



# Danish Energy Agency

By Alp Gunsever

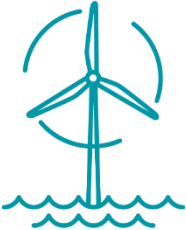
9. april 2024



Danish Energy Agency

# The Danish case for renewables - status

Offshore wind: 2.47 GW



Onshore wind: 5 GW



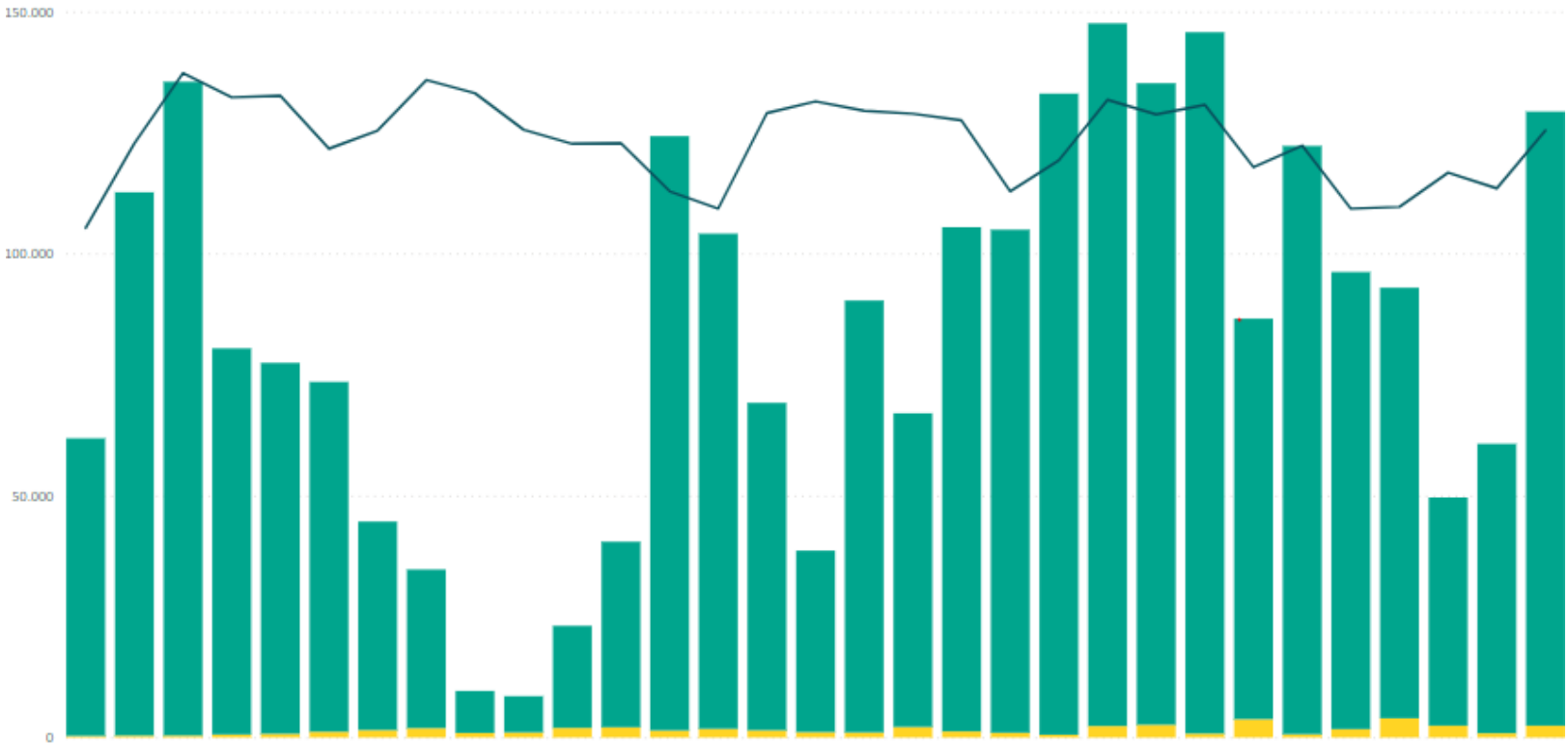
Solar: 3.5 GW



99.9999796%



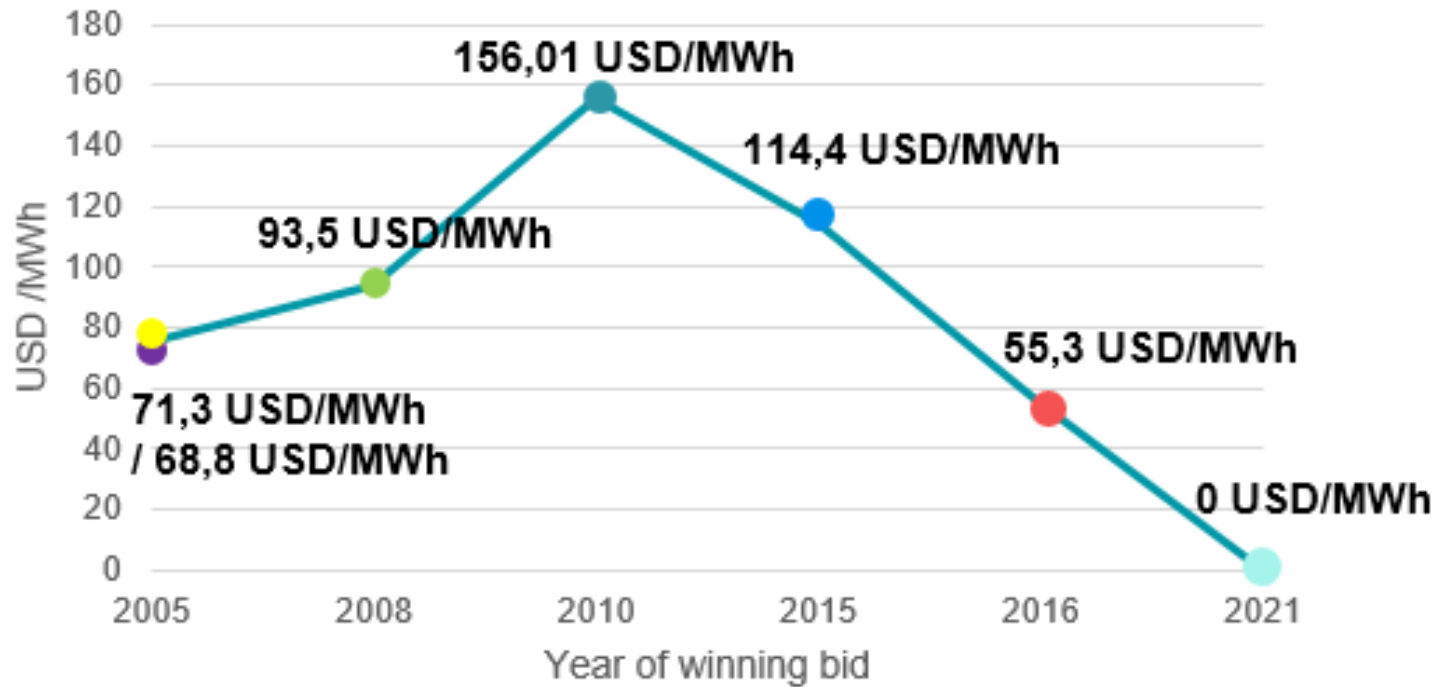
January 2024 daily electricity consumption and production (wind + solar)





