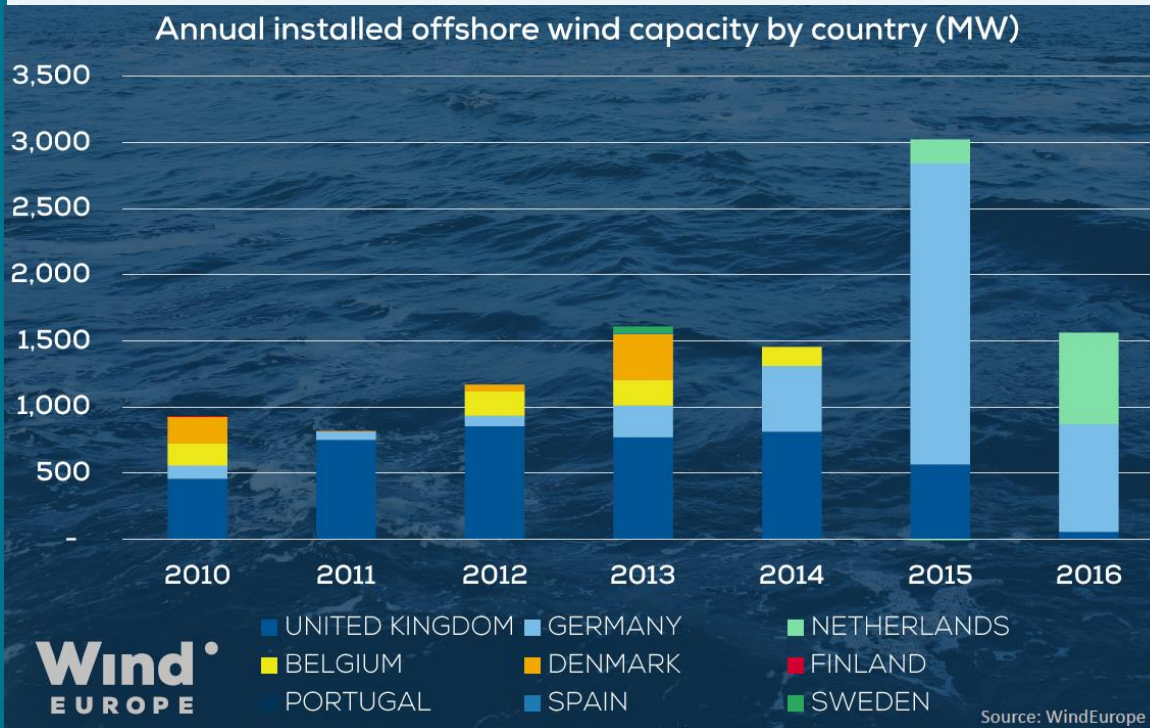
FIGURE 1

Cumulative and annual offshore wind installations 2000-2016

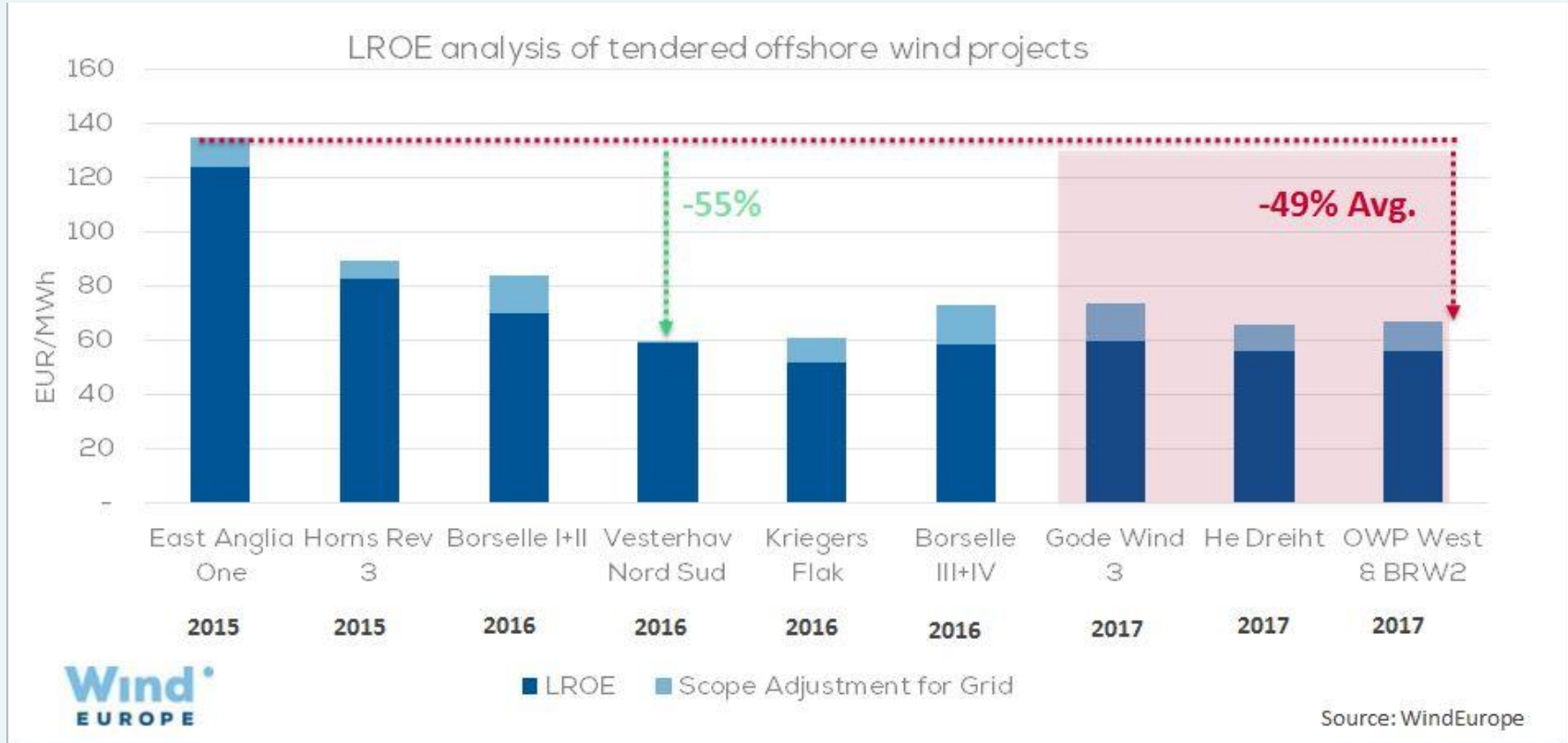


Source: WindEurope

Development of offshore wind energy in Europe

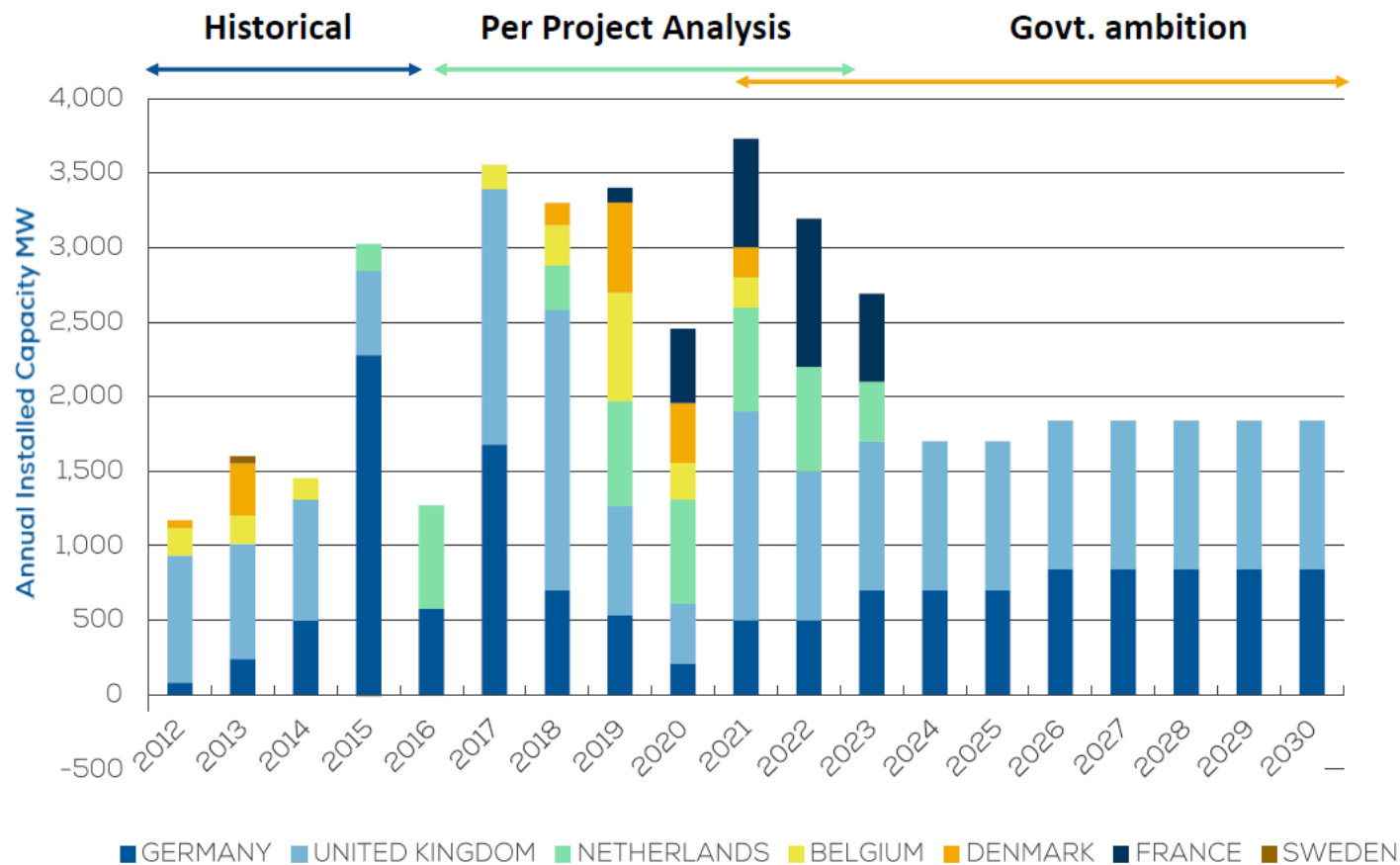


Prices are cut in half



WindEurope: Current market projection

Market projection to 2030



