

Opportunities to develop
offshore wind energy in
Colombia based on the
Danish experience

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Offshore Wind - The advantages are many

- Lower interference with land use
- High capacity factors contributes to security of supply
- Can create local jobs both short and long term
- Potentially closer to major demand centers
- Key technology to accelerate clean energy transitions and minimise fossil fuel dependence



Denmark:

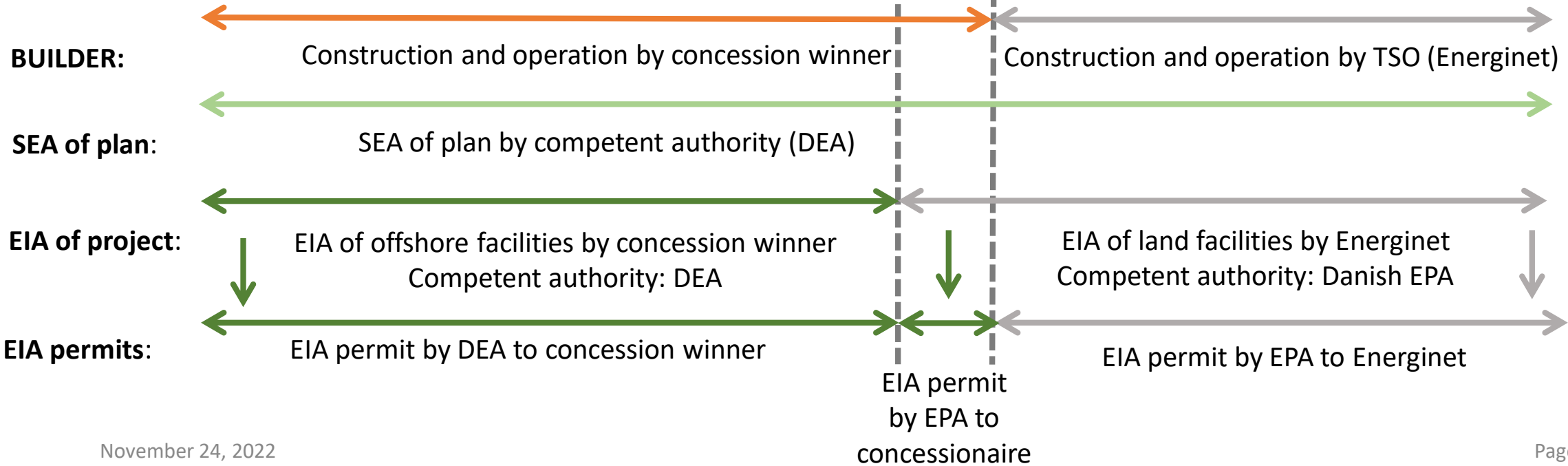
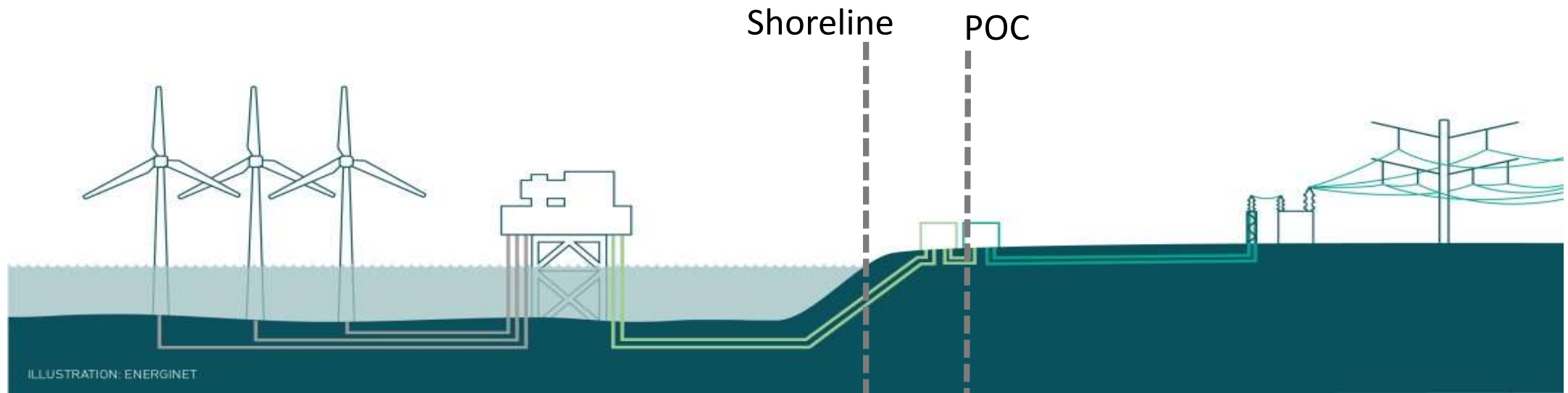
- Enjoys very good wind resources
- First mover
- World class performance
- Achieved very low auction results

