

Offshore Wind Market Development and Cost Reduction Background

13th February 2018

1. Policy Cost Reduction Enablers

1.1. In order to realise cost reductions the single most important prerequisite is a steadily increasing market for offshore wind power together with a predictable set of project timings. The shift towards a Contract for Difference (CfD) model, with competitively allocated, fixed delivery-window and guaranteed contract length provided this. The Renewables Obligation (RO) fulfilled a number of these criteria, however, by operating in a less competitive way at a time when the industry and technology was first emerging, the RO regime wasn't able to deliver cost savings comparable with the CfD.

2. Sector Maturity

2.1. Given the capital intensity of offshore wind farms, the cost of capital is a key driver of LCOE. A drop of one percentage point in the weighted average cost of capital (WACC) is equivalent to a reduction in LCOE of around 6%. As the offshore wind industry has gained experience, key risks (i.e. installation costs and timings, turbine availability and operating and maintenance costs) have been better managed and the overall risk profile of offshore wind farm projects will reduce. This has allowed for a reduction in the required returns demanded by providers of capital.

2.2. As an emerging technology offshore wind has been able to capitalise on benefits that other sectors would be denied. The increase in turbine size and efficiency is symptomatic of developers exploring the parameters of new technology and the opportunities to deploy it. This has enabled a 'race to the bottom' for development costs, hence the recent reductions we have seen in GB and other European markets. Additionally, construction and assembly methods have driven costs down as the sector has matured; factory line assembly at facilities such as the Siemens factor in Hull being fundamental to this. It's unclear whether such equivalent efficiencies would be deliverable in a sector such as CCS.

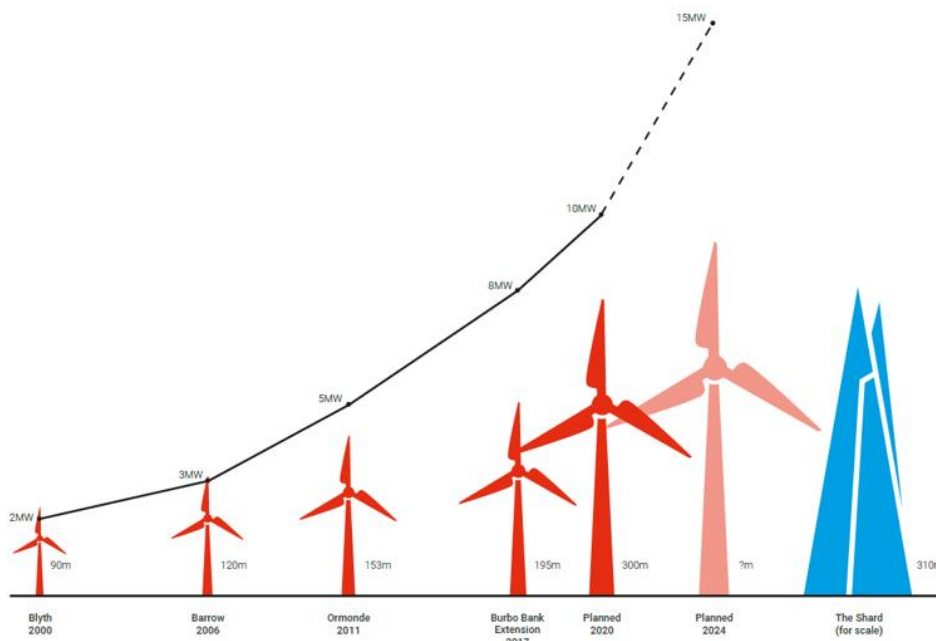
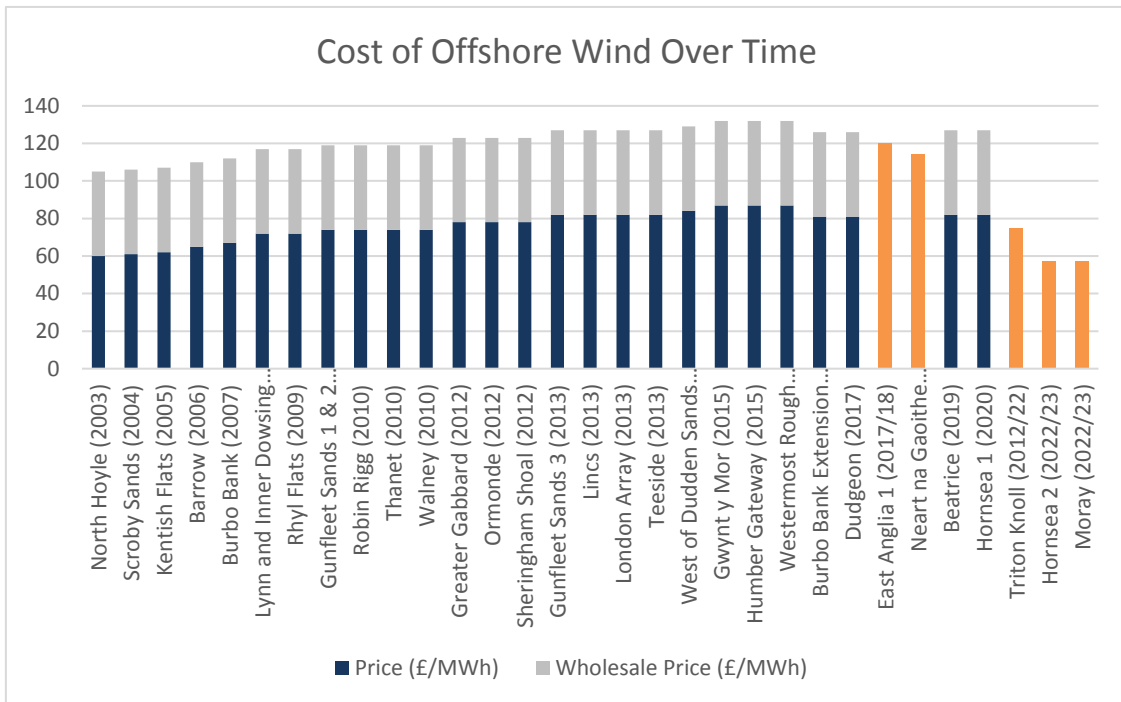


