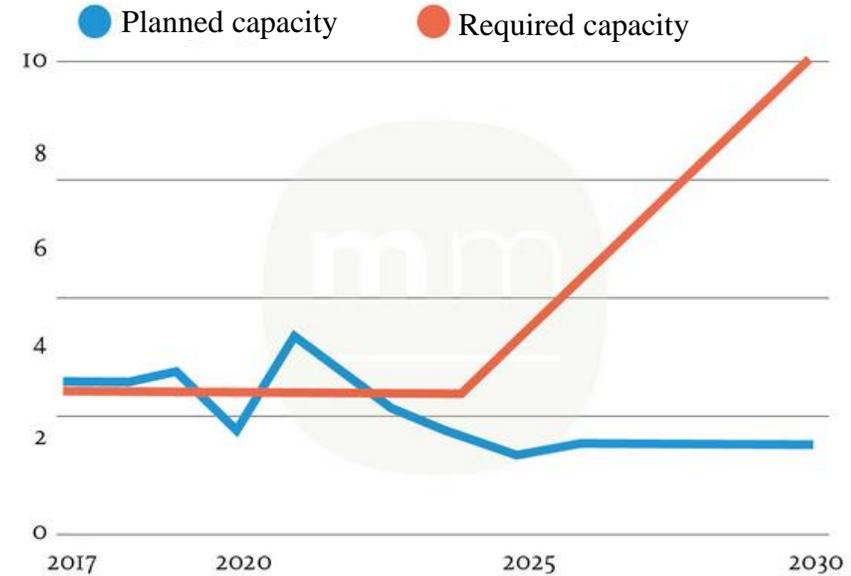
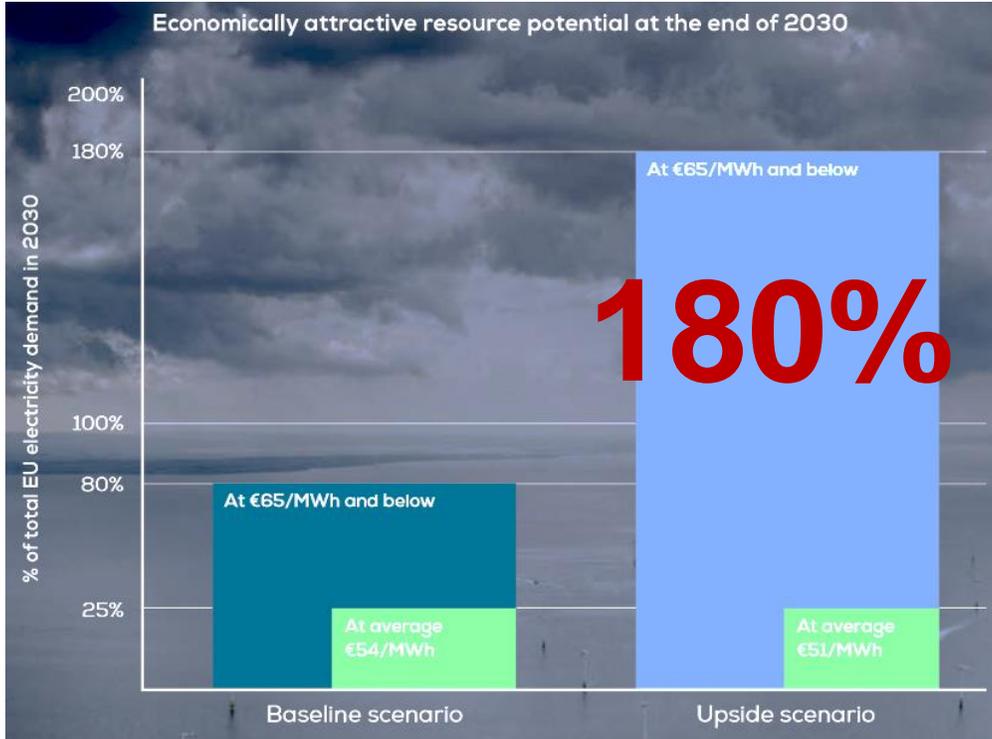


