



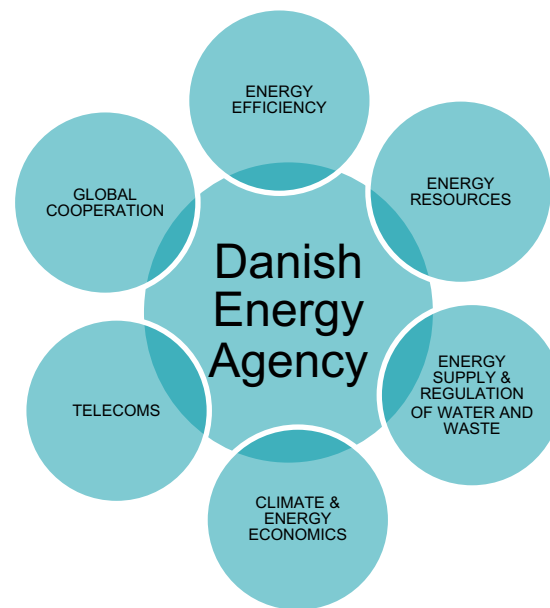
Danish Energy
Agency

Wind Energy: The Danish Model

Copenhagen – January 28, 2019
Pablo Hevia-Koch, PhD

The Danish Energy Agency (DEA)

- Agency under the Ministry of Energy, Utilities and Climate
- Established in 1976
- Responsibilities:
 - Energy production and supply & economic regulation of water and waste sector
 - Energy consumption
 - Energy economic and scenario analysis
 - Climate
 - Telecoms

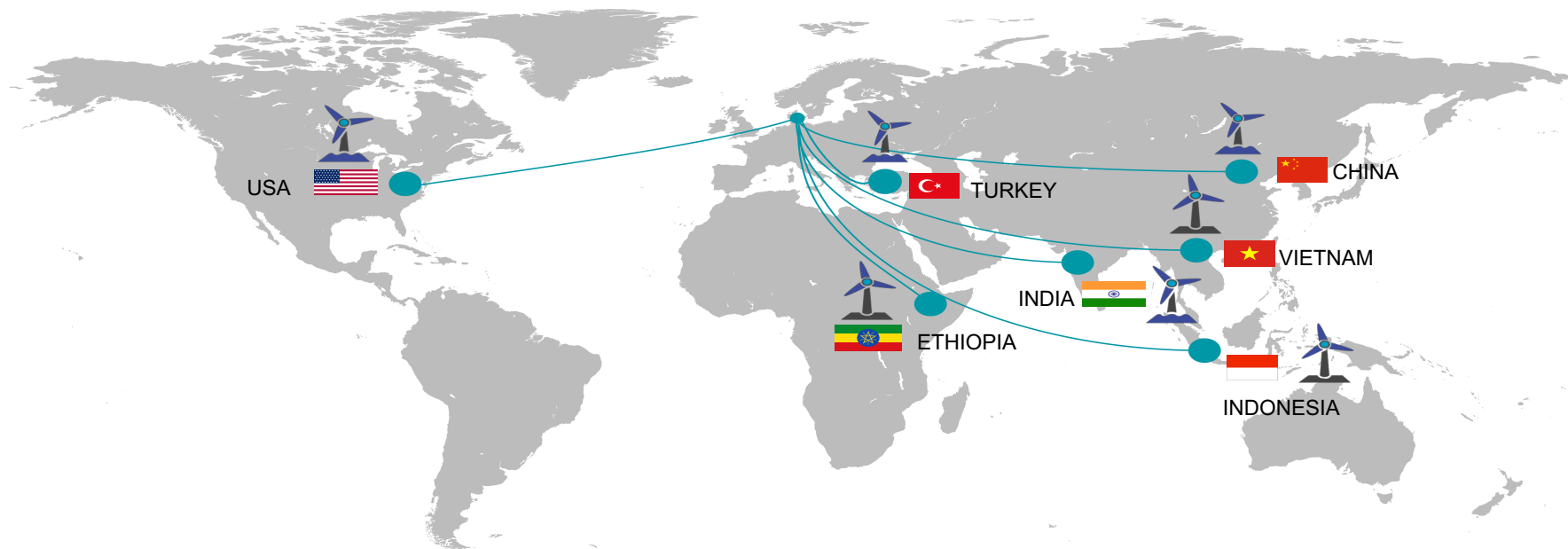




Global Cooperation



Cooperation on wind (on- and offshore)



