



STEAG Energy Services – Your Expert Partner for Wind Farms

We Optimize Availability and Revenues



Challenges Faced by Wind Farms

The service portfolio of STEAG Energy Services covers the entire value chain of plants for power generation: from project planning and engineering via operation management and optimization right up to intelligent IT solutions. With WINDcenter, these services and our broad expertise are now also available for wind energy.

High availability – safe returns

Wind turbines have to be operated with a high availability in order to lastingly achieve high revenues and thus safe returns during the entire lifetime of the plant, beyond the planned return on investment.

Losses in spite of proven strategies

Despite proven optimization strategies including regular inspections, maintenance and repair, frequent WT output limitations or outages do occur. This leads to a loss of revenues.

Late detection of unexpected problems

The causes of output limitations are often creeping changes that are difficult to be detected by the WT controller. Therefore, the reaction to problems and fault messages in the form of systematic service operations takes place far too late, so that valuable time is lost. The result: substantial losses of revenues.

Optimization approach: avoiding losses of revenue

A study by STEAG Energy Services documents the preventability of losses of revenue of wind farms. The output of wind farms can thus decrease by up to 700 MWh within one year due to directly measurable generation losses, which, depending on the remuneration model, can lead to revenue losses of €75,000 up to €150,000. Unnecessary losses that would have been largely avoidable!

Expert knowledge for your success

At STEAG Energy Services we have valuable experience in the operation and maintenance of wind turbines. Moreover, we support you as owner's engineer of your wind farm project including all auxiliary plants even before the first wind energy plant has been installed. Make use of our expert knowledge and our range of services to make your existing or planned wind farm a complete success regarding your return expectations.

Additional increase of availability and revenues

With our IT solutions and the services of the WIND-center (WIND: Wind farm Integrated Neural Diagnostics), STEAG Energy Services now offers you an intelligent and manufacturer-independent package for the monitoring of wind farms that allows you to further increase the availability of your wind farm.

Our WINDcenter: We Will Handle It!

From project development via the implementation right

At STEAG Energy Services we can support and implement your projects from development right up to the commercial operation of wind farms. Both the comprehensive know-how of our engineers from the fields of mechanical, electrical, and structural engineering as well as control technology and our valuable experiences with grid operators on linking large-scale power plants to the grid are very helpful here. Moreover, our engineers have developed concepts for the early detection of problems in the project implementation (like e.g. possible delays or insufficient quality) and for systematically initiating countermeasures.

You do not have the necessary staff resources for continuously monitoring your wind farms? We will gladly do the job for you. With the WINDcenter, our