# HISTORIC DANISH TENDER RESULTS

(Prices not indexed from year to year)



- Horns Reef II, 210 MW (2005)
- Rødsand II, 207 MW (2005)
- Rødsand II (2<sup>nd</sup>), 207 MW (2008)
- Anholt, 400 MW (2010)
- Horns Reef 3, 400 MW (2015)
- Kriegers Flak, 600 MW (2016)
- Thor, 1000 MW (2021)

# Historically, we have focused on the market

## Building blocks for Denmark's growth in wind



## Industry has evolved on the back of market regulation

### Competition and market dialogue

*Market dialogues inform tenders stimulating competition amongst market participants and provides learnings from international best practices*

### Ambitious long-term planning and reliable targets

*Long-term, stable and transparent energy planning procedures, supported by ambitious targets and legislation*

### Demonstration projects and test sites

*Demonstration projects and test sites have provided valuable regulatory, technical and engineering learnings and boosted investors' confidence*

### Permitting and de-risking

*Appropriate risk allocation and streamlining of permitting procedures have reduce regulatory risk and potential delays (one-stop-shop concept)*

### Economic incentives and financing

*Subsidies and taxes have been instrumental to incentivize investments*

# Maritime Spatial Planning

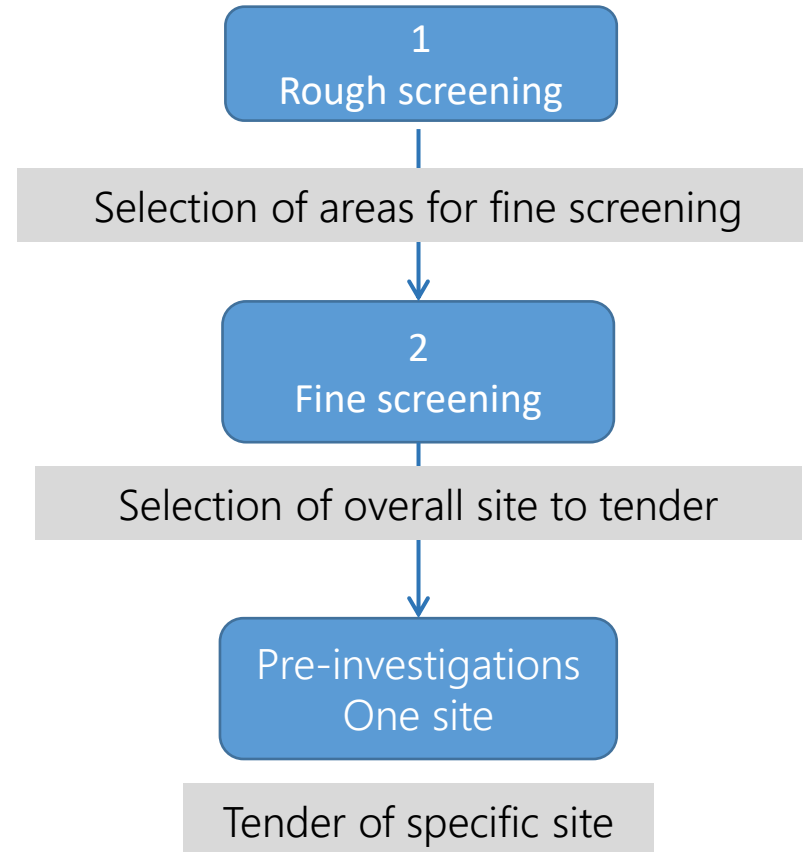
## Background for the DK MSP: [Maritime Spatial Plan](#)

- Increasing pressures
- Coordinated and balanced approach
- Multiple stakeholders
- EU directive

## OWF development

- Long-term planning and political target setting
- Creating predictability, transparency and clearer rules

## The procedure in Danish waters



## Indian MSP

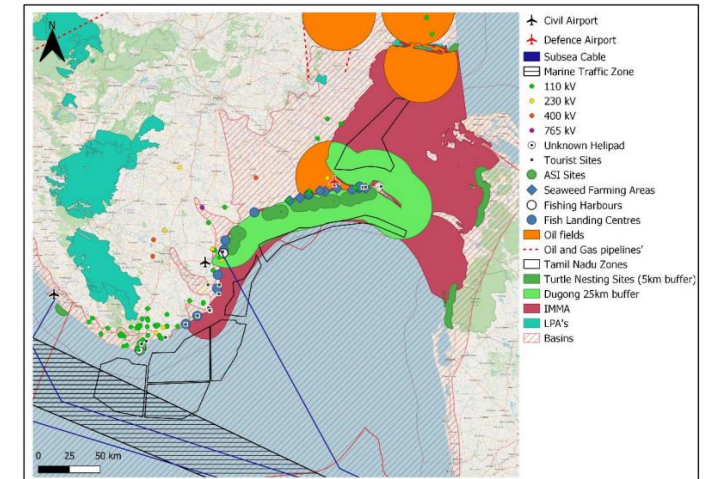
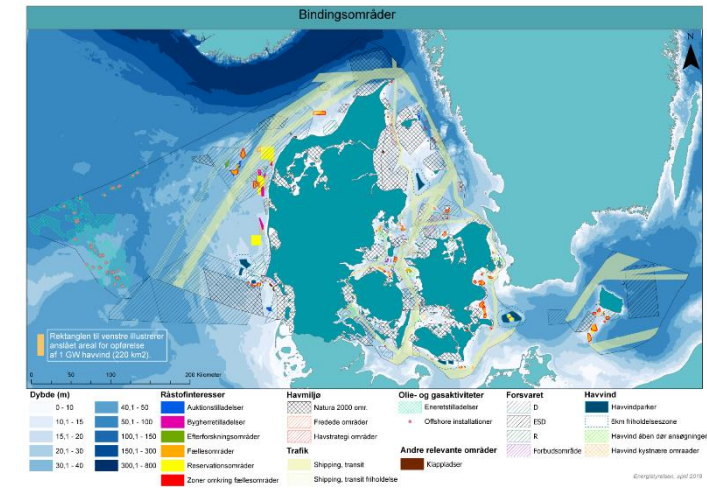


