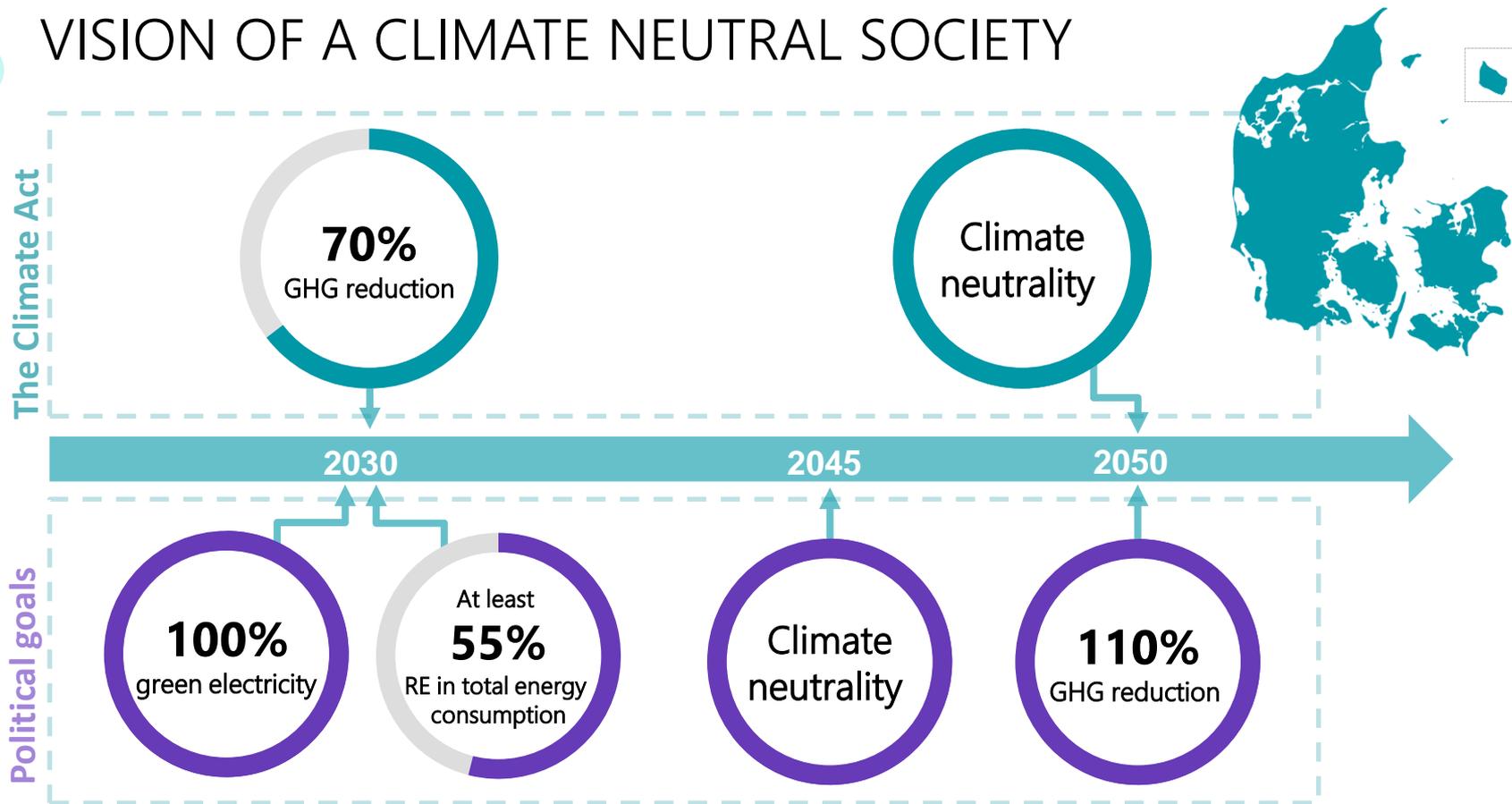


Status of Renewable Energy in Denmark

26th May 2023



VISION OF A CLIMATE NEUTRAL SOCIETY





ONSHORE RENEWABLE ENERGY TARGETS

Latest Energy Agreement, 25th June 2022

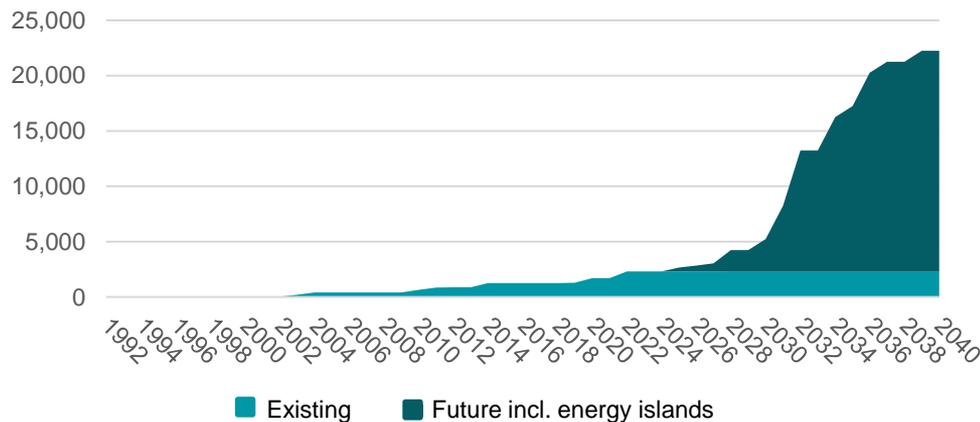
- Quadrupling of the of onshore wind and solar PV by 2030
- The Danish state will designate larger areas for “Energy Parks” onshore as a supplement to the planning for renewables executed by the municipalities
- The Danish State will start screening for 10-15 locations onshore for more renewables
- Strong local acceptance from residents and municipalities is critical for the expansion of four times more renewables onshore

DEVELOPMENT OF OFFSHORE WIND IN DENMARK

- **1991:** First Danish offshore wind farm Vindeby (5 MW)
- **2023:** ~ 2.3 GW offshore capacity
- **2030:** ~ 9 GW installed capacity
- **2050:** ~ 35 GW installed capacity

Tender out 9 GW to be constructed by 2030.

