DE-RISKING OFFSHORE WIND POWER IN DENMARK

A key contribution to renewable energy deployment in Denmark has been the long-sighted vision and policy framework including broad-based political energy agreements in the Danish Parliament. Based on such transparent and stable energy targets, there is a significant decrease in risk for investors and higher incentives for developing an extensive supply chain, which is particularly necessary for energy projects, where economic lifetimes of 20 or more years are standard.

Recent calculations, based on Danish conditions, show that offshore wind presents a total cost of approximately US$ 49/MWh, while coal-fired combined heat and power plants have a total cost of approximately US$ 55/MWh, excluding any externalities. This economic advantage is one of the reasons why the recent 2018 Energy Agreement unanimously decided by the Danish Parliament presented a plan for further expanding offshore wind capacity in Denmark by 2.4 GW.

Clarity in the regulatory framework

A transparent and coordinated approval system for offshore wind projects is fundamental. In Denmark, the tendering of offshore wind projects is carried out for a designated area. The full tender specifications will list the terms of the tendering procedure, framework conditions for establishing the offshore wind farms, draft permits for preliminary surveys, establishment and operation of the offshore wind farms, as well as a draft concession contract. The interested developers have only one single point of contact, the Danish Energy Agency (DEA), to gather the needed information and approvals – the so-called one-stop shop model. If a developer requires further information, the DEA will then contact all relevant authorities to provide the appropriate information. This provides for a transparent and coordinated approval system that reduces risks for developers/ investors across all project steps. Because the Environmental Impact Assessment (EIA) is approved and all licenses have been established to be transparent and compatible with the project in question, before signing the concession agreement, the developer can be certain to obtain the necessary permits for the development of the project, significantly reducing risk.

Based on preliminary investigations carried out by the TSO for the designated area, an EIA report will be drafted in consultation with potential bidders similar to the so called “Rochdale Envelope Approach”. It will ensure that subsequent EIAs will not be necessary for the specific project. The preliminary studies including MetOcean, geological and environmental aspects will be carried out and published in good time before completion of the tendering procedure so that tenderers will have the opportunity to submit a qualified bid for the offshore wind farm. To optimise prices and minimise developer risk, the Government takes liability for information provided. The Concessionaire will, however, have to carry out supplementary investigations in the project design phase. The cost of the preliminary studies is to be covered by the Concessionaire after closing the bid.

Timing and flexibility

The tender procedure takes around one year to complete and includes two stages, of which the first is a prequalification. Only prequalified bidders are allowed to proceed to the second stage, the final bid. In order to further reduce the risk for all parties involved, the DEA maintains a close and transparent dialogue with potential bidders throughout the tender process. This means that optimisation potential can be incorporated in the initial tendering phases before publication of the contract notice and contract documents.

Upon release of the final tender material, sufficient time must be available to prepare tender documents. In the 400 MW Horns Rev 3 project, developers had 9 months to prepare the bid after the call, but actually started working on their bids immediately after the kick-off conference 20 months before deadline. Finally, granting the Concessionaire the necessary licences to carry out project development without delay contributes to a significant de-risking for the developer.

Following award of the successful winner, experience suggests that approximately 4-5 years should be allowed to develop, design, construct and commission a project. Hence flexibility in the timeline for commissioning is vital to avoid additional risk premiums being added by bidders.

Risk sharing

The Power Purchase Agreement (PPA) in Denmark is a fixed price/kWh based on Contract for Difference (CfD) for the electricity generated during 50,000 full-load-hours, corresponding to approximately 11-12 years of operation depending on the site and the technical solution. The CfD strike price is defined by the winning bid price, where the subsidy is determined as a variable premium covering the difference between the fluctuating spot price and the fixed strike price. The remaining years of production are on the electricity market price conditions. As mentioned above the second stage of bidding has lowest price as the only award criterion. The CfD is not indexed. All in all, this provides for a very predictable and bankable income for a winner.

Under the Danish approach to offshore wind farm development, the TSO is responsible for design, construction and operation of the necessary grid connection. This includes all grid reinforcements required in order for the grid to be ready to receive power at an agreed point in time. This approach removes the risk of non-availability of the grid from the developer. Off-taker and curtailment risk is equally removed from developers by Government.

Examples on Danish Risk Sharing Mechanisms	Risk carried by
A penalty for defective performance to ensure that the Concessionaire will not withdraw after signature of the agreement.	Developer
A penalty for non-completion applies to ensure that the wind farm will be completed by the agreed date. The penalty is a reduction in the production amount eligible for premium.	Developer
Upon signature of the Concession Agreement, the Concessionaire must provide a guarantee from a financial institution, an insurance company or similar covering the penalty for defective performance.	Developer
Compensation schemes provide certainty that the grid connection can off-take the production as soon as the park starts producing, including a sufficient onshore transmission grid to transport the production to consumption centres.	Authorities
In the event of a break-down of the export cable, the Concessionaire is entitled to receive compensation for loss of production during the outage.	Authorities

Integration

Integration of variable energy production from renewables creates a need for increasingly flexible power systems. Danish power system flexibility, and the ability to integrate large shares of variable renewables, rest on many pillars – but some of the most fundamental ones are:

- Market-based power dispatch ensures cost-efficient asset allocation on hourly basis. This provides transparent and unambiguous price signals to market actors.
- Balance responsibility assigned to all traders on the spot market, for supply as well as demand.
- Strong market integration with interconnectors to neighbouring countries facilitates a larger physical balancing area, including large hydro power facilities with reservoirs.
- A highly refined TSO forecasting system for variable renewable energy production, reducing the need for other forms of system flexibility.
- An incentivised market for ancillary services coordinated by the TSO.
- A thermal power plant fleet that has become among the most flexible in the world.

For decades Denmark has had close cooperation with neighbouring countries on exchange of power, which in combination with quite large differences in electricity demand from day to night, have encouraged Danish power plants to enhance their flexibility. The creation of a Nordic power spot market with hourly pricing has been instrumental in incentivising thermal plant operators to improve and utilise the flexibility of their plants during the past two decades. Improvements of flexibility of existing thermal power plants have been achieved through e.g. technical retrofitting, such as boilers able to operate at lower minimum loads or the use of measures to improve ramp-up and ramp-down rates.

Learn more on our website:
https://ens.dk/en/our-responsibilities/global-cooperation

For further information, please contact:
srn@ens.dk
+45 3392 6696