

Offshore Wind

Wind Energy

An integrated
and innovative
approach to
offshore wind
engineering

With its international, independent and multidisciplinary expertise, Tractebel offers as Owner's Engineer, Lender's Engineer, Consultant Engineer or Contractor an integrated approach covering all aspects of your offshore wind projects (including floating offshore wind).

Three important reasons to work with us

- Complete technical expertise in offshore wind related domains, allowing for overall optimizations and cost competitive solutions
- Experience in technical consultancy / design activities from early project phase up to operational phase
- Flexible and "thinking along" attitude in order to find "winning solutions".

A local player on the global market

On top of our technical strength, we can offer you our local presence in Europe, Latin America, Asia, etc. As such, we establish project teams which combine long-term experience in project development, assessment, construction and operation with local experts including the specific requirements and context.

A multidisciplinary approach

Project Management Expertise

- Interface management
- Risk management
- Planning & cost management
- Contract management
- Site supervision
- Quality management
- HSE management
- Document management

Wind Turbine Expertise

- Wind resource assessment
- Layout optimisation
- Energy yield calculation including losses, wake, flow-modelling and uncertainties assessment
- Data measurement and analysis including nacelle based lidar measurements
- Turbine technology assessment

Electrical Expertise

- Electrical & Topside design
- Grid code compliancy and calculations
- Grid connection design/studies
- SCADA definition and programming
- Cable design and trajectory

Operation, Maintenance & Repair Concepts

Foundation Structure Expertise

- Geotechnical & geophysical data analysis and soil parametrisation
- Hydrodynamic, morphodynamic & magnetometric surveys
- Set-up of design basis
- Conceptual, basic & detailed design
- Scour protection system
- Design of substation platforms, self-installing platforms (MOAB®s)

Transport & Installation Expertise

- Workability analysis
- Installation techniques evaluation
- Vessel database
- Decommissioning assessment
- 3D visualisation and equipment design method statements

HSE Expertise

- Environmental Impact Studies
- Measurement campaigns
- Safety analysis

Port Infrastructure Expertise

- Design
- Master planning
- Port and logistic concepts

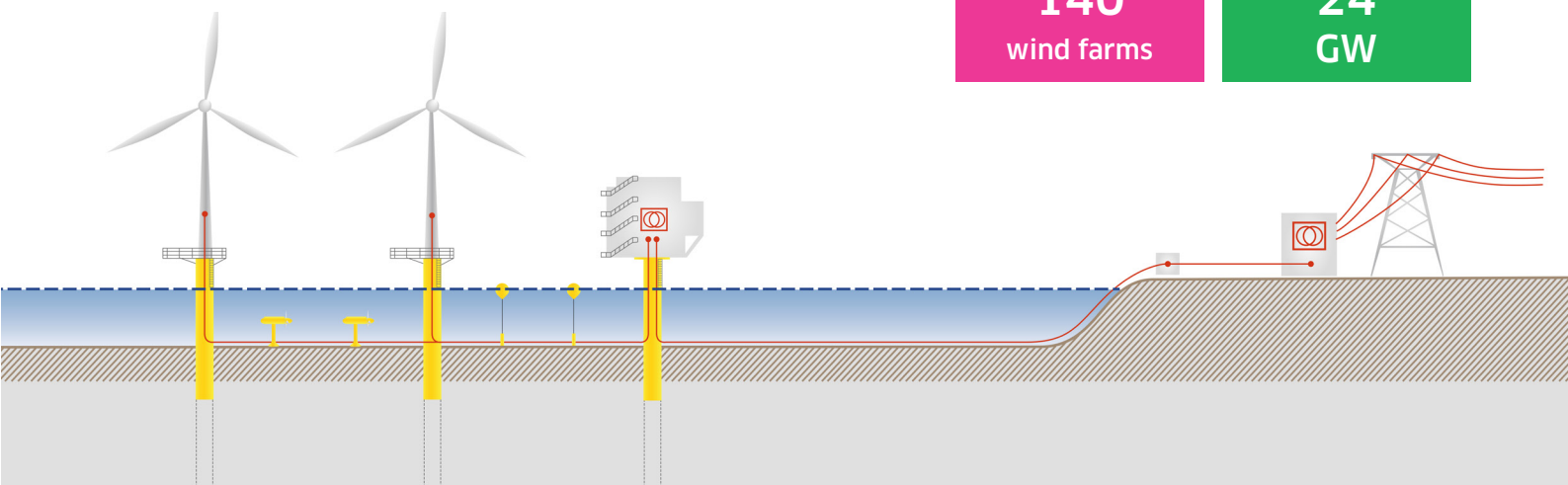
Naval Architecture

- Design of special purposes vessels
- New-builds and vessel conversions

Tractebel has all the competences and state-of-the-art software needed to successfully bring your offshore project to life and meet your project goals.

140
wind farms

24
GW



Roles

As **Owner's Engineer**, we can support you with:

- Concession Files and Permit Elaboration
- Pre-Feasibility Studies
- Conceptual or Basic Design
- Procurement Support
- Project Certification Follow-up
- Construction & Commissioning Follow-up
- Operation & Maintenance Support
- Detailed Design for Electrical Systems including Testing and Commissioning

As **Lender's/Investor's Engineer**, we can help you with:

- Technical Due Diligence Services
- Project Monitoring Services

As **EPC Contractor** for Electrical System of Topside

Some References

Belgium - C Power - Owner's Engineer mission for the development and construction phase - 326 MW installed capacity

Germany - Merkur - EPC for HV/MV equipment of OHVS (Offshore Substation) and detailed design of grid connection - 400 MW installed capacity

Germany - Baltic Sea - Technical due diligence services, including review of energy yield assessment, technical project concept, maintenance concepts evaluation, extension of useful lifetime, OPEX assumptions, WHSE concept, TA for investor during completion phase - 288 MW installed capacity

The Netherlands - Gemini - Basic & detailed engineering of HV/MW system of the OHVS's (Offshore Substations), 100 km AC grid connection and onshore HV/MV substation - RAM and HAZOP studies - HV, MV protections tests after construction and SCADA system commissioning of HV/MV system - 600 MW installed capacity

Germany - Hohe See - Technical due diligence services, including review of construction schedule and construction contracts; CAPEX and potential value enhancement options; permits and grid connection; energy yield assessment; technology risk assessment; maintenance concepts evaluation; OPEX assumptions - 500 MW installed capacity

France - Le Treport/Noirmoutier - Technical assistance during bid preparation, design basis management, foundation package management, pre-FEED studies in electrical, ICT and SCADA, QHSE and decommissioning - 2 x 500 MW installed capacity

Portugal - Windfloat Atlantic - Technical assistance on floating wind technology during project development - 24 MW installed capacity

South Korea - ShinChang OWF - Pre-feasibility study, assessment of preferred offshore area preliminary wind resource assessment, preliminary wind farm layout, determination of suitable wind turbines types - 60 MW foreseen capacity

United Kingdom - Galloper - Supervision offshore installation inter-array-cables

Germany - Bard Offshore I - O&M vessel management, JUB Windlift, CTV Natalie, SIEM W2W, Ocean Zephyr, On Board reps, mobilisation coordination, general agency support, Lit plans, 3D investigations, acquisition of new projects for the fleet

Germany - BorWin-Beta-HVDC Substation - Concept, basic engineering, detail engineering, T&I engineering

Tractebel combines the expertise of



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