



leanwind

Logistic Efficiencies And Naval architecture for Wind Installations with Novel Developments

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Document Information

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		A report to describe the offshore windfarm energy market and assess the market potential of LEANWIND innovations in offshore wind-farm foundation types, installation vessels, and Operations & Maintenance (O&M) vessels.																
Version 1	08/3/17	<table border="1"> <thead> <tr> <th>Prepared by</th> <th>Reviewed by</th> <th>Approved by</th> </tr> </thead> <tbody> <tr> <td>Aldert Otter & Laura Finlay & Henry Jeffrey</td> <td>Declan Jordan</td> <td></td> </tr> <tr> <td>Version 2</td> <td>10/3/17</td> <td>Aldert Otter</td> <td>Declan Jordan</td> <td></td> </tr> <tr> <td>Version 3</td> <td>20/3/17</td> <td>Declan Jordan & Aldert Otter</td> <td>Jan Erik Hanssen, 1-Tech Federico D'Amico, EDF</td> <td>Declan Jordan & Jan Arthur Norbeck</td> </tr> </tbody> </table>	Prepared by	Reviewed by	Approved by	Aldert Otter & Laura Finlay & Henry Jeffrey	Declan Jordan		Version 2	10/3/17	Aldert Otter	Declan Jordan		Version 3	20/3/17	Declan Jordan & Aldert Otter	Jan Erik Hanssen, 1-Tech Federico D'Amico, EDF	Declan Jordan & Jan Arthur Norbeck
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Executive Summary

The report assesses the market potential of LEANWIND innovations in offshore wind-farm foundation types, installation vessels, and Operations & Maintenance (O&M) vessels. Using primary data from original surveys of potential buyers and users of the innovations, the report identifies and ranks the attributes most important in the decision to buy or use the innovations. This provides an insight to the most critical factors in ensuring LEANWIND innovations add value to potential users, enhancing design for commercial application and improving the opportunity for wider diffusion of the innovations in the offshore wind energy industry.

The report reviews the offshore energy industry and market, including the background of the industry, its evolution, and present status across different regions in the world. It also identifies the key stakeholders. Furthermore, the possibilities for overcoming the existing problems and for further development and growth of this industry are discussed.

Offshore wind energy currently costs more (per installed MW) than onshore wind, which is the major obstacle for its expansion, and if the industry is to progress, cost reduction is mandatory. Recent auctions in the Netherlands and Denmark suggest a reduction in the difference between onshore and offshore costs, though only for established technologies. The aim of the LEANWIND project is to provide cost-reductions by applying lean principles to the offshore wind lifecycle and supply chain. There are a number of components in an offshore wind project in which the reduction of the cost could be applied: Foundations, Turbines, Electrical interconnections, Operating & maintenance, Installation, and Policy. This report identifies the directions leading to cost reduction in each of these components, to eventually deliver a fully competitive industry in the global energy market.

The LEANWIND project has generated innovative solutions for the offshore wind energy market to achieve its objective of cost-reduction in the industry. The report assesses the extent to which these innovations meet the requirements of stakeholders in the industry and, using attribute matching, assesses the extent to which innovations add value in the most critical aspects of the use or buy decision. This is achieved using a survey of industry stakeholders.

The market analysis report finds that there are a number of conditions that will impact the growth of the industry, some are external factors (such as competition with other markets for resources, or with incentives for development) which cannot be controlled directly by developers, but perhaps with collaboration between markets, their impact could be minimised. Technological innovations is likely to be significant in reducing the Levelised Cost of Energy (LCoE). Technological innovations expected to become more mainstream in the industry in the near future include: larger capacity turbines, floating foundations, and improved installation and monitoring technologies. There are other more innovative designs currently in the design and development phase, but these are unlikely to be introduced into the market anytime soon.

The report also found that originally, ownership of offshore wind farms was almost exclusively by large utility companies. Although they still own the majority share in projects, the mix of investors is changing due to the increase of joint-venture projects, where

investors include financial lenders (such as the Green Investment Bank), institutional lenders (such as Pension Danmark), smaller power producers, or Engineering, Procurement, Construction and Installation (EPCI) contractors (e.g. the turbine manufacturers). The report also notes that there may be more vertical integration along the supply chain, that is offshore wind developers are bringing operations such as maintenance in-house. The report also looks at different projections of the industry.

Following a review of the offshore wind energy industry, the report considers the technological innovations developed in the LEANWIND project and the extent to which they match the self-reported important criteria of potential users. The report presents detailed technical specifications of the the LEANWIND innovations and the gaps in the industry which they are intended to fill.

To explore the extent to which the innovations add value to potential users/purchasers, and therefore the likelihood that the innovations will be taken up by the market, an original survey is administered to industry participants that are potential users and/or purchasers of the innovations for wind-farm developments. Three surveys are used, one each for innovations in installation vessels, operations and maintenance (O&M) vessels, and wind turbine foundations.

The results of the surveys generally confirm the demand for larger installation vessels which are able to handle larger components than current vessels available in the market, and substructures which are able to support larger wind turbines and in deeper water than is currently feasible.

More specifically, health & safety and workflow are considered important factors for both types of vessel. Comfort for crew and passengers is considered the most important factor for O&M vessels but less so for installation vessels. Operational expenditure is considered a very important factor for the O&M vessel but less so for the installation vessel. However, respondents indicated that functionality should be prioritised over reducing operation expenditure for both vessel types.

Vessel operators prefer installation vessels suitable for transportation and installation of both foundations and turbines rather than installation vessels dedicated to turbines only. This is important in the context of the LEANWIND project as the design of the LEANWIND vessel is dedicated to turbines only.

'Green' designs and environmentally friendly solutions are considered important for the vessels, but to a lesser extent for the foundations.

Reducing the manufacturing costs of foundations is considered more important than reducing installation costs. Respondents indicate a willingness to use novel foundation types for the installation of offshore wind turbines, however, when given the choice the monopile is still the most popular foundation. In addition there is evidence of potential for floating offshore wind energy generation.