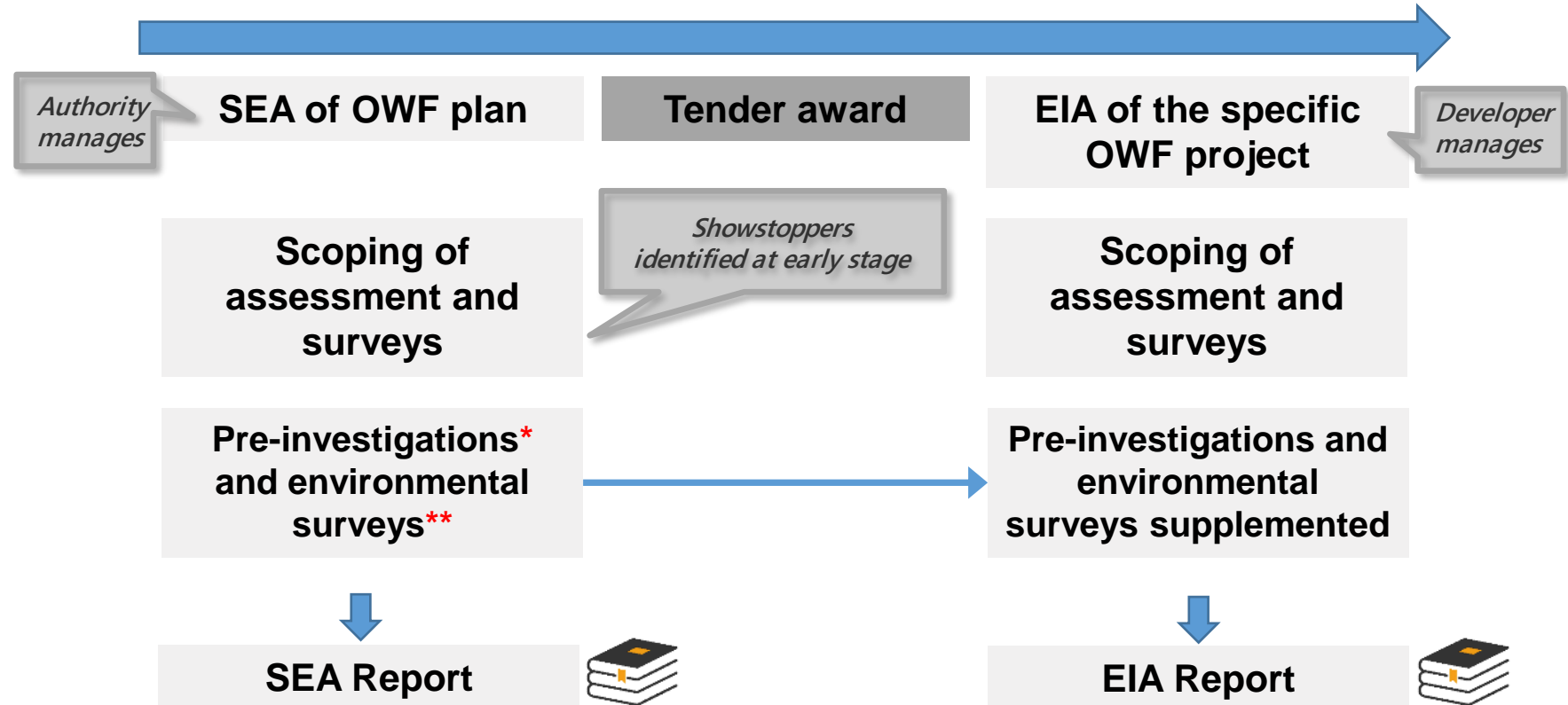
Figure 0.1 - Rough screening of coastal area in Tamil Nadu

## Danish MSP



# Strategic Environmental Assessment and Environmental Impact Assessment

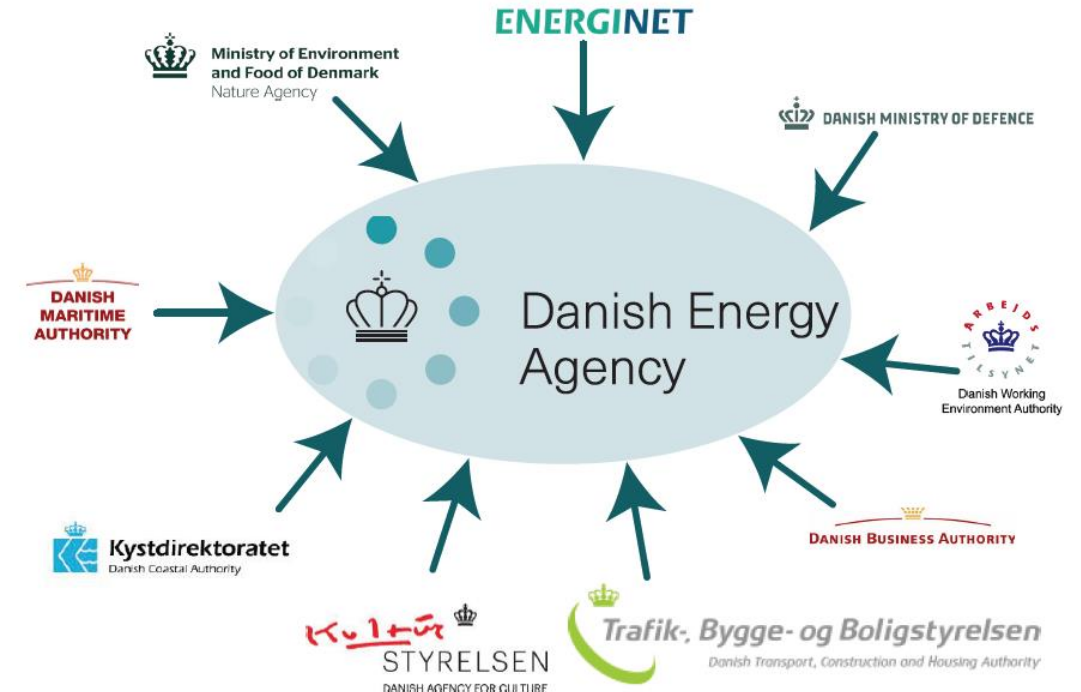
- The EIA aims at evaluating the largest possible environmental impact, along with the potential cumulated effects with the other nearby offshore wind farms.
- The SEA and EIA procedures are very similar (e.g. assessment criteria), but there are some **differences**:
  - The procedures are used at different stages in the decision making
  - In the SEA the competent authority has the duty to disclose all relevant information
  - In the EIA the project builder has the duty to disclose all relevant information





# DEA as One-Stop-Shop

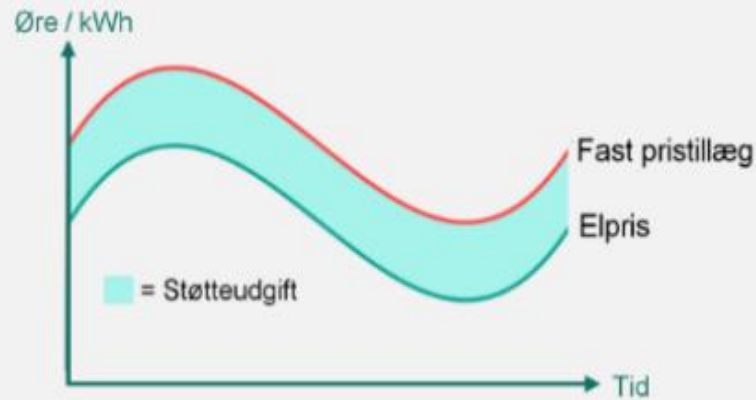
- The One Stop Shop is an **administrative procedure** in which the Danish Energy Agency is the central authority responsible for the planning and consenting of offshore wind projects.
- The DEA **coordinates** with all relevant authorities to grant the necessary permits.



