A new generation of jack-up vessels

WTIVs With the dawn of the new 12-MW offshore wind turbines, installation capacities of the current, third generation wind turbine installation vessels (WTIVs) will be pushed to the limits and beyond. A new generation of jack-up vessels is necessary to serve the future offshore wind industry. The Dutch company Ulstein Design & Solutions BV has its own perspective when it comes to developing an efficient jack-up with a healthy economic lifetime in this rapidly evolving sector.

Following the early pioneering days of offshore wind, the second-generation installation jack-ups, specifically designed for wind turbine installation, started working in 2010, Ulstein noted. Originally intended to be the offshore wind installation vessel for decades to come, within a few years these vessels were caught up by the rapid growth in offshore wind turbines. Although some vessels were upgraded to cope with the higher lifting heights for the current 8-MW wind turbines, the quicker than expected increase in turbine size has meant that these second-generation wind installation vessels are no longer as efficient as they were.

Around 2015, the third generation of wind installation jack-ups became operational due to the rapid growth in wind turbine size. Although these vessels are a nice fit for current generation wind turbines, they will be pushed to their limits by the new 12-MW turbines expected in 2022, Ulstein said. Like previous jack-up generations, it seems their viable economic lifespan again is reduced to just a single decade, rather than a more healthy 25 years, the company added.

Jan de Nul recently announced the construction of what can be reckoned as the first installation jack-up of the fourth generation, the Voltaire. With its size and lifting capacities, this huge vessel will be able to install the new 12-MW wind turbines and appears to be ready for the expected further growth in turbine size in the decade to come.

Ulstein Design & Solutions sees the big challenge as how to design the next generation jack-up correctly: making it only slightly larger than the current generation could mean that it might be obsolete within a few years; building it too large and the unit might never be competitive in the market.
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Business case
As leading ship designers, Ulstein studies the market developments in offshore wind carefully to gain insight into the expected size of future wind turbines, which determines the design case for new installation vessels. The company created a business case tool to develop and evaluate multiple solutions. This tool shows which designs would be viable in the current and future market by calculating relevant performance parameters, including average installation time, cost per turbine and return on investment.

For turbine installations, the designers ran a wide range of business case analyses for different types and sizes of installation vessels and jack-ups. These analyses provided great insight in which technical options and jack-up sizes work well from a business perspective. Working with business models and studying the results enabled them to understand clearly the challenges of their clients, Ulstein said. One of the interesting lessons is that ‘economies of scale’ does have its limits for wind installation vessels; the economic sweet spot is not necessarily the largest unit, it added.

With the business case results the designers optimised and further developed their range of Ulstein wind installation jack-ups. Featuring lower steel weight, higher crane capacity and better operability, Ulstein’s X-Jack design clearly shows its benefits for a 15-MW business case; cutting up to 25% in total installation cost in comparison with currently available jack-ups. Moreover, the company said it has been able to optimise the main dimensions of the Ulstein J102 to be the most competitive design in the market; both for the near future as well as for the next generation wind turbines envisioned by 2030.

Norwegian expertise for floating wind farm in South Korea

**DONGHAE 1 |** Norwegian state energy company Equinor, the Korea National Oil Corporation (KNOC) and power company Korea East-West Power have established a consortium to undertake a feasibility study and develop a 200-MW floating offshore wind farm, Donghae 1, off Ulsan in South Korea. The facility will be located close to the KNOC-operated Donghae natural gas field and the partners will assess the feasibility of using the Donghae 1 platform as a substation for the wind farm. Subject to the outcome of the feasibility study, construction of the facility could begin in 2022, with power production starting about two years later. If the plans go ahead as the partners envisage, the Donghae floating wind farm will be more than twice the size of the largest floating facility today – the 88-MW Hywind Tampen facility on Norway’s continental shelf.

“We are very pleased to be a member of the partnership involved in realising the first floating offshore wind farm in Asia,” said Stephen Bull, senior vice president for the wind and low carbon cluster of New Energy Solutions in Equinor. “A floating offshore wind farm of this size will help further increase the competitiveness of floating offshore wind power in the future.”

The project comes as part of South Korea’s strategy to transform its energy mix, cutting the share of nuclear power and coal while targeting a 20% contribution from renewables by 2030. Of the 49 GW of renewables production planned by then, solar is likely to account for 31 GW and wind 16 GW.