Your challenges

The wind energy sector continues to grow rapidly in terms of capacity and complexity, posing new risks and challenges. Offshore wind farms in particular face severe complications due to their isolated location and conditions such as very deep water, extreme wind, high waves and the salt content in both water and air. To accurately define technical risks, both onshore and offshore wind farms need to go through reliability and safety assessments.

Given the substantial funding required for the projects, it is important for investors and owners to protect their investment by minimising risks. Operators need to safeguard their wind power production while complying with national regulations. Quality assurance across the entire project as well as crucial individual phases is critical for ensuring the profitable operation of onshore and offshore wind farms.

What is project certification?

Project certification helps to verify that wind farms meet site-specific conditions. It identifies risks at an early stage when they are more manageable. If initiated in the early stages, project certification can significantly reduce the risk profile of a wind project.

Design and Development Phase

- Site Condition Evaluation
- Design Basis Evaluation
- Risk Analysis HAZIP/HAZOP
- Design Evaluation
- Collision Analysis
- Detailed Structural Analysis
How can we support your project certification requirements?

TÜV SÜD helps you to protect your investment by providing independent monitoring and evaluation of your wind farm project. As your expert partner, we provide a full range of services from greenfield planning, due diligence, construction, grid connection and evaluation of installations to final commissioning. Our engineers are engaged in all aspects of approval, design review and calculation (stress analyses, dynamics, lifecycle assessment) and in the review, testing, approval and certification across the current range of wind farm projects. As a Wind Energy Certification Body, we carry out certifications, approvals and inspections in the field of wind power and participate in the preparation of standards and regulations. The certification of your wind farm will be documented by a project certificate according to IEC or GL standards.

Our project certification services

- **Site condition assessment**
  Our experts conduct soil investigation (technical design, validation of exploration results), review of measuring campaigns (mast, lidar, etc.), evaluation of wind and energy yield reports, assessment of maritime conditions and verification of load-case definitions. We can perform conceptual/feasibility design examinations for the turbine, foundation, transformer station, cables or other components.

- **Design basis evaluation**
  TÜV SÜD examines the main parameters and requirements for the design of the whole offshore wind farm to ensure that it is properly documented and sufficient for the ongoing safe design and execution of the project.

  - **Design risk analysis (HAZIP/HAZOP)**
    We provide organisation, invitations, chairmen and minute taking to facilitate HAZIP/HAZOP workshops. Our experts are well versed in hazard identification, risk estimation, comprehensive reporting and individual worksheet development.

  - **Design evaluation**
    TÜV SÜD’s experts assist you with verification of both integrated and dynamic load calculations. This includes a technical review of the detailed foundation design (pile design, steel and solid construction, etc.) as well as technical evaluation of the detailed turbine design (machinery components, blades, etc.) and substation (structure, topside, electrical engineering, fire protection, etc.), secondary structures of the turbine and/or substation (boat landing, ladders, helicopter platform), and lifting operations/equipment (lifting/handling/lashing of heavy loads, including effects on component function and their friction-free installation, cables, end fastenings and load-handling devices). We assess the met mast (structure and measurement system) and review the logistics and installation concept of your design. Our experts also conduct assessment of your HSE scheme.

  - **Detailed structural analysis (FE Computation)**
    We perform linear and nonlinear analysis of stresses, deformations and stability. Our experts review global and local load conditions occurring at OWEC, foundational structures and offshore installation ships. The service covers evaluation of local plastification under extreme loads, fatigue analysis
of welded and unwelded details, and confirmation of further requirements for usability during transport, construction and operation (free and forced vibrations, elastic as well as plastic deformation, damage checks, evaluation of additional imperfections).

- **Collision analysis**
  TÜV SÜD uses explicit FE Software to evaluate dynamic phenomena caused by ship-to-offshore wind structure collisions. We assess local deformation at ship and turbine structure or substation structure from collisions, as well as damage to the ship or the turbine/substation primary or secondary structure from mooring impact. Our variation studies take into consideration factors such as different foundation structures, topsides, turbines, water level and drifting angle of ships. We conduct failure scenario investigation for critical material expansion (crack formation), tilting of wind turbine, crash of nacelle, influence on boat landing manoeuvres on turbine (fatigue) and other situations.