Total capacity of offshore wind (MW) in Denmark





OVERPLANTING OF OFFSHORE WIND

Maritime Spatial Planning

Screening the Danish waters for suitable sites for offshore wind to be tendered.

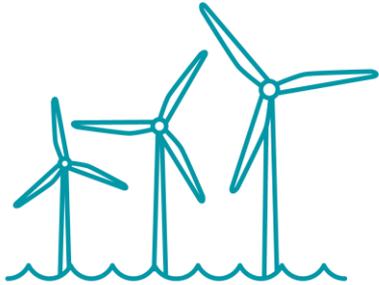
Overplanting

- Higher capacity in each area with more/larger turbines.
Downside: creates wake effects.
- Permission to install a higher capacity within an area than what can be connected to the grid in the first place. Excess power can be used for PtX via a direct line rather than through the grid.



Power-to-X and Offshore Wind

Power generated by offshore wind can be used for PtX and hereby contribute to the green transition of heavy transport and air traffic.





CO-EXISTENCE

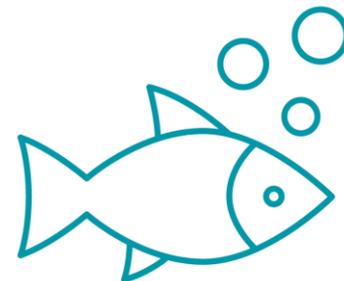
Existing procedures still valid when overplanting

Before tender:

Strategic Environmental Assessment (SEA)

Before establishment of the wind farm:

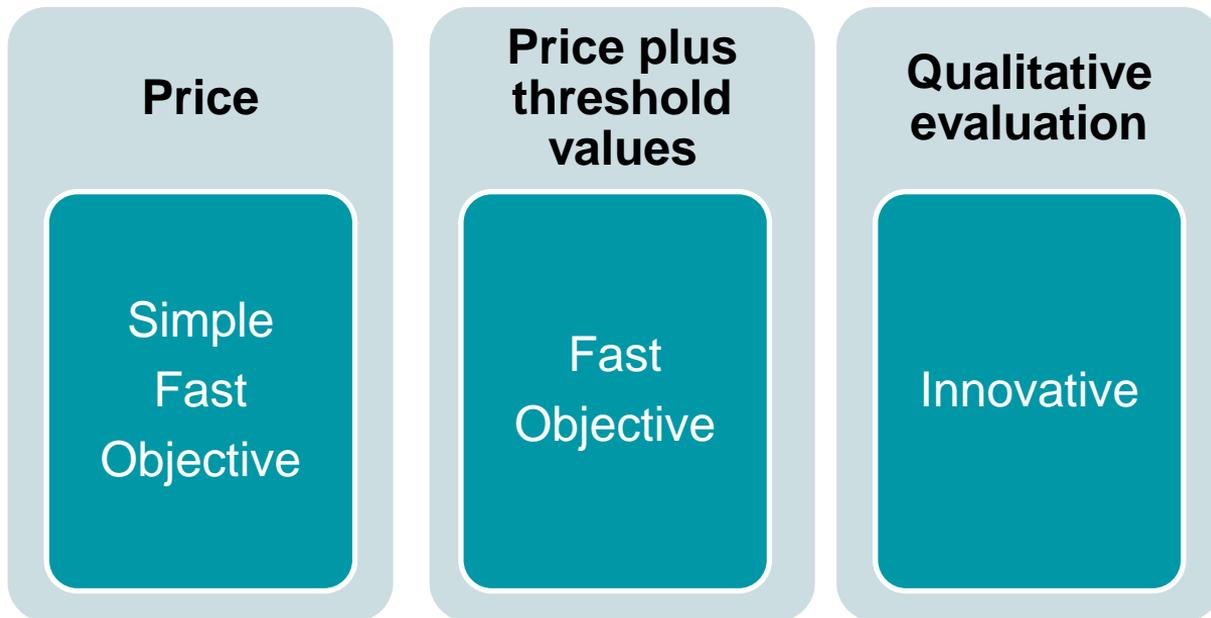
- The concession winner must carry out Environmental Impact Assessment and have it approved.
- Dialogue with the fishermen as part of screening of the seabed for suitable sites for offshore wind.
- The concession winner must pay compensation to the fishermen.





TENDER EVALUATION CRITERIA

Different approaches



Electricity sector reform.
Capital to power companies.
TSOs established. Market
access for large companies.

State-owned TSO established.

Negative prices
allowed in day-ahead
market.

Smart meters and
hourly settlement to all
customers.

Vertically
integrated sector

- 100+ distribution companies own 14 power plants.
- Local monopolies.

1999

2005

2009

2020

1995

2003

2007

2014

Unbundled and
market based

- Transmission and generation unbundled.
- Commercial suppliers introduced
- Distribution companies reduced to 43

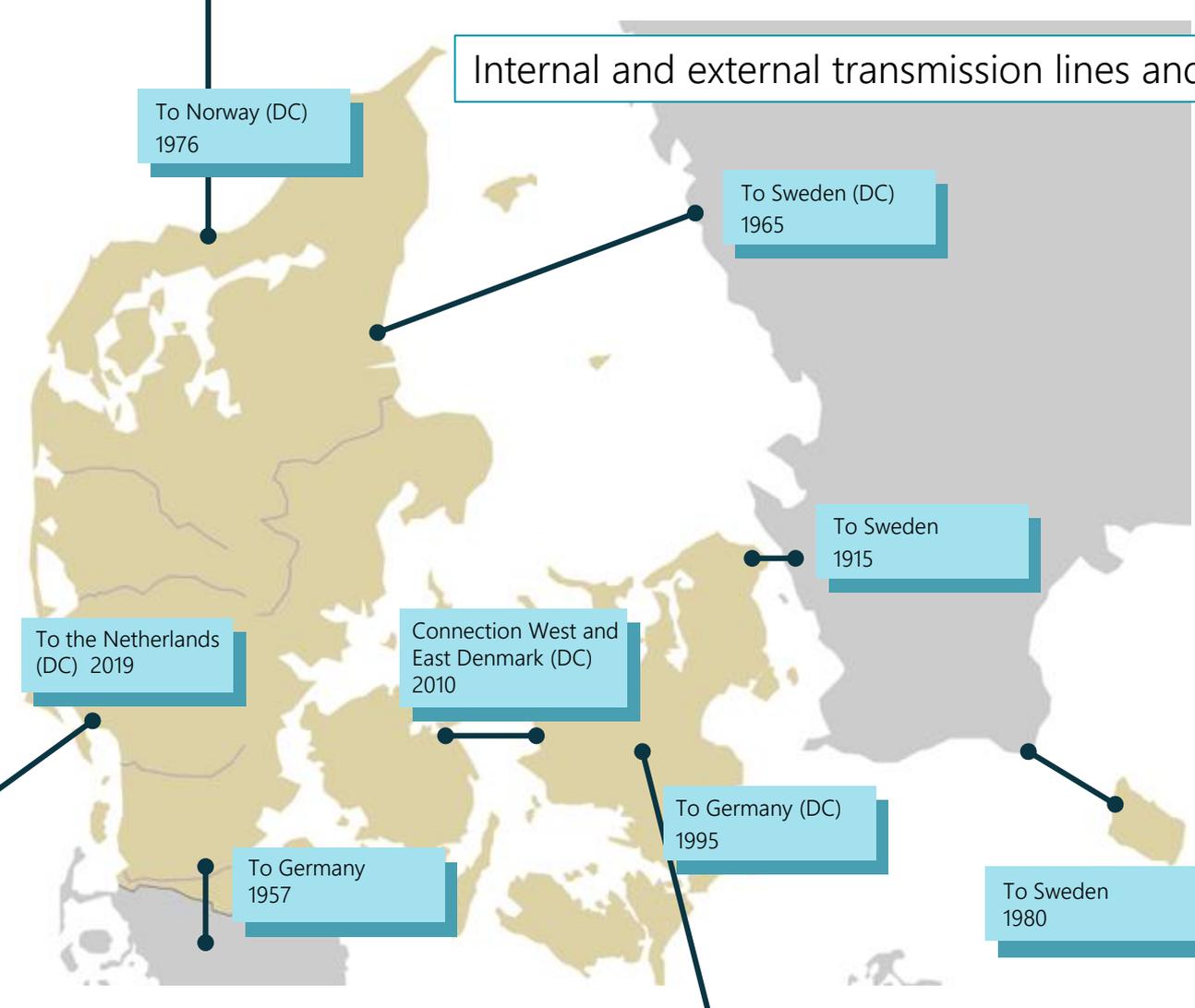
First EU liberalisation directive introduces TPA and unbundling. Nordic market already underway.