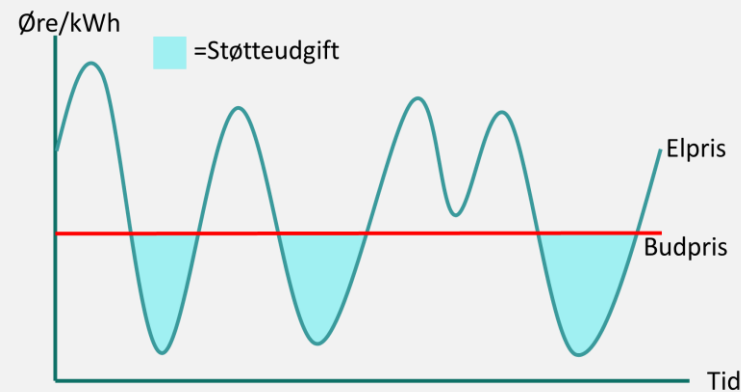
# Development of the price model for the power offtake

In Denmark we have had a development of different price models for the offtake of the offshore wind farms and their production. Subsidy has been used in order for the market to take off and de-risk the offtake uncertainty

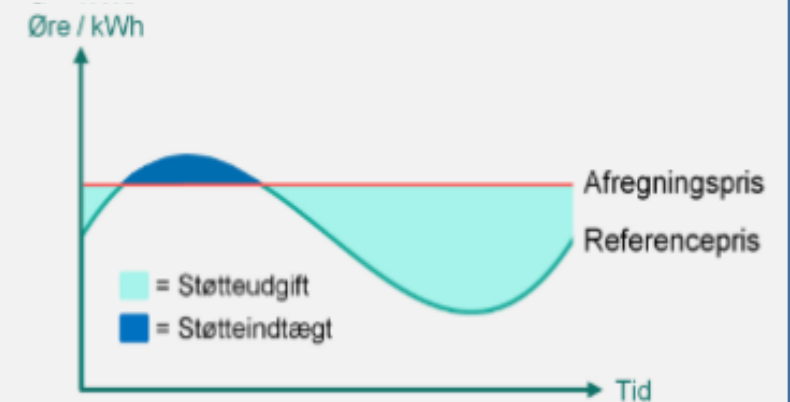
Fixed price model per kWh



1-sided Contract for differences (CfD)



2-sided Contract for differences (CfD)

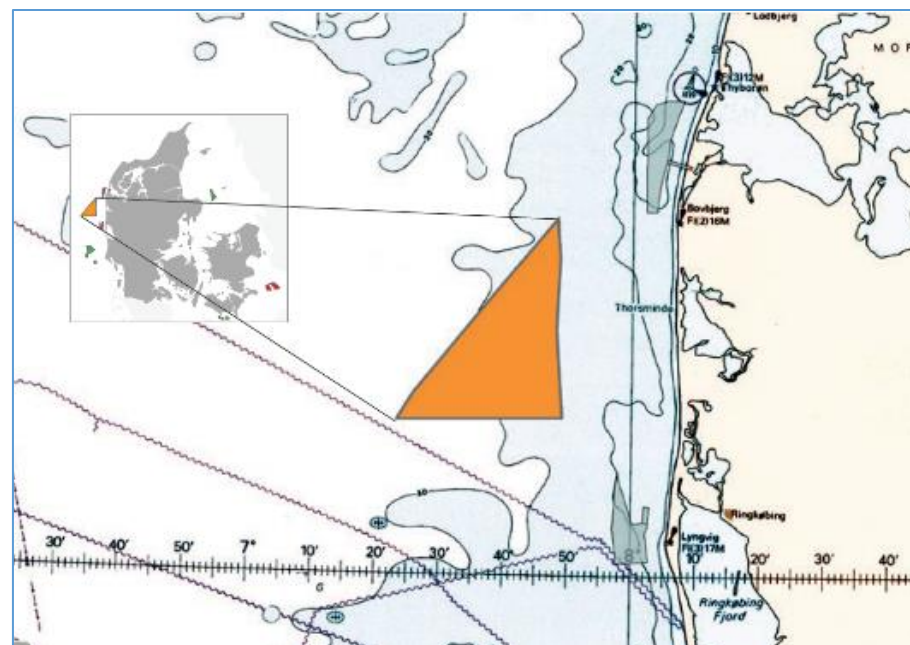
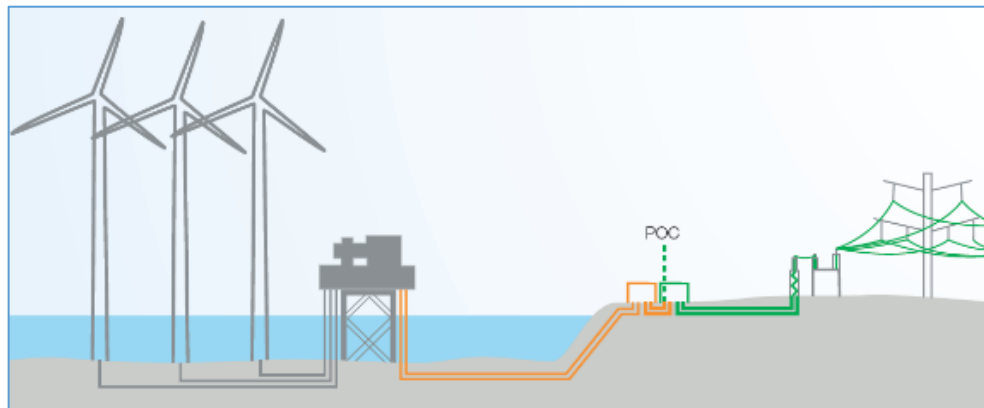






# THOR OFFSHORE WIND FARM – QUICK OVERVIEW OF THE PROJECT

- 800-1,000 MW wind farm to be build
- Offshore substation, export cable, nearshore substation to be build
- 2,7 bn USD/15,5 bn DKK investment