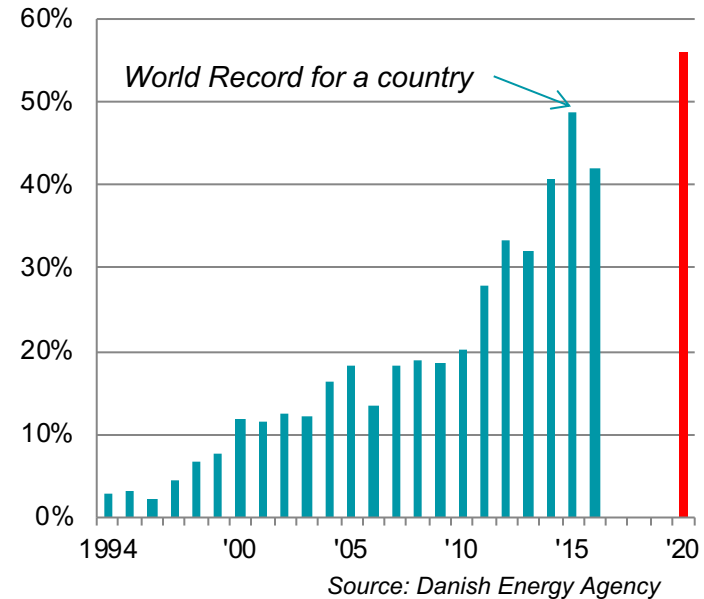
Offshore Wind Energy in Denmark

- 25 years of experience

Timeline for Offshore Wind Energy in Denmark

- **1991:** First Danish offshore wind farm Vindeby (5 MW)
- **2011:** 868 MW offshore capacity
- **2018:** ~ 1,300 MW offshore capacity including 28 MW R&D
- **2022:** Additional 1,350 MW under construction (1,000 MW offshore, 350 MW nearshore)
- **Future:** New tender to be released for additional 3 x 800 MW (decided in June 2018)
→ Public investment of US\$ 130 million over 8 years

Wind Power Generation
% of Danish Power Production



Joint development of wind power

- Triple Helix Cooperation

Academia

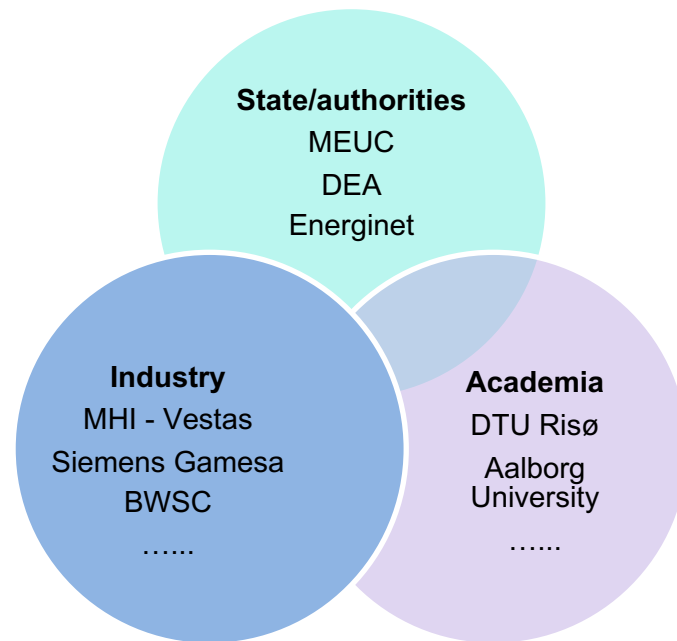
- Utilizing long-term research
- Public R&D support
- Establishing industry standards