Market access for all consumers.

Small scale CHP on the market.

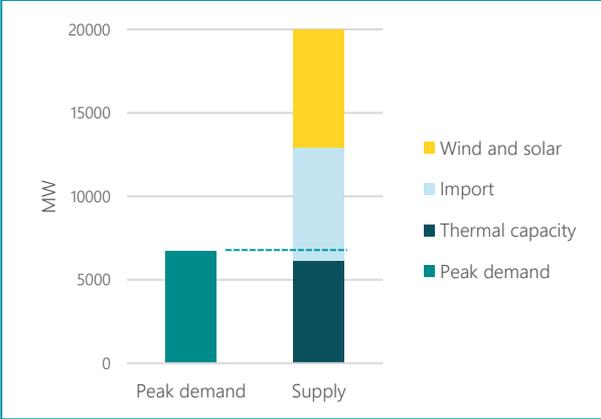
Electricity regulation Committee. Revised regulation for DSOs.

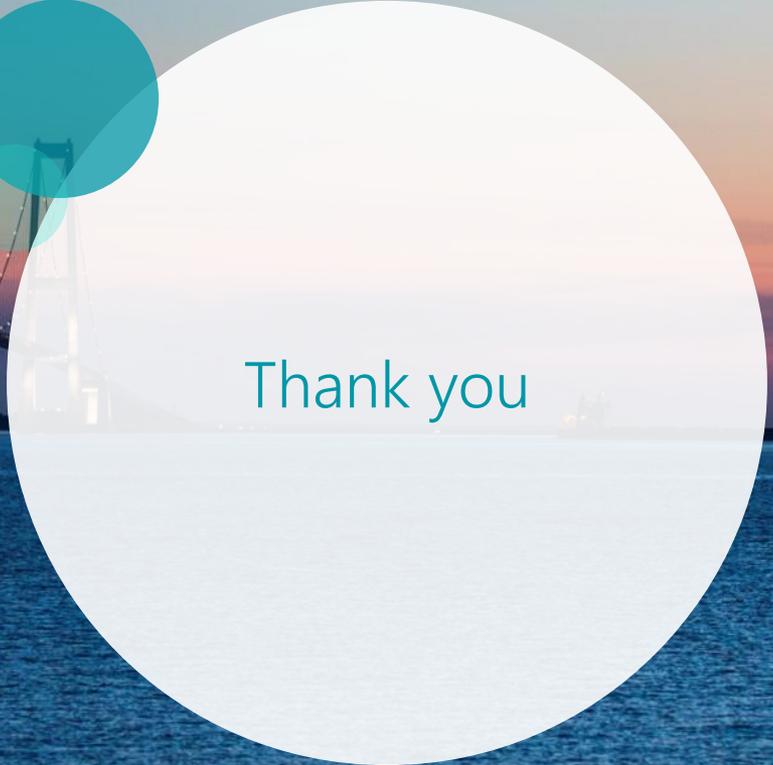
Internal and external transmission lines and the year of commission



- Denmark is very well-connected to its neighbours.
- Many connections have later been strengthened.
- A cable to UK will open in 2023.

Capacity balance 2020: Dependent on neighbours





Thank you