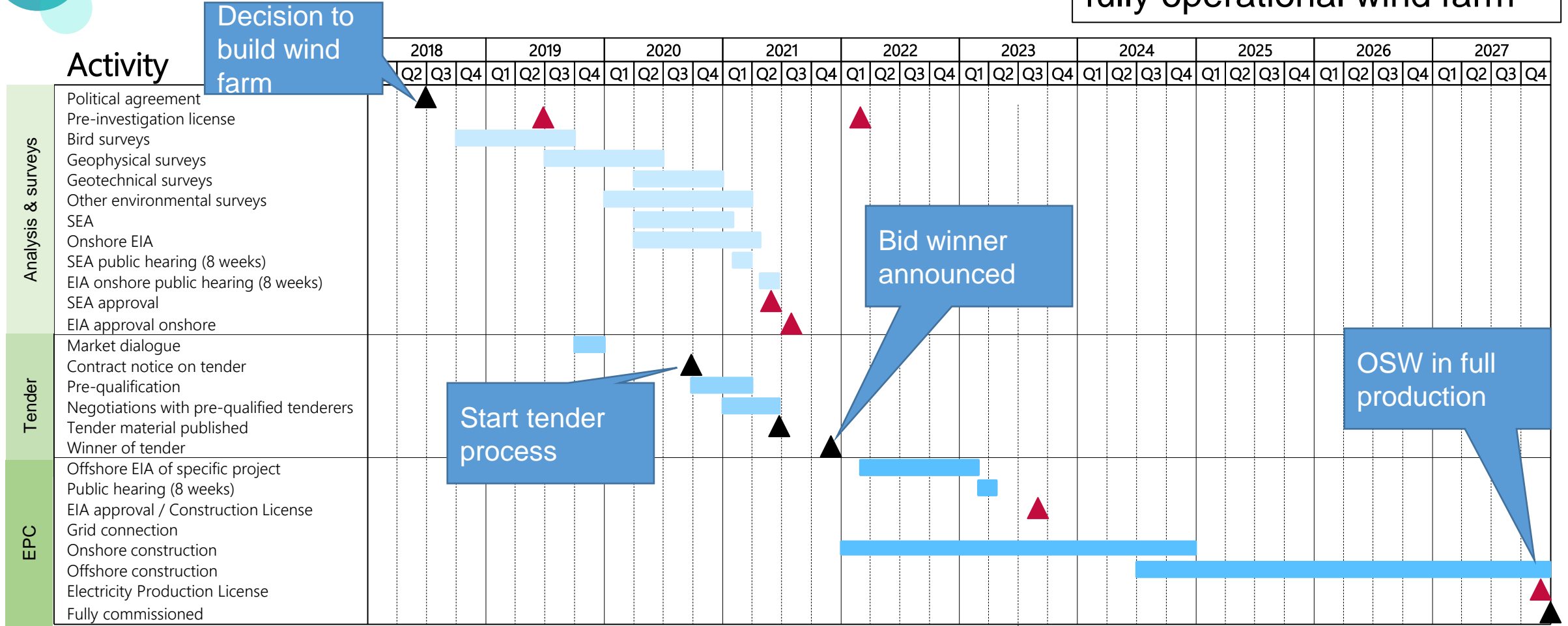
## Characteristics about the site (approximate figures)

Distance to shore	Minimum 20 km to the west coast of Jutland
Distance to harbour	Esbjerg 100 km Thorsminde 20 km Thyborøn 45 km Hvide Sande 45 km
Mean wind speed	10.3 m/s
Sea depth	25 – 35 m
Tide	0 - 1 m



# TIMELINE FOR THOR

8-9 years from decision to fully operational wind farm



\* The political agreement based on the rough and fine screening in 2017 and 2018.  
 Licensing duration from Political agreement to SEA: 35 months  
 Licensing duration from Political agreement to Construction License: expected 62 months

▲ General milestone  
 ▲ Permit milestone (some expected)

'17~'18	'18	'19~'21	'21~'23	'27
Rough Screening → Fine Screening	Political Energy Agreement	Preliminary Surveys SEA, Tender process	EIA	Operation



# KEY FEATURES OF THOR'S TENDER DESIGN

*Key policy drivers agreed with politicians:*

- Focus on cost-effectiveness (lowest possible price)
- Focus on build-on time (climate plans matter a lot)
- De-risking the project for developers as much as possible to facilitate low bid-prices (a believe in de-risking as key cost-driver)
- International competition is key, no local content requirements, attracting best players in the world, English as primary language, high transparency in communication and processes

Broad long-term political commitment	Price is the primary award criteria
One Stop Shop	Support will be granted as a CfD for a period of 20 years
TSO does preliminary studies	Efficient and transparent electricity market
Dialogue and negotiation with prequalified bidders	Guaranteed access to the grid

# 9 GW: Draft tender conditions released



## Key characteristics:

- All projects must be fully operational no later than year-end 2030
- Grid connection will be guaranteed for 9 GW. Developers are free to overplant (uncapped)
- The State will require 20% ownership of each project
- There will be no subsidies
- Minimum requirements on environmental impact introduced

# New ground-breaking tender conditions

## Minimum requirements

- Third-party verified Environmental Product Declarations of main components (towers, blades, etc.)
- Third-party verified Life Cycle Analysis of the project's construction, operation, and decommissioning
- Recyclable blades
- Environmental data collection throughout the life of the wind farm – data publicly accessible
- Social responsibility – documentation for living up to human rights and international conventions, fair wages and working conditions

## Overplanting

- Strategic Environmental Assessment enables virtually uncapped overplanting
- Freedom for developer to improve business case
- Hydrogen production expected
- “Use it or lose it” in the North Sea

# Procurement and support



Danish experience with tenders and support schemes for Offshore Wind

- No support scheme in upcoming 6-9 GW tender coming out later this year
- But experiences on support schemes from previously tenders/solicitations on offshore wind

## Tender design (Thor)

- Price criteria
- Penalties
- Guarantees



# Retention incentives

- Multiple tools intended to make sure the wind farms are built on time
  - Minimum requirements to be eligible to bid
    - Technical requirements
      - Experience developing large scale offshore energy project (offshore wind or oil/gas)
      - Experience with at least 3 of the following 6 key areas: project management, engineering, procurement, execution, operation and quality control of a largescale offshore project in relation to energy production
      - Experience can be proved with examples from the last 10 years
    - Financial requirements
      - Annual average revenue of minimum 4,5 bil. USD
      - Debt rating requirement OR +20% equity ration (equity/assets)
  - Penalties for delays
    - Progressively increasing penalties for delayed start of construction
      - The DEA has the right to cancel the contract if construction start is not achieved and further after 24 months delayed constuction start
    - Progressively increasing penalties for delay of minimum capacity (1 GW by 2030)
      - The DEA has the right to cancel the contract after 48 months delayed minimum operational capacity