State/authorities

- Long-term policies
- Streamlined authorization process

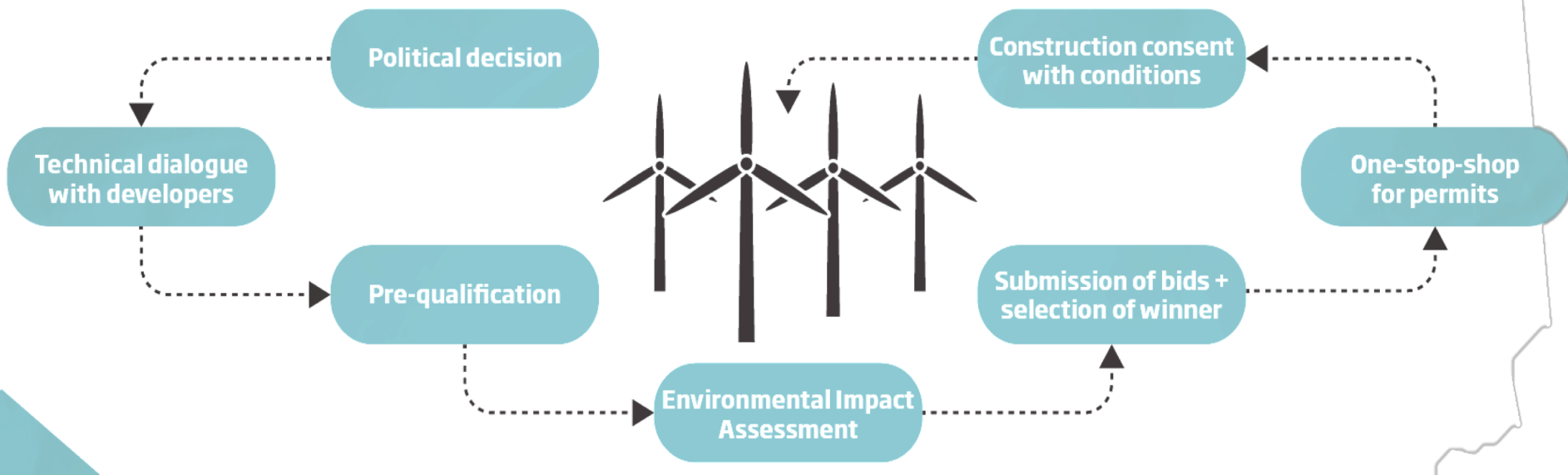
Industry

- Established track record with initial customers
- High technical standards = Bankable projects



The Danish Approach to Auctions

ONE-STOP-SHOP CONSENT PROCEDURE

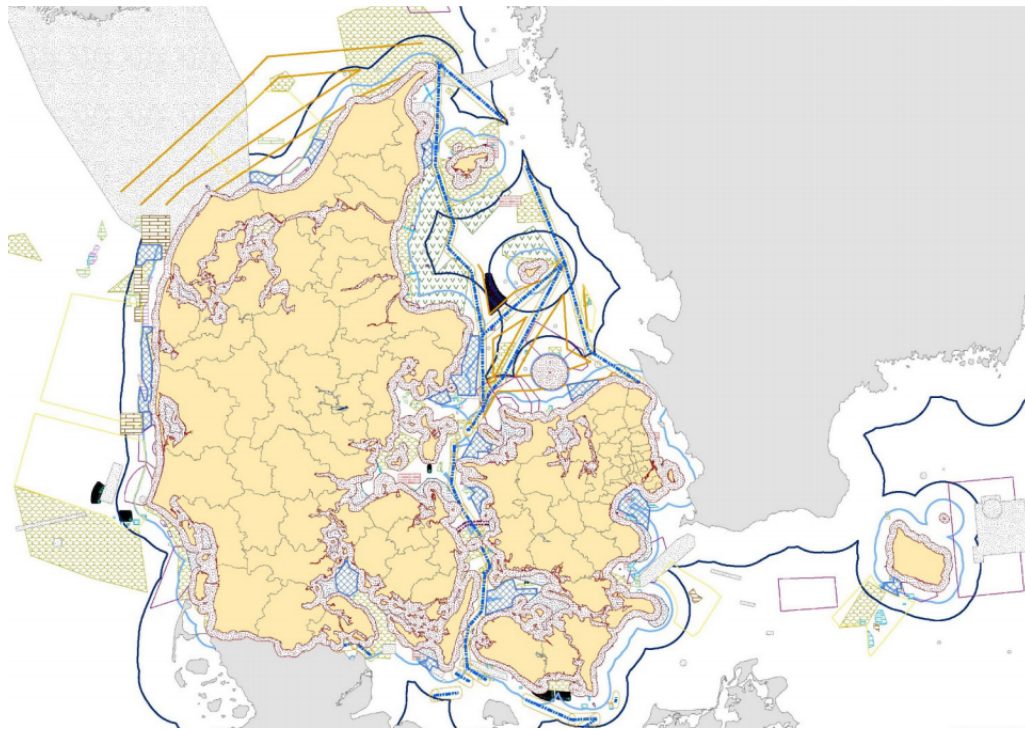


Spatial Planning for offshore wind

- Initial involvement of all relevant stakeholders

Continuous process since 1995 leaded by DEA and involving:

- Ministry of Energy, Utility and Climate (offshore resources)
- TSO and local grid operators
- Ministry of Environment and Agriculture (natural environment and fishery)
- Ministry of Transportation and Buildings (safety at sea)
- Ministry of Defense (naval issues)
- Ministry of Culture (visual interest, etc.)
- Wind Industry and R&D institutes



Environmental Impact Assessment

- Broad EIA by the TSO
- EIA is a hard stop for any project
- Effects on:
 - Birds, Fish, Mammals...
- Publicly available

Kriegers Flak Offshore Wind Farm

Marine Mammals
EIA - Technical Report
June 2015

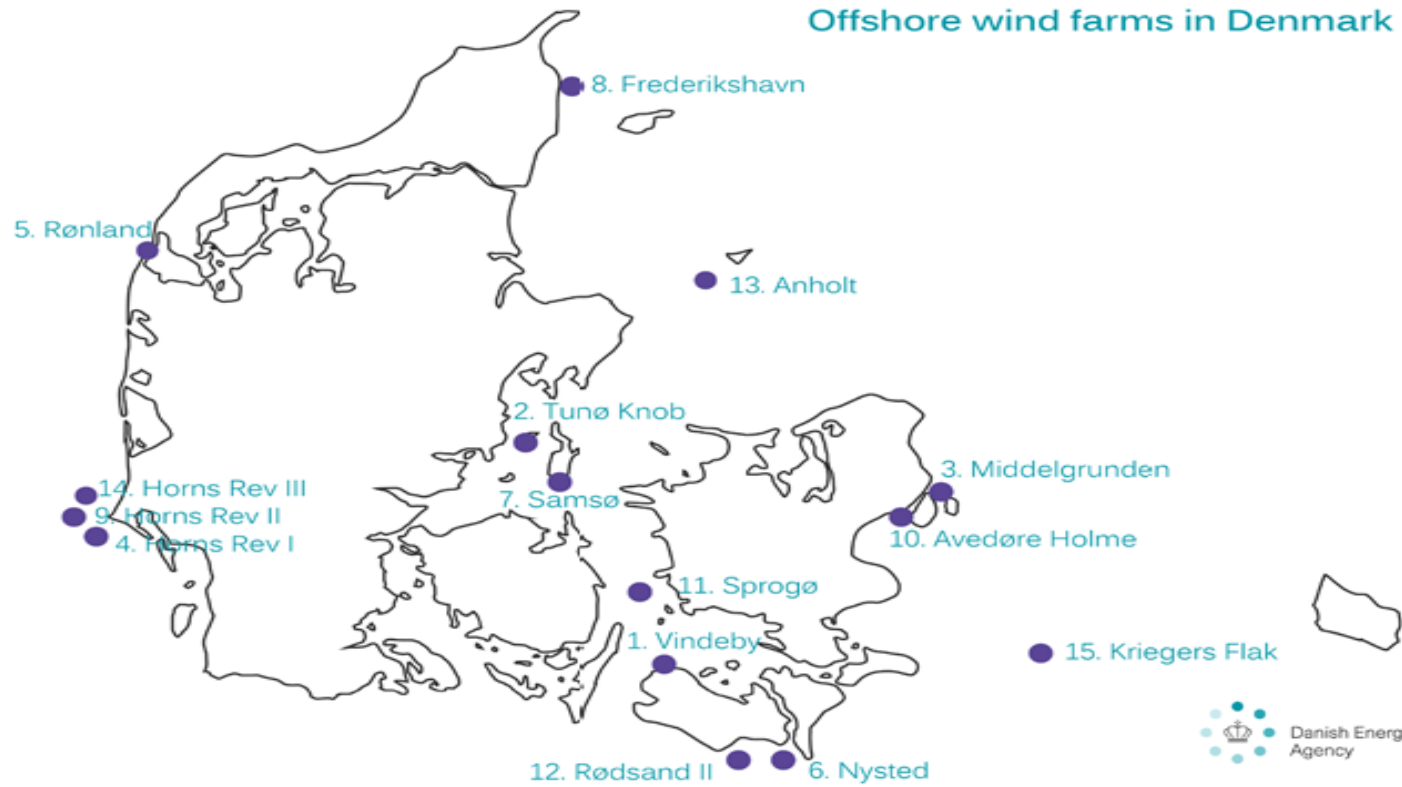
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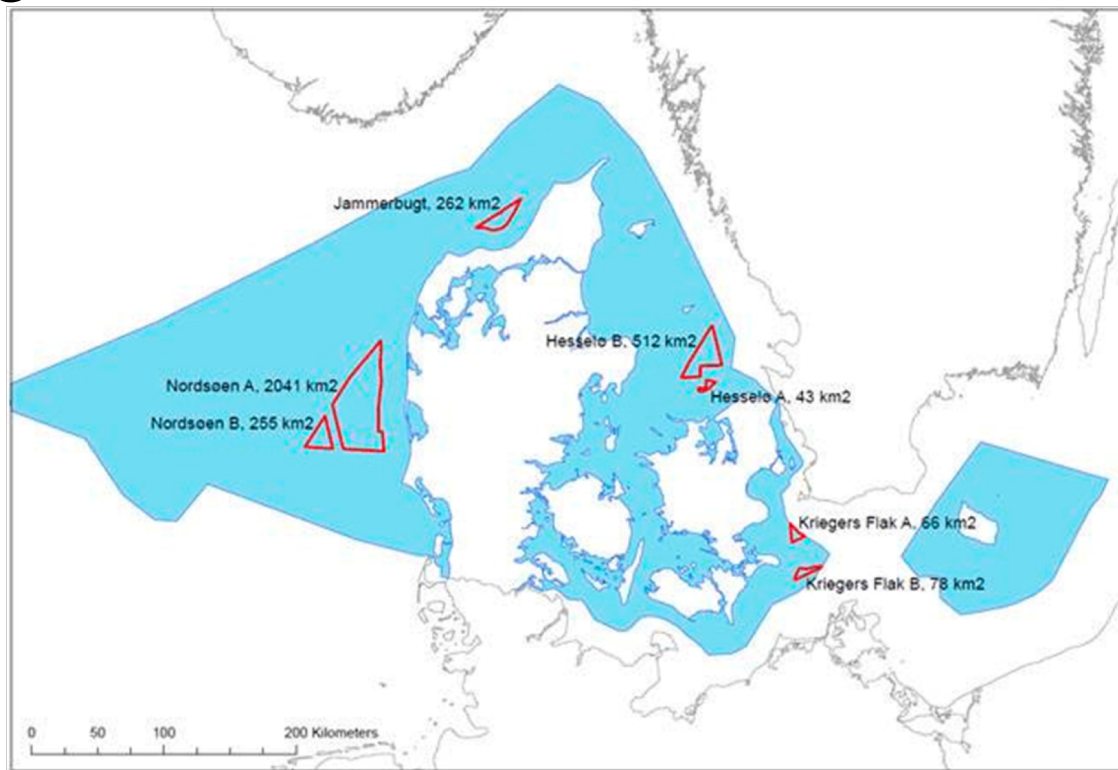
DHI