- **Production evaluation**
  TÜV SÜD offers assessment of suppliers based on quality, experience and capacity. Our audits of production facilities include review of manufacturing documents as well as review of training and qualifications. In sampling tests of manufacturing quality, we perform reviews of the current state during production, detection of deviations to target state as well as reviews of material quality and workmanship. In addition, we provide an on-site representative to perform continuous monitoring of production, which covers compliance with quality specification and adherence to time schedules.

- **Transportation and installation**
  During the design and planning phase, our experts support you with insight into assembly planning and verification of assembly instructions; calculation and assessment of hydrodynamic motion coupling; consideration of motion behaviour, operating limits, resulting forces and safety; and investigation in areas such as mutual shielding, anchoring effects, lifting operations and lashing. During the operation phase, we monitor the installation process and, where applicable, identify errors and determine causes. We also ensure adherence to planning, specifications, regulations and codes of practice; conduct quality assurance measures such as checking the integrity and completeness of deliveries; perform reviews based on health and safety requirements of Machinery Directive 2006/42/EC; review lifting accessories, chains, ropes and webbing as well as construction site hoists; and ensure compliance with health and safety regulations.

- **Safety management and inspections**
  Our experts provide monitoring and certification of commissioning wind turbines, foundations and substations. We also offer national required commissioning inspections of components (BSH and BetrSichVerordnung, including for example Davit-Cranes, elevators, pressure tanks); survey of plant safety in accordance with the accident prevention regulations (ladder and climbing protection system, PPE, crane systems); tests on proper functioning of control and safety systems of wind turbine and operational behaviour; checks for damage and conformity of the components used with the certification documents; inspection after start-up/Final Acceptance Test; periodic inspection (turbine, substation, cranes, elevators, safety equipment); as well as end of warranty inspections.

- **Failure analysis**
  In addition to identifying the cause of failures and providing process analysis, TÜV SÜD provides identification and assessment of failure effects; witnessing and support of tests and measurements; fracture-mechanics assessment of existing defects in components and assessment of remaining service life; support in developing technical solutions, evaluation of measures and solutions, and assessment of technical and organisational measures in the continued operation of damaged components; as well as endoscopy and non-destructive testing (NDT) on-site or in our testing laboratories. We also help you communicate complex technological connections and cause of failure to non-technical audiences.

- **Decommissioning assessment**
  TÜV SÜD assists your company in complying with decommissioning standards when removing whole installations and performing seabed clearance. We provide expertise in notification and marking of remains, as well as maintenance and management of the site after decommissioning.

- **Extended operation**
  We assess the operational and maintenance records of wind farms; conduct periodic monitoring on all parts, systems and components for functionality, corrosion, wear or damage; and determine the
appropriate strategies for extended operation such as additional monitoring, design modification, exchange of wind turbines and components, inspection and maintenance, and optimisation of operation.

Your business benefits

- **Understand risks and gain certainty** – from the onset, ensuring reliable development and operation of your wind farm.
- **Optimise plant productivity** – by ensuring quality and maximum performance of all installations and systems through our qualified and experienced wind specialists.
- **Strengthen your asset value** – by ensuring safety and reliability throughout development, installation and operation phases.
- **Achieve profitable investment** – through economic optimisation of facilities.

Why choose TÜV SÜD?

With over 30 years of experience in the wind industry, TÜV SÜD offers integrated solutions backed by best-practice case scenarios from our successful involvement in over 1,000 wind energy projects. We are widely known as an independent third-party specialist capable of delivering reliable and realistic reports to guide your decisions.

TÜV SÜD is accredited as a Wind Energy Certification Body for onshore and offshore wind turbines, components and projects in accordance with all relevant international standards. We certify your wind farms in accordance with IEC, GL, BSH (German Maritime and Hydrographic Agency) or DNV standards. With our presence in key locations worldwide, we provide local knowledge coupled with global expertise.

Choose certainty. Add value.

TÜV SÜD is a premium quality, safety and sustainability solutions provider that specialises in testing, inspection, auditing, certification, training and knowledge services. Represented in over 800 locations worldwide, we hold accreditations in Europe, the Americas, the Middle East, Asia and Africa. By delivering objective solutions to our customers, we add tangible value to businesses, consumers and the environment.

Related services

TÜV SÜD provides the following related services:

- Product certification
- Operations and asset management services
- QHSE services for renewable energy projects
- Failure analysis
- Owner’s engineer services for renewable energy