A photograph of an offshore wind farm with several white wind turbines in a row over the ocean. The sky is clear and blue.

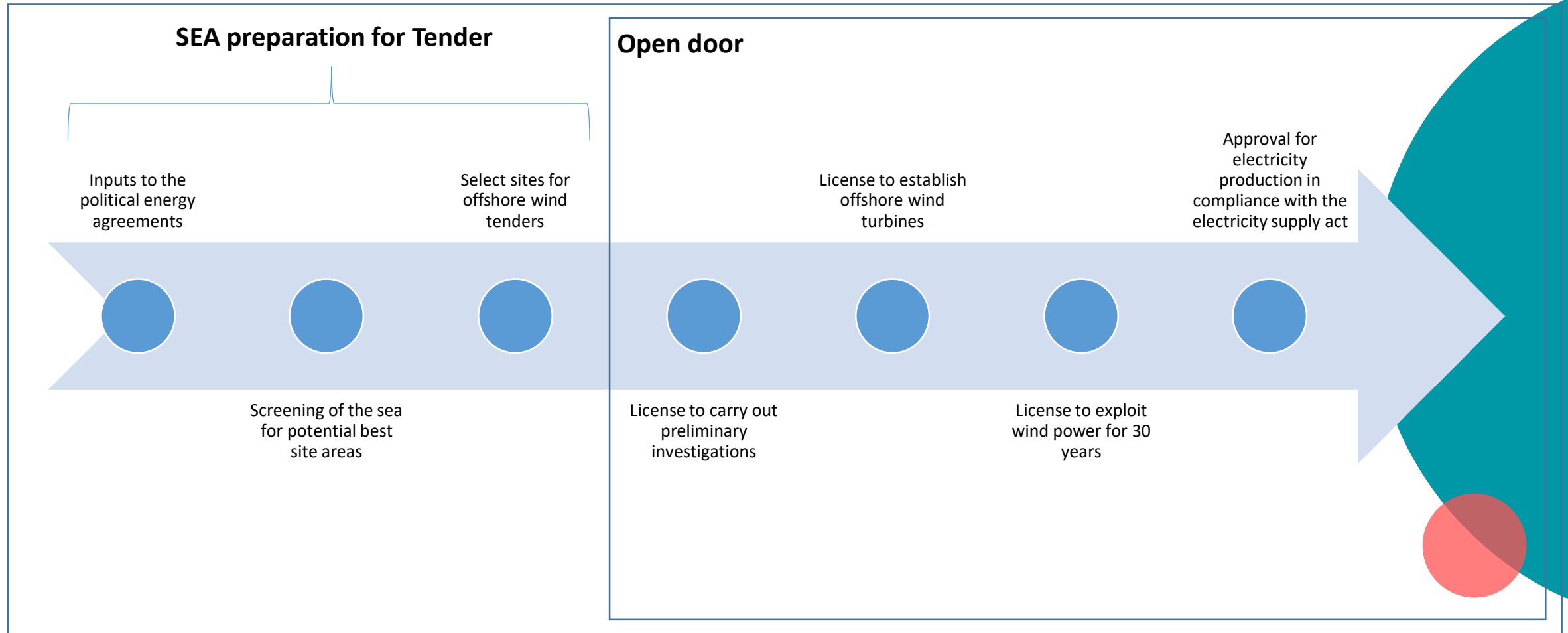
Danish Energy Agency – role in offshore wind

