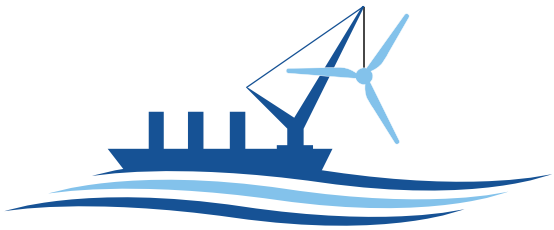

leanwind

Logistic Efficiencies And Naval architecture for Wind Installations with Novel Developments

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Definitions

IAG	Industry Advisory Group	CPT	Cone Penetration Test
GBF	Gravity Base Foundation	OCR	Over-Consolidation Ratio
HLV	Heavy Lift Vessel	HS	Hardening Soil
LCOE	Levelised Cost of Energy	DNV-GL	Det Norske Veritas Germanischer Lloyd
CAPEX	Capital Expenditure	FEA	Finite Element Analysis
FEM	Finite Element Method	MATLAB	MATrix LABoratory
DOF	Degree of Freedom	API	American Petroleum Institute
ULS	Ultimate Limit State	TOPSIS	Technique of Order Preference by Similarity to Ideal Solution
FSE	Free Surface Effect	DLC	Design Load Case
DtP	Distance to Port	WD	Water Depth
GIS	Geographic Information System	QGIS	Quantum Geographic Information System
O&M	Operation & Management	DP	Dynamic Positioning
LW	LeanWind	LAT	Lowest Astronomical Tide
SMA	Second Moment of Area		

Executive Summary

Deliverable 2.4 disucsses “Fixed Platform Design Frameworks”. In this report, comprehensive design refinements for designing both gravity base foundations (concrete) and steel substructures (suction caissons and jacket piles) were developed and discussed. This study has also incorporated the installation constraints to develop an optimised deployment strategy.

This deliverable, firstly, verifies industry-standard design codes, which are normally used for developing XL monopile foundations, versus numerical models. This research has been conducted to develop optimum design methods to reduce monopile sizes and save money on the cost of steel, as conventional pile design methods and design codes such as API tend to be extra-conservative. The benefits of leaner and more efficient design approaches resulting from these results clearly lead to significant CAPEX cost reductions.

Furthermore, the deliverable covers a study on buoyant GBFs, which proposes optimised cost-effective foundation forms of concrete supports for offshore industry. The focus of this research has been on the detailed design of novel concrete structures, including geotechnical, structural and hydrodynamic analysis. For this purpose, a suite of parametric studies have been undertaken to define the optimum geometric configurations for buoyant gravity structures. Detailed geometrical optimisation calculations are also provided in an appendix to this report.

In the third part of the deliverable, an integrated design of floating jackets and caissons has been analysed. The concept of the floating jacket for a fixed offshore wind turbine corresponds to a jacket that can be floated to site and sunk to seabed for installation. In this case, the connection to the soil can be suction buckets. This method has provided satisfactory results in the design stage and can decrease the costs associated with HLVs and conventional lifting cranes.