Fig 1. Greenpeace report 'Offshore Wind: A Great Deal for the UK'

3. Competition's Impact on Development Costs

- 3.1. On a £/MWh basis, the cost of offshore wind incrementally increased until the industry matured. Burbo Bank and Dudgeon were two of the last RO offshore wind projects to secure funding however, as the 23rd and 24th developments they reflected a turning point in the industry. The turning point came at the same time as the introduction of Electricity Market Reform which has combined with the sector maturity (nationally and internationally) mentioned above do deliver incredibly drastic cost reductions.
- 3.2. Those marked in orange were allocated their contracts through CfD auctions.



4. Lessons Learned - OFTOs

- 4.1. The OFTO (offshore transmission owner) framework was set up on the basis that there would be independent OFTOs building offshore networks; this has never materialised. When the Government or regulators are designing frameworks they should try not to predict or restrict the potential outcomes – offshore wind developers have organically brought significant cost reductions and innovation in offshore networks
- 4.2. When setting up frameworks it is essential to take a whole systems perspective i.e. the OFTOs are highly leveraged with low costs of financing as a result of being in a low risk framework. But that low risk is in places achieved by placing additional risks on the connecting wind farm – from a system or consumer perspective this is not necessarily efficient
- 4.3. Within the OFTO framework there is significant policy misalignment including with the onshore frameworks. Examples include OFTO contract length expiring long after the expiration for projects being commissioned from 2021 onwards (CfDs are 15 year contracts whilst an OFTO is awarded a 20 year contract) and the wind farm paying for most of the OFTO except the onshore substation. Introducing complex frameworks can lead to unintended consequences and misalignment.

5. Wider Economic Benefits

- 5.1. Developmental timelines and the growth of the industry has allowed for a significant domestic supply chain to build up. In the four years between the London Array being constructed and East

Anglia 1's delivery, the domestic content in those two projects increased from 10% to over 50%. Furthermore, much of that content is now developed in regions of the UK where the Government has been focused on regeneration. In building a strong supply chain, UK businesses have been able to take our international leadership to win 115 of 250 available contracts to help build and service 50 offshore wind projects abroad.