# THE DANISH ENERGY AGENCY

*A government agency under the Ministry of Climate, Energy and Utilities*



Danish Energy Agency

GLOBAL  
COOPERATION

GREEN POWER  
PRODUCTION

GREEN UTILITIES

RISK  
PREPAREDNESS

GREEN  
TRANSITION

RESSOURCES  
AND LEGAL

SYSTEMS  
ANALYSIS  
AND  
INNOVATION

SUBSOIL  
RESSOURCES

ELECTRIFICATION

ENERGY  
ADMINISTRATION

ORGANISATION  
AND STRATEGY

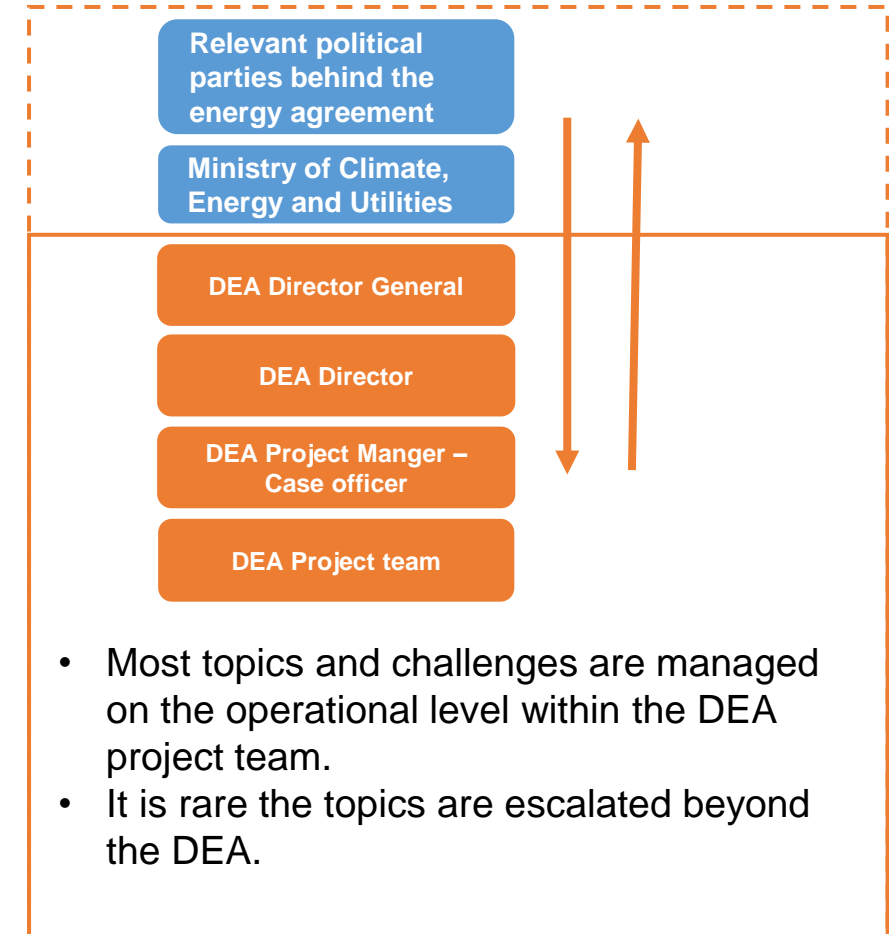
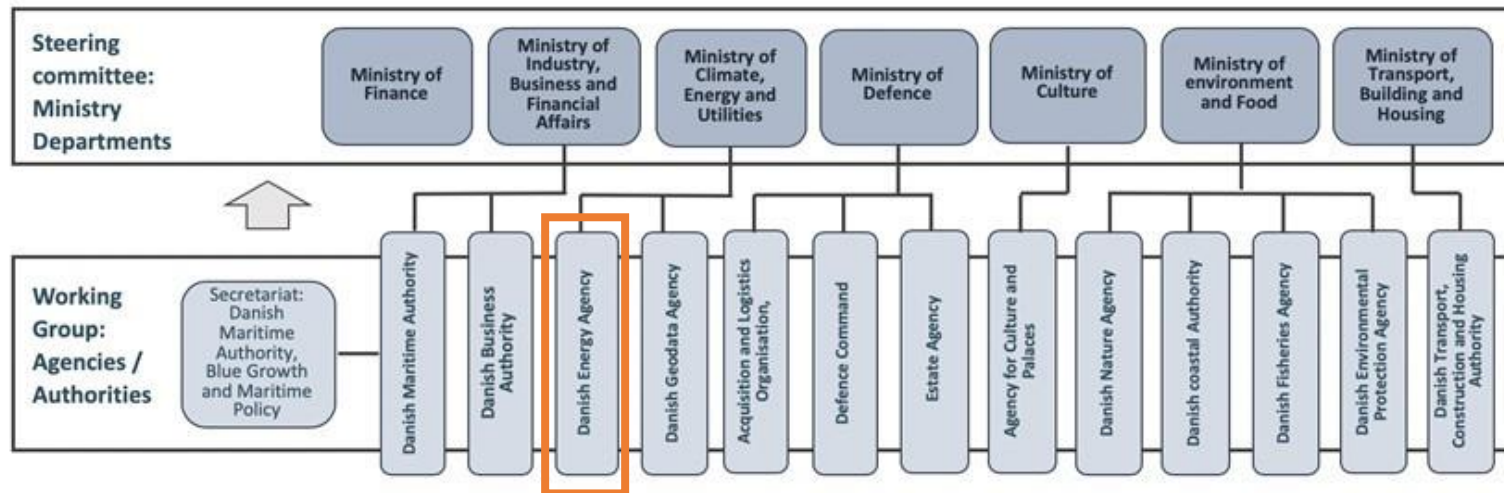


# ORGANISATION OF OFFSHORE WIND TEAM

HAV1: Analyse og Politics		HAV2: Enviroment permitting		HAV3: Tender, Legal and EU		
ANALYSE 1	ANALYSE 2	MILJØ		PERMITTING	TENDER	LEGAL + EU
Team of 8 people  Future offshore wind parks, allocaation of OSW in the future and integration of Hydrogen	Team of 8 people  Energy islands and economic aspects of offshore wind	Team of 10 people  SEA and pre-investigatio ns	Team of 7 people  EIA and general environme ntal issues	Team of 8 people  Project management and issuing of permits	Team of 9 people  Preparation and execution of tenders, including market dialogues, tender documentation, contracts, and state aid approval	Team of 10 people  Preparation and execution of tenders, including market dialogues, tender documentation, contracts, and state aid approval