Energy exploration and exploitation in the territorial sea and in the EEZ:

- Early planning
- Strategic environmental assessment (SEA)
- Tender procedure
- Permit for preliminary investigations
- Environmental impact assessment (EIA)
- Permits for construction and operation



Permitting - Tender and Open door procedure



Tender - Market Dialogues

Market dialogue # 1: site-investigations

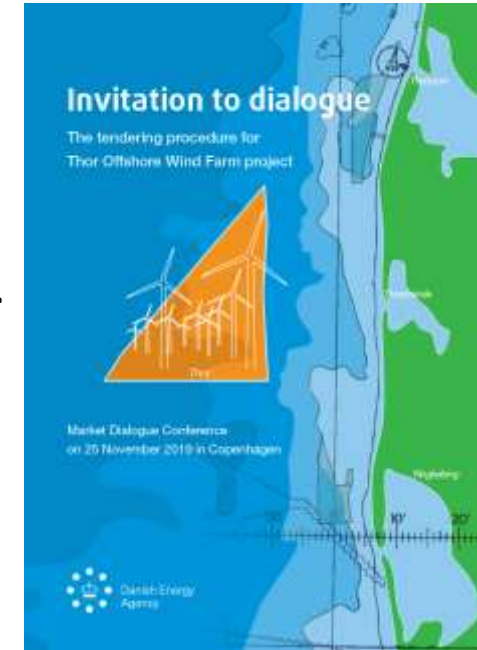
Purpose

- Agree with potential bidders on the scope and expected products of the planned site-investigations in order to align expectations and de-risk the project
- The concession winner will have to pay the cost of these pre-investigations (151 mill. DKK & 714 mio. DKK for onshore grid connection build by TSO for the Thor project)

Market dialogue # 2: tender conditions

Purpose

- Optimise tender conditions to achieve lowest bid price
- Content: time table for process, prequalification conditions, award criteria, penalties, grid, etc.



Preliminary Investigations (Site Assessment - SEA)

For wind farm site and export cable route (and land fall)

Environment

- Birds
- Marine Mammals
- Benthic (sea bottom) fauna and flora
- Visibility analyses
- Assessment of safety of navigation
- Radio links and radar
- Fish populations
- Commercial fisheries
- Underwater noise



- Geophysical surveys** (bathymetric and acoustic surface mapping, seismic systems)
- Hydrographical report
- Marine archaeology/geo-archaeology
- UXO risk assessment

- Geotechnical investigations** (Boreholes, soil sampling, CPT)

- MetOcean** (wind, wave and current)
- Lidar measurements
- Mesoscale wind resources
- Ocean data
- Site Conditions Assessment (SCA)

Radar coverage



Prequalification, Negotiations, Penalties & Guarantees

Prequalification:

- Technical capacity and Financial capacity

Negotiations:

- To reduce the bid price through adjustments to tender conditions
 - Bidders provide initial bid against existing tender conditions
 - Bidders submit proposals' for negotiations with impact on bid price
 - Negotiations are carried out as confidential with each bidder

Penalties & Guarantees:

- Penalty for defective performance
- Incentive for completion
- Obligation to decommission the wind farm

Danish regulatory model for offshore wind development

- Solid government target and pipeline
- Government driven maritime spatial planning
- Transparent and well planned auction process with extensive dialogue with industry/potential bidders (Thus far with price as the only award criteria)
- Firm offtake arrangements (no PPA, but very liquid power market) combined with Government-backed revenue stabilisation mechanism (contract-for-difference)
- Certainty for grid connection
- Compensation for curtailment
- No local content requirements



Muchas Gracias