*BE+FR projects conditional on gaining full consent

Source: WindEurope

Joint Statement of European Industry and European Governments, 6th of June

Volumes key to cost reduction

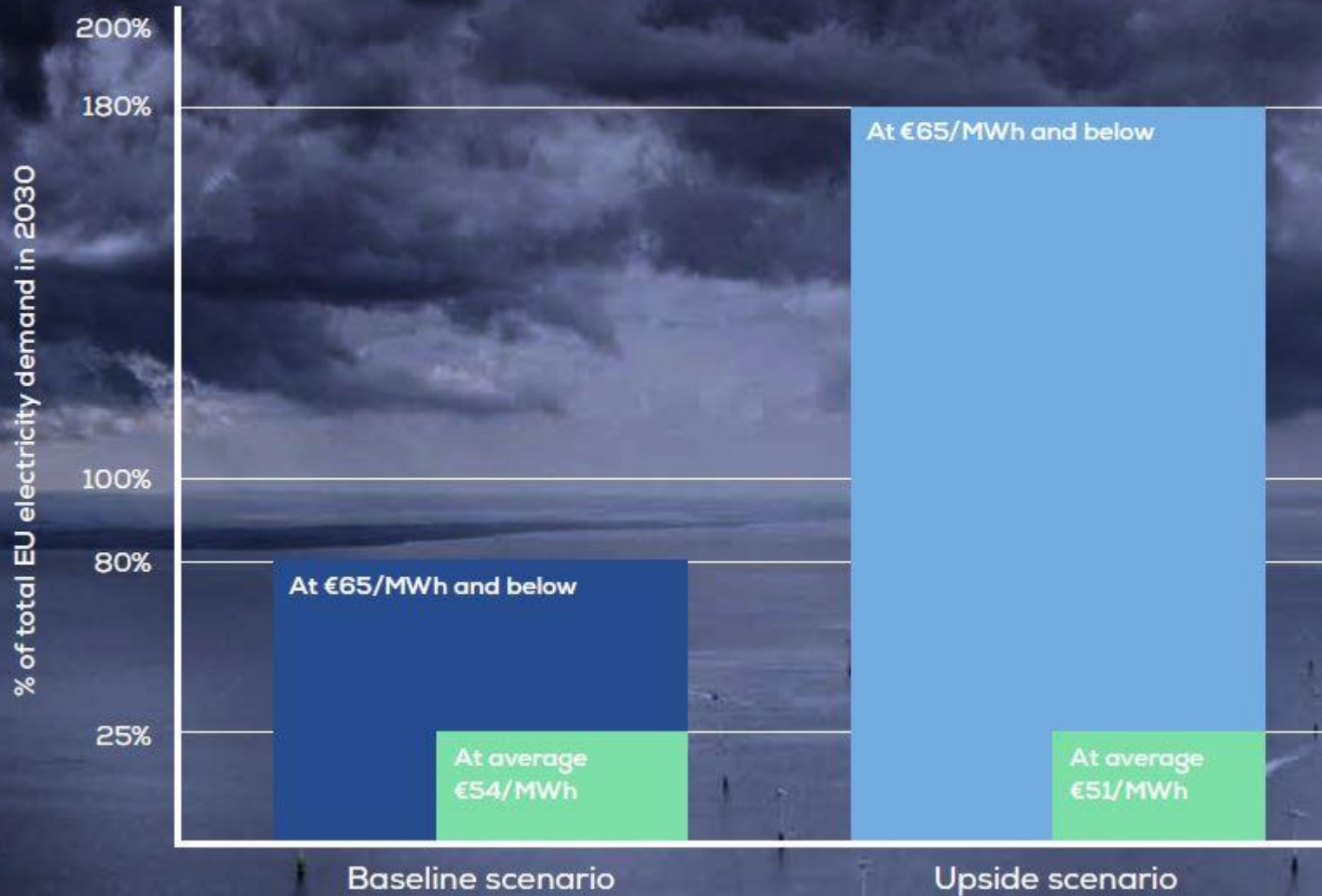
- 4 GW/yr
- 6–7 GW/yr

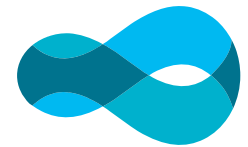
in Europe is a minimum for a sustainable industry,
is necessary to remain at the forefront in
world wide industry.

Volumes will sustain competition, investment and growth in the supply chain



Economically attractive resource potential at the end of 2030





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Thank you very much for your attention!

**German Offshore Wind Energy
Foundation**

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