Existing projects



New large scale scenarios for 2030



Wide support for wind development...

Over 90% of the Danes are in favour of the expansion of wind power in Denmark

- Broad political support
- Involvement of stakeholders as early as the Maritime Spatial Planning
- Public participation in the decision making process
- Long tradition for local ownership

... But local resistance

- Increase of the Willingness To Pay with the distance of the wind turbines from the properties
- Preference for offshore wind farm located further than 18km from shore
- Evaluation of potential visual disamenities in EIA



Tamra Offshore Wind Farm in Jeju Island

4 acceptance schemes

- Introduced in 2009
- Administered by Energinet (TSO)
- For both onshore and nearshore projects

1

Option-to purchase scheme

The developer must offer at least 20% of the share of the project to local residents.

2

Guarantee scheme

A dedicated fund from Energinet provides a guarantee to local cooperatives for preliminary investigations.

3

Loss-of-value scheme

Compensation for value loss on properties in the vicinity of the wind turbines.

4

Green scheme

Financing to municipalities for enhancing the landscape and the recreational values of wind projects.

Offshore and fisheries

- The Fisheries Act entitles the fishermen to a compensation for the loss of income due to the establishment of the wind farm, both during the construction and the operation phases.
- The developer has to negotiate the compensation for documented losses with the Danish Fishermen's Association, and with individual fishermen if necessary.
- An impact assessment on fisheries is part of the EIA.

The tender also contains requirements on **underwater noise management during construction.**

The DEA assesses and approves the mitigation measures during the licensing process.

Thank you for your attention!

Any questions?

Read more at www.ens.dk/global-cooperation