Floating Offshore Wind Turbines enable clean energy production at deep water locations where bottom-fixed substructures are not economically feasible.

Floating Wind is a growing market entering the pre-commercial phase, featuring a large variety of floater designs from spars, semi-submersibles, and barges to tension leg systems. The technology, with its inherent importance on the interaction of wind turbine and floater dynamics, requires an appropriate multi-disciplinary engineering approach.

Ramboll has a well-established track record in industrial and R&D projects as a leading independent engineering consultancy in the field of floating offshore wind.

Our clients highly value our broad expertise and service portfolio from concept development, design, supervision of fabrication, and offshore installation to operation, maintenance and decommissioning. We build on our competence as the world leader in detailed design of fixed offshore wind foundations and our long-term experience with wind turbines, special purpose ships, floating and compliant offshore structures, mooring systems and marine operations.

Our mission is to provide our clients with customised, tailored, cost-efficient, effective and industrialised solutions and services during the entire lifecycle of a floating offshore wind turbine project. We provide solutions which are best fit for the specific project of our client. Our focus and expertise is not limited to a particular floater design.

**Our experience and competences**

Ramboll is a truly independent one-stop engineering consultancy. Our synergistic floater team consists of experienced engineers in offshore technologies, wind turbines, structural design, load analysis, coupled simulation, monitoring and control, as well as in asset and risk management, and on-site inspection and supervision.

We follow proven offshore engineering principles and standards for safe, reliable and cost-efficient solutions. We avoid one-dimensional optimisations by considering all relevant technical KPIs such as the floater’s dynamic characteristics, and key cost drivers including fabrication, installation, operation and maintenance.

Ramboll participates in high profile R&D programmes and joint industry projects which aim at advancing floating wind technology and contributing to its commercialisation and industrialisation. By participating, we supplement our knowledge and incorporate relevant methodologies and innovation into our engineering and consultancy services.

In floating wind, technologies are rapidly evolving and unique challenges are occurring in every new project. With our multi-disciplinary team combining detailed offshore knowledge and in-depth understanding of wind turbines, we are in an excellent position to efficiently solve any project challenge.

For further information, please visit www.ramboll.com or contact us directly:

**CONTACT**

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Owner’s engineer

As Owner’s engineer we support our clients as an independent engineering consultant with:
• Independent concept evaluation and selection
• Preparation of tender documents and tender evaluation
• Critical Design Reviews covering all phases: conceptual and structural design, mooring systems, numerical methods, transport and installation and fabrication (with schedule analysis, optimisation and cost-benefit analysis)
• Asset Management
  o O&M service strategy
  o Risk assessments
  o FMECA
  o HAZID/HAZOP.

As an independent third party, we support project viability, to avoid design errors, and fill client gaps in resources and expertise to help reduce cost and risk.

Design

Ramboll has expertise in the design of floating wind turbines during all phases from concept development to workshop drawings.

We offer:
• Feasibility studies
• Conceptual design
• FEED
• Floater detailed design (including integrated load analyses)
• Mooring design
• Tower design
• Controller
• Component design (Secondary Structures, Moorings, Dynamic Cables).

We are well-prepared to support our clients in any design challenge. We draw on our proven customisable in-house and commercial software process chain, and our long-term experience with detailed design of fixed offshore wind foundations, special purpose ships, floating and compliant offshore structures, mooring systems, and wind turbine control systems.

Consultancy and supervision

We provide consultancy services incl.:
• Due diligence (technical and commercial)
• Certification support
• Reference designs
• Planning of inspections and condition monitoring
• Structural health monitoring.

Based on our practical hands-on experience, we provide inspection and supervision services for:
• Fabrication/construction
• Factory acceptance tests
• Offshore transportation and installation
• Commissioning
• Marine operations (inspection, maintenance, repair)
• Decommissioning.

As trusted and dedicated advisers and critical partners to our clients, we deliver tailored services to de-risk floating wind projects, ensure their technical and commercial viability and put our clients in a position to achieve the best project results possible.

COMMERCIAL PROJECTS IN DESIGN OF FLOATING SUBSTRUCTURES FOR OFFSHORE WIND TURBINES

CUSTOMER Various project developers and offshore yards
LOCATION Atlantic, Mediterranean Sea, North Sea
PERIOD 2009-now
SERVICE PROVIDED Concept studies on Semis, TLPs, Spars; parametric cost models and sensitivity studies; FEED studies; innovative mooring designs; basic design for demonstrators; critical design reviews.

EUROPEAN H2020 RESEARCH PROJECT: LIFESSO+ - ADVANCE FLOATING WIND TECHNOLOGY FOR LARGE WIND TURBINES

CUSTOMER European Union
LOCATION Sites in France, Scotland and USA
PERIOD 2015-2018
SERVICE PROVIDED Ramboll leads the work package on industrialisation and supports concept evaluation and risk assessment of four commercial floating substrutures (Semis, TLP and barge types).

JOINT INDUSTRY PROJECT: COUPLED ANALYSIS OF FLOATING WIND TURBINES

CUSTOMER DNV GL
LOCATION Hamburg, Germany
PERIOD 2016-2017
SERVICE PROVIDED Ramboll collaborates with the JIP partners to develop a recommended practice for analysis of floating wind turbines, with Ramboll focusing particularly on load calculations and DLC setup.