Political visions meeting market and regulatory challenges in North Sea offshore hubs

Lena Kitzing, Energy Economics and Regulation Group, Sustainability Division, Department of Technology, Management and Economics

Europe has the potential and the need to add significant amount of offshore wind in the near future



Source: Analysis by Ecofys for North Sea Wind Power Hub on offshore wind capacity additions required to meeting Paris Climate ambitions

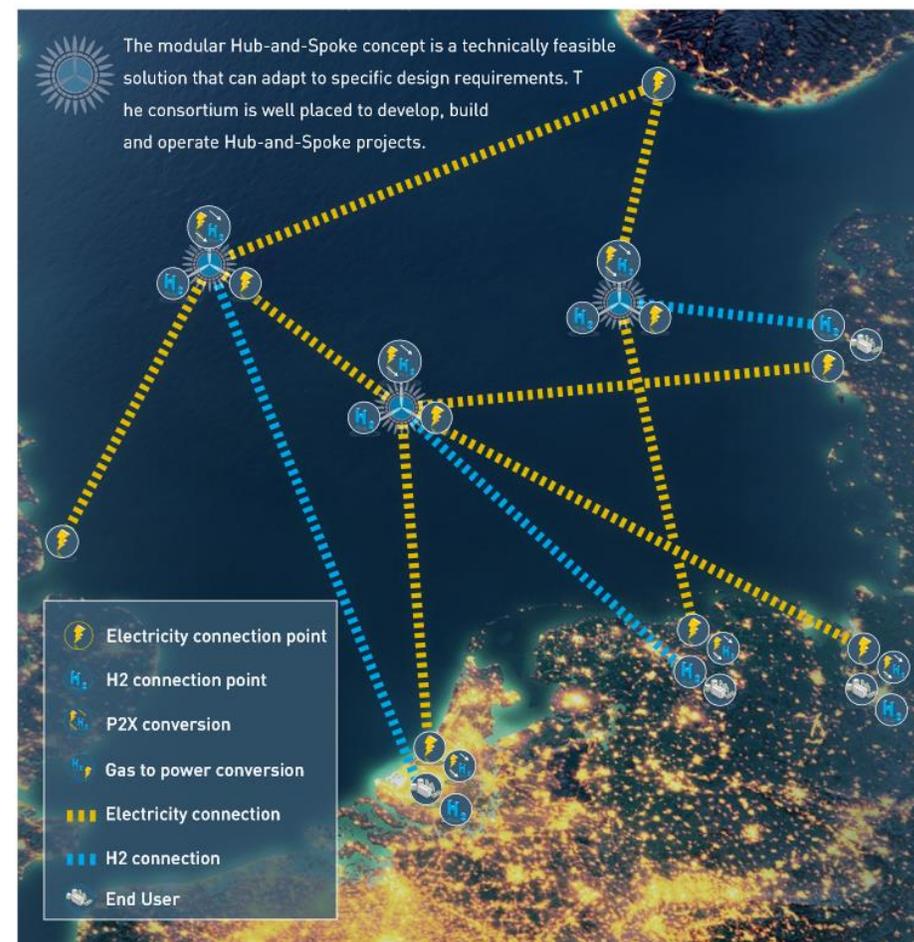
Source: WindEurope <https://windeurope.org/wp-content/uploads/files/about-wind/reports/Unleashing-Europes-offshore-wind-potential.pdf>

Momentum in Europe to jointly develop the North Sea

- First Political Declaration on target cooperation in 2009
- The North Seas Countries' Offshore Grid Initiative (NSCOGI)
- North Seas Energy Cooperation (from 2016), under Danish Presidency (joint declaration in June 2019)

→ wind power hub became one of the focus areas

- North Sea Wind Power Hub cooperation (from 2017)



