Offshore Wind: The Role of Geoscience in Underpinning a Strong Project Foundation

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Abstract

The take up of offshore wind as a source for electricity is accelerating globally across a variety of geologic settings. The scope and scale of these projects is enormous. Whereas a major offshore oil and gas development might require the installation of four or five drill centers - be they from fixed platforms or subsea manifolds - and associated in-field and export pipelines and umbilicals, an offshore wind farm may require the installation of over a hundred turbines together with offshore substations, offshore convertor stations, intra array cables and export cables to shore. The areas that these projects cover is also significant with in-array project areas covering in excess of 750 km^2 (>290 mi^2).

Foundation engineering of these projects can account for greater than 35% of gross project costs—compared to less than 3% for oil and gas projects. This means that prior to licensing bidders need to be confident of shallow geological conditions and variability thereof across the project's footprint as well as current sedimentary processes that might affect choice of foundation concept and implications to installed facilities across the project's life span.

To be successful, therefore, projects require front end loading of geoscience input to understand overall setting, variability and implication to foundation concepts, followed, post license award, by intensive geophysical activity to accurately map site variability to develop a shallow geologic model, calibration by borehole ahead of final foundation choice.

This paper will discuss and demonstrate the challenges being faced and approaches being adopted in response.