**In Total 60 People are working in DEA with deployment of Offshore Wind in Denmark**

# DEA is a part of a larger coordination between ministries



Thanks for coming





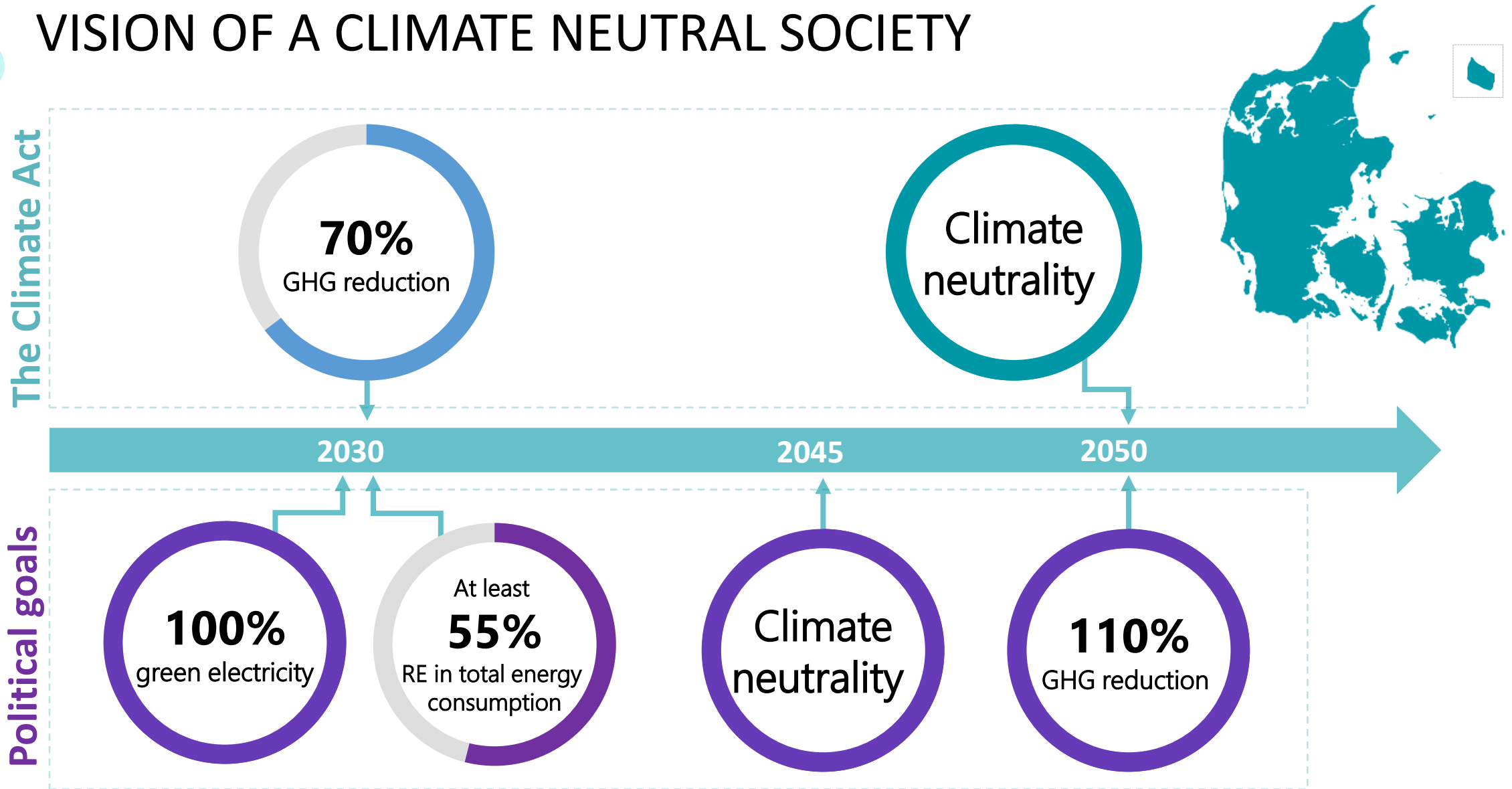
# Back-up







# VISION OF A CLIMATE NEUTRAL SOCIETY





# MAIN STEPS IN THE PREPARATION OF OWF TENDERS

## CHOICE OF SITES: SCREENING AND ANALYSIS OF LCOE\*

Distance to shore

Distance to harbour

Main wind speed

Environmental restraints

Sea depth, Tide

Analysis of LCOE

## ANALYSIS OF GRID CONNECTION, COSTS AND TIMELINE

Close cooperation with TSO  
Energinet

Analysis of possible location  
for grid connection onshore

Analysis of need for grid  
reinforcements, timelines  
and costs

## EARLY ENVIRONMENTAL ASSESSMENTS ETC. (ENERGINET)

Strategic environmental  
assessment (SEA) and  
environmental impact  
assessment (EIA) onshore

Geotechnical and  
geophysical surveys

Basic environmental sur-  
veys.

## MARKET DIALOGUES AND PREPARATION OF TENDER MATERIAL

Detailed tender material  
including draft licenses and  
concession agreement

Coordination with other  
authorities

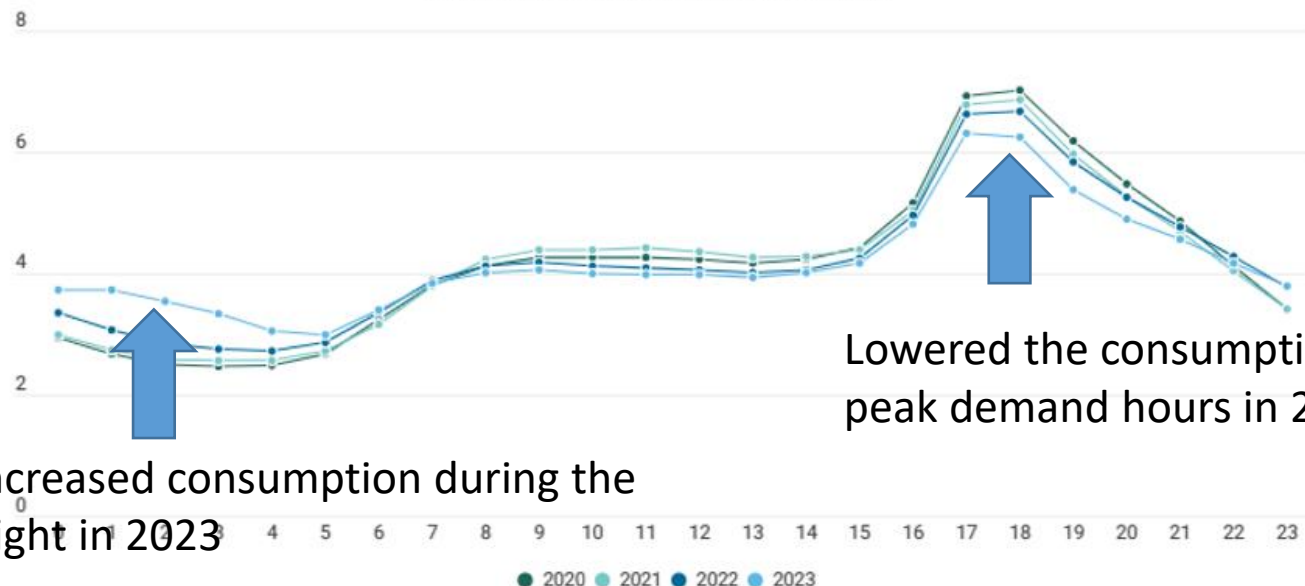
Market dialogue before the  
tender material is published

\*Floating Wind: Many of the same factors – different outcomes of calculation

# Thematic slide: Flexible demand

## Gennemsnitlig fordeling af elforbruget i årets første 3 måneder for parcel-, række og kædehuse uden elvarme i 2020-2023

Enhed: Procentvis forbrug i timen over alle døgnets timer



Kilde: Green Power Denmark pba EnergiDataService

Note: I denne figur er alle dage anvendt. Tidszonen er DK. "0" angiver "00-01". Kogespidsen fra kl. 17-21 ses i grafen fra 17-21.