Offshore wind development could significantly increase through hub concept

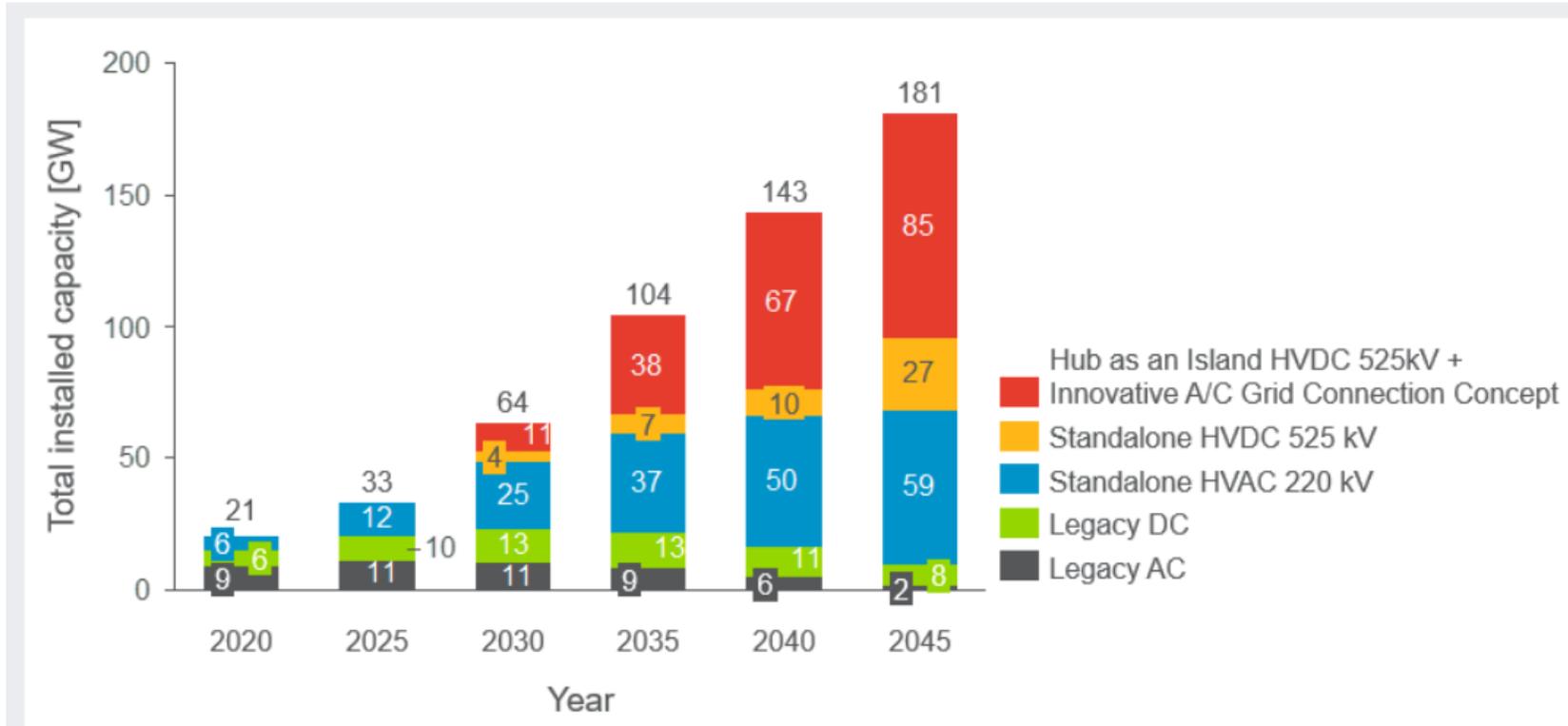


Figure 4 Installed wind power capacity in the North Sea broken down to the different transmission asset concepts for the ICRO approach. Legacy AC refers to currently operational and planned AC radially connected offshore wind farms. Legacy DC refers for currently installed and planned DC connected (German) offshore wind farms. The remaining grid connection concepts refer to Table 1

Source: <https://northseawindpowerhub.eu/wp-content/uploads/2017/11/Concept-Paper-2-Modular-Hub-Spoke.pdf>

