



Offshore Windfarms Design - Project References

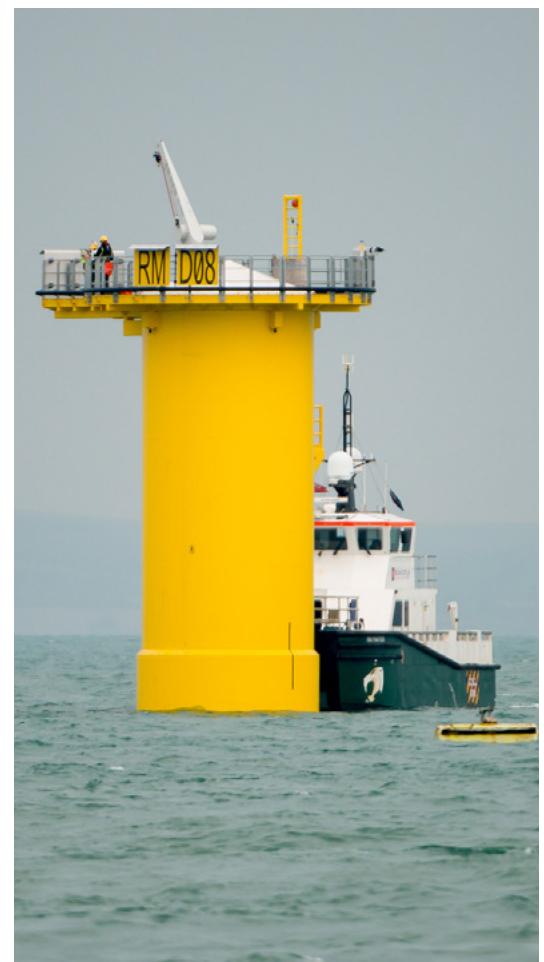
For the last 20 years LICEngineering A/S has played a major role in the offshore wind energy sector undertaking projects domestic as well as abroad. Our company has designed support structures for numerous sites in Northern Europe, and has worked as a subcontractor on many other completed projects in Europe, Asia and North America. Our design solutions cover all aspects from the early phase of project planning, through geotechnical investigations & interpretation, conceptual & detailed design, drawings, fabrication, transport & installation, on-site inspection, in-service and finally decommissioning.

We offer detailed design in accordance with any relevant industry standards such as DNV-GL, ADS & Eurocodes

Monopile Foundations

For more than 2 decades LICEngineering has developed and designed Monopile type of foundations. Additionally we have participated in several research projects within the offshore energy, in order to investigate and improve the concept into a low cost foundation for offshore wind turbines and as support structure for topsides at marginal oil & gas fields. LICEngineering has carried out extensive research within the areas of both geotechnical and structural design as well as developing low cost fabrication and installation methods.

Furthermore, LICEngineering has developed and continuously improved the design for related issues such as scour protection systems secondary steel, cathodic protection etc.



Rampion Offshore Windfarm

Selected references for Monopile Foundations

- Xuwen WTG Monopile Foundation, Detailed Design
- Detailed Design of Sensor Platform and Facility Platform for Anholt Test Centre
- Dogger Bank - Design Study for TP-less foundation
- SPIC: Dafeng H3 China, WTG Detailed design
- Vattenfall: Kriegers Flak Detailed Design
- Vattenfall: Vesterhav Syd & Nord: Detailed Design
- COP: Vineyard, US, WTG Detailed design
- COP: Veja Mate, North Sea, Detailed design
- UFO: LEEDCO wind farm Lake Erie, Detailed Design
- EON: Rampion, North Sea, WTG Detailed design
- Northwind: Northwind North Sea, WTG+ OSS Detailed Design
- Triton Knoll North Sea, WTG Detailed Design
- Vestas: North Hoyle, WTG + OSS, Detailed Design
- Powergen: Scroby Sands, WTG+ OSS Detailed Design



Installation of DAFENG H3 offshore Windfarm, China



Monopile for Northwind, ready for installation



Rampion Offshore Windfarm

Design Work For Jackets

LICEngineering has extensive experience developing and designing jacket foundations. We participate in several research projects within the offshore energy sector, in order to investigate and improve the concept into a low cost foundation for offshore wind turbines and as support structure for topsides at marginal oil & gas fields. LICEngineering has carried out extensive research within the areas of both geotechnical and structural design as well as developing low cost fabrication and installation methods.

Selected References for Jackets

- SPIC: Jieyang Jinghai Jacket Substation Substructure
- Siemens Jacket WTG, Detailed Design, Owners Engineer
- St Brieuc WTG, Jacket FEED Design, Fully Coupled Analysis
- Le Treport WTG, Tender Design, Owners Engineer
- Le Nouirmoutier WTG, Tender Design, Owner Engineer
- Changhua Taiwan WTG, Detailed Design
- Anholt OSS, Detailed Design

Floating Foundations

Floating wind farms have the potential to significantly increase the sea area available for offshore wind farms, especially in countries with limited shallow waters,. Locating wind farms farther offshore can also reduce visual pollution and reach stronger and more consistent winds. Commercial floating wind turbines are mostly at the early phase of development, with several single turbine prototypes having been installed since 2007.

Selected References for Floating Foundations

- Hexicon, Dounreay: Coupled analysis and floater design, LIC/Principia
- Seatwirl: design of blades/ coupled analyses and floater design, LIC/Principia

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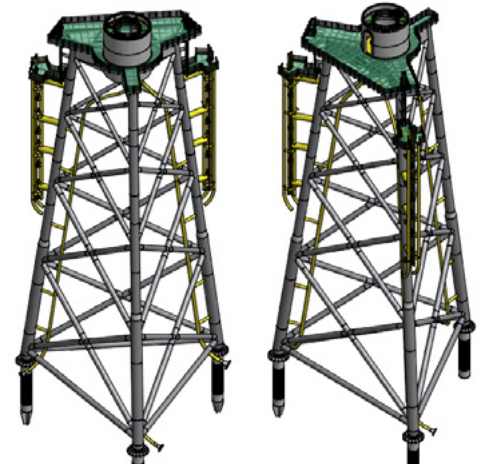
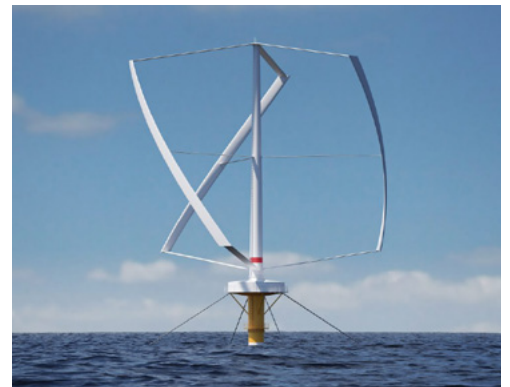


Illustration of Jackets



Jackets ready for deployment



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