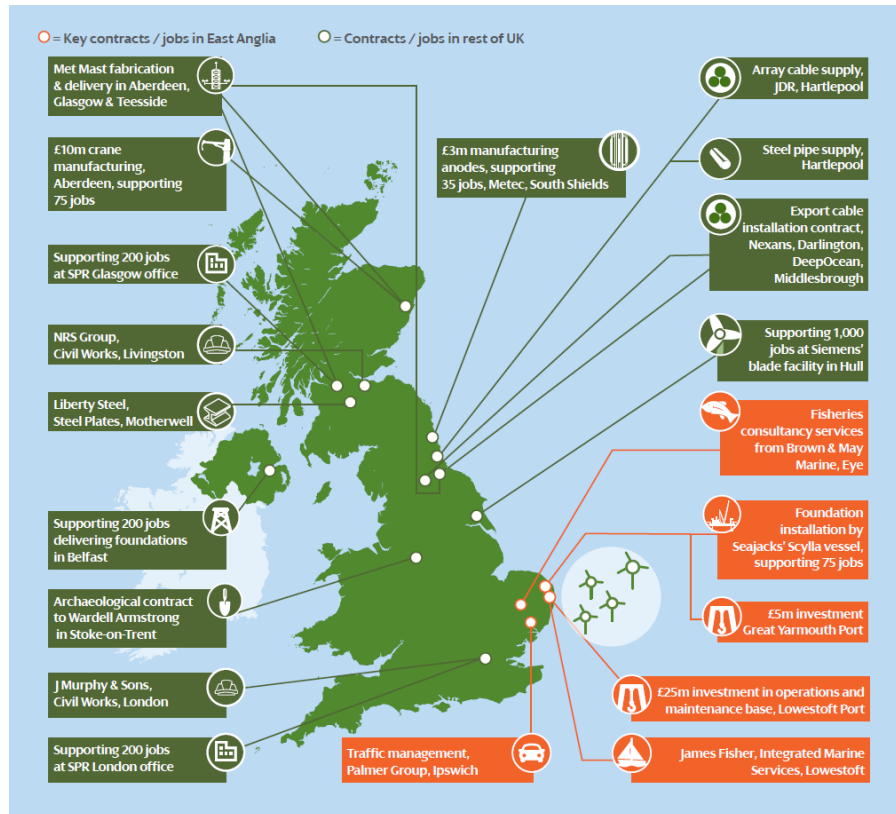


Fig 2. ScottishPower Renewables East Anglia ONE Supply Chain

5.2. Expectations have already been exceeded with regards to reducing costs for offshore wind. In The Crown Estate's [Cost Reduction Pathways Study](#) the ambition was set out to reduce the levelised cost of electricity (LCOE) for offshore wind to £100. In 2016 the LCOE was £97/MWh.

6. The Future of Offshore Wind in the UK

6.1. The forthcoming Five Year Review of EMR will define where offshore wind will sit in the future. The 2019 auction will have offshore in Pot 2 but in future auctions the remainder of the £557million would need allocating via Pot 1 in accordance with State Aid Rules – Minima and Maxima could be utilised within Pot 1 to deliver this. The State Aid ruling on the CfD mechanism was that to be an 'emerging technology' a technology must represent less than 5% of generation, a level which offshore wind will shortly exceed and with the contributions from the 2017 and 2019 auctions it will exceed significantly. Therefore, it is unclear where that funding will be allocated.

6.2. The shift towards subsidy free developments continues. Holland and Germany both have subsidy-free offshore wind farms in development however both operate in different markets with different development costs; primarily that their connection to the grid including the highly expensive OFTO is provided by the Government. As this cost is borne by the developer in the UK it is inevitable that the pathway to subsidy-free offshore wind will take longer. However, the pace of development and the efficiencies articulated above have a number of Energy UK members predicting subsidy-free offshore wind by the late 2020s. In such a market, Crown Estate leasing rounds and the planning/marine consenting regimes would be the only way for further deployment to be controlled.