Political visions in Denmark are high

- Develop (one of) the first European North Sea Energy Hub in Danish territory
- Government announced that they are exploring the possibility that Denmark constructs the first “Energy Island” in the North Sea with at least 10 GW offshore wind by 2030



Dan Jørgensen

Danish offshore regulation

- A project of the magnitude of an energy island has never been carried out in the Danish EEZ (Exclusive Economic Zone)
- There does not exist legislation in Denmark that covers all aspects of the project. Hence, general principles apply (principle of state sovereignty)

Affected area	Regulatory Responsibility
Amendment to the National Maritime Spatial Plan (to be adopted in 2020)	The Danish Coastal Authority
Planning and permitting of large pipelines and offshore wind farms	Danish Energy Agency
Planning and Regulation reg. the environmental assessment	Danish Environmental Protection Agency
Harbours etc.	Danish Transport, buildings, and housing Agency

Regulatory aspects with artificial energy islands

- UN Convention on Law of the Sea (UNCLOS)
 - > *The coastal state has the jurisdiction regarding the establishment and use of artificial islands, installations and structures, marine scientific research, as well as the duty to protect and preserve the marine environment*
- Espoo Convention
 - > *States have an obligation to assess environmental impacts & notify and consult each other in that respect*
- European Maritime Spatial Planning (Directive 2014/89/EU)
 - > *better integration of all maritime planning between Member States*
- EU Marine Strategy Framework Directive (MSFD) (2008/56/EC)
 - > *ecosystem-based approach to protect and manage the marine environment*

Environmental Impact Assessments (EIA)

- Large offshore wind / Hubs / Artificial islands are subject to Appropriate Assessment (AA), to ensure that ‘beyond reasonable scientific doubt’, adverse effects on the species, living places and the integrity of the site will not occur
- Complex task because of mobile nature of a number of bird, fish and mammal species in the wider marine environment and their life cycle -> migratory routes, feeding areas, breeding/ spawning areas etc.
- Likely to impact multiply Natura 2000 sites in different countries



Regulatory challenges & options

- It is conceivable to develop a first Hub-and-Spoke project within the current regulatory framework and market design
- Timeframe (<2030) ambitious, given the time needed for investigations, planning, consultations (authorities, countries, public), permitting & licensing, etc.
- Reconsideration of the regulatory framework is required to properly incentivise stakeholders in the long-term
- Open issues:
 - Market arrangements, e.g. introduce separate bidding zone or integrate into existing market areas?
 - Revenue models for producers, e.g. auctions for premiums?
 - Revenue models for transmission infrastructure operators, e.g. OFTO type?

Going international...even more regulatory & policy issues in cross-country cooperation on energy islands

- Different environmental and technical standards (Member States as well as EU law)
- Potential multiple jurisdictions (claims) over cross-border cable systems
- **Hybrid character of cables (both transmission and connection) has no existing legal definition – no clear regulation and many different approaches**
- Open issues:
 - Should energy be (commercially and physically) fed into home market (EEZ)?
 - > *direction of commercial electricity flow may be unclear*
 - > *what if OWF not connected to home market?*
 - Should the North Sea become its own market zone? Price formation?
 - Balancing responsibility?
 - Priority dispatch?
 - Curtailment regulation and compensation?

How to make cross-country cooperation on energy islands happen? Some ideas...

Project-specific legal agreements between countries

- Transnational approaches regarding legal and regulatory framework conditions
- Short-term solution through Hybrid Asset Network Support Agreements (**HANSAs**), specific mitigation measures designed to overcome relevant legal and regulatory barriers)

Costs and benefits sharing

- Clear rules for the fair allocation of costs and benefits
- Project-specific solutions

Financing

- E.g. EU's Connecting Europe Facility provides early-stage and investment support for Projects of Common Interest. Additionally, offering EUR 900 million in early-stage co-investments for renewable cross-border projects is considered from 2021

Future TSO entity for the North Sea

THANK YOU

DTU

QUESTIONS?

