

# Comparison of policy instruments in the development process of offshore wind power in North Sea countries

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With the growing demand for renewable energy, the development of offshore wind energy (OWE) in the North Sea has gained significant momentum in the last decade, particularly in the UK, Germany, the Netherlands and Denmark. The primary objective of this paper is to provide insights into the variations in policy choices during the offshore wind development process in North Sea countries. We examine the theoretical implications associated with offshore wind development in this specific region. We go on to present a detailed analysis of the fundamental components of the policy instruments utilized in the offshore wind development process across different countries. Next, we discuss the findings, with a specific emphasis on the divergences and convergences observed in tender and subsidy designs. We offer the following conclusions.

*Offshore is playing a pivotal role in the Net-zero transition of North Sea countries.*

The offshore wind sector has experienced remarkable expansion over the last decade, with installed capacity reaching fivefold increase of ten years ago. A significant step forward in this evolution has been the substantial reduction in the costs associated with OWE projects, underscoring the potential for offshore wind to stand as a more competitive option against conventional power generation technologies. The emergence of zero-bids in countries like Germany, the Netherlands, and Denmark further exemplifies that OWE can be economically viable without additional subsidies. The combination of technological developments, mounting installed capacity, and decreasing costs reflects the robust maturity and competitiveness of the offshore wind industry, providing a strong foundation for achieving the ambitious capacity objectives set by North Sea countries.

*Competitive auctions for development rights and CfD support mechanisms have been widely adopted.*

A paradigm shift in the acquisition of OWE project development rights as well as the grant of subsidies is observable through competitive bidding process. This transition promotes cost



reduction and project optimization, fostering an environment that welcomes global investors of various sizes to participate in the open bidding processes.

A marked convergence is witnessed within subsidy mechanisms, notably the ascendancy of the two-sided CfD model. In addition to the UK, countries including Denmark, Belgium, Norway, and France have embraced the two-sided CfD approach in recent OWE tenders. Meanwhile, Germany and the Netherlands have adhered - so far - to the one-sided CfD model, where zero-bids are more likely to happen. The widespread adoption of CfD signals a shift towards a standardized and effective subsidy mechanism across countries.

It is essential to highlight that while CfD mechanisms hold promise, they need to continue to evolve as exemplified by the potential design issues observed in the 2021 Danish offshore auction, and the 2023 UK CfD auction.

*2030/50 OWE installation targets are possible but challenging with the optimization of approval process remaining the priority.*

Our analysis, derived from project-to-project insights, underscores that the 2030 OWE installation targets of North Sea countries (with an absence of Sweden and Norway targets) is attainable under optimal conditions, encompassing the sum of operational, to-be-built, in-construction, and pipeline projects. Getting to 2050 targets is even more challenging than reaching 2030 targets, given the sustained and increased commitment that this requires.

For 2030, the pre-construction projects as well as announced pipeline projects still confront substantial uncertainties. Rising financing and supply chain costs facing the sector is making permit holders reevaluate the project financial viability of currently awarded but not constructed projects, leading to some project suspensions. Furthermore, unconsented and unsubsidized projects could exacerbate the capacity gap by 10 GW/140 GW towards the 2030/2050 OWE targets, considering potential drop-out rates. In response, strategic measures are needed to facilitate the progress towards these targets.

*Negative bids will have profound implications on the offshore wind economics.*

Four categories of negative subsidy are defined within this study. In the case of UK Round 4 leasing, seabed leasing fees may constitute over a third of the project's life-cycle revenue, leading to a raise of the investment cost and the LCOE by a comparable proportion. Similar scenarios are observed in Germany and Denmark's tenders. Perceived as an additional burden for developers, large up front or early project payments have also raised concerns within the industry that such practices might inevitably benefit larger and financially resilient companies.

The emergence of offshore wind as a significant source of rent for the state, similar to oil and gas franchises, raises questions of the best way to extract this rent and what to do with it. This rent should be extracted in a way that does not jeopardise the achievement of 2030 and 2050 targets. It will be a question for individual countries as to whether this rent is collected for the purposes of general tax revenue, returned directly to all or a subset of electricity consumers via reduced electricity bills or hypothecated towards supporting decarbonisation more generally.

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