Denmark is reaping the benefits of:

### Price signals for consumers

- Dynamic prices (choice of most consumers)
- Updated distribution tariff structure

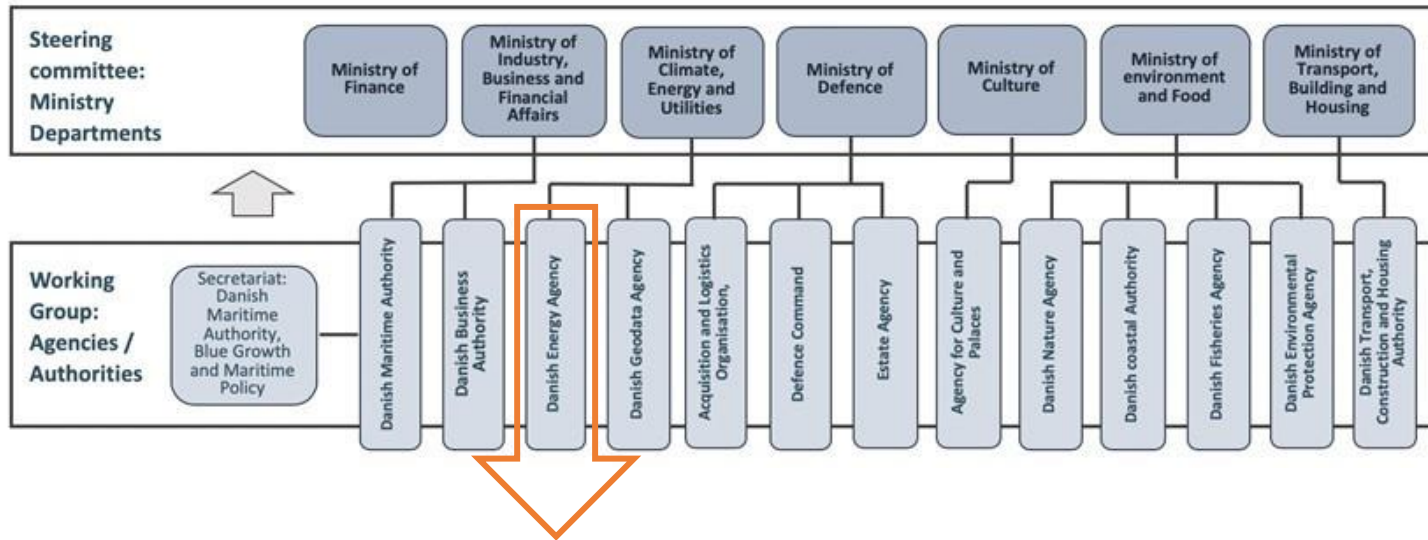
### Solid market frameworks

- Competition in power retail market
- Easy access to data and easy market entrance
- Market framework for balancing and ancillary services

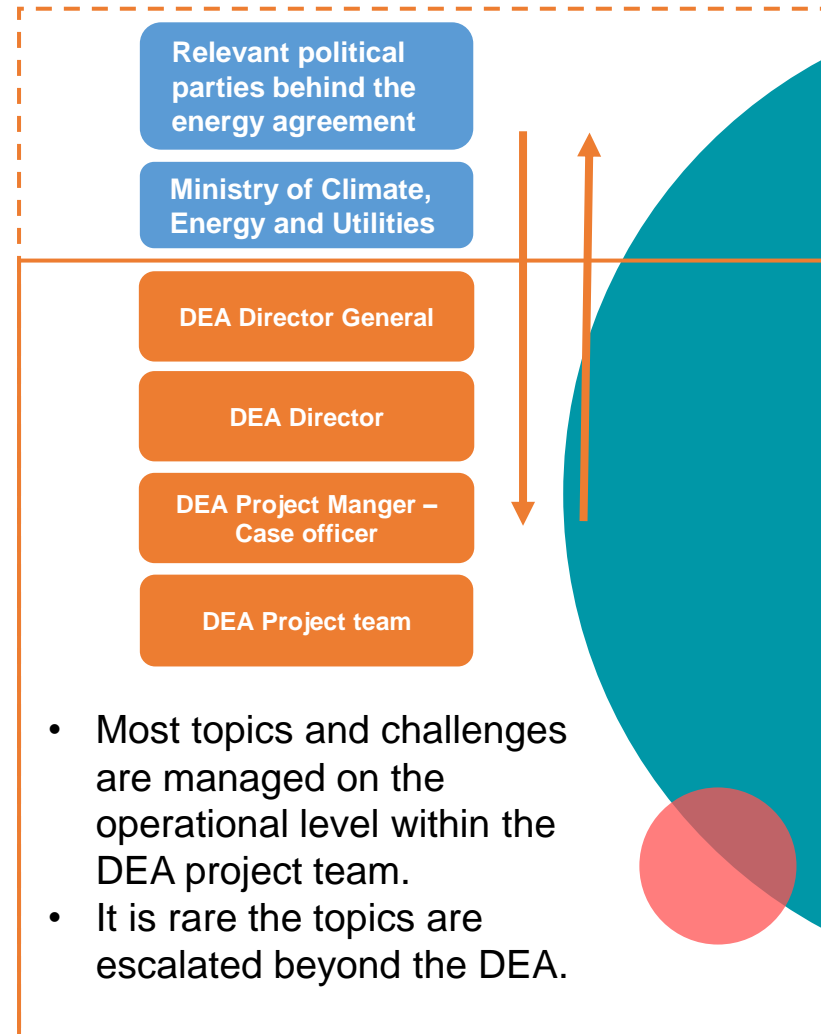
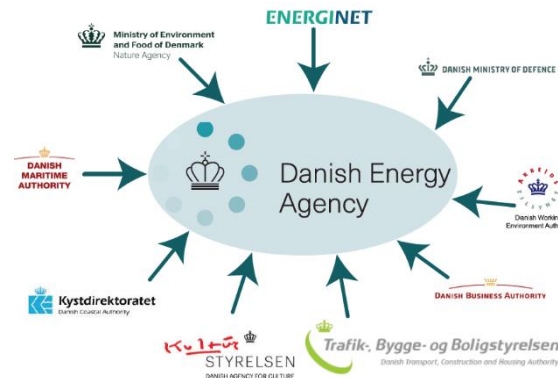
It is resulting in grid infrastructure savings, empowerment of consumers, making room for more renewable power.

# Tender procedure - Governance and decision-making

*Maritime spatial planning and selection of sites for tender*



- The One Stop Shop is an administrative procedure in which the Danish Energy Agency is the central authority responsible for the planning and consenting of offshore wind projects.
- The DEA coordinates with all relevant authorities to grant the necessary permits.



- Most topics and challenges are managed on the operational level within the DEA project team.
- It is rare the topics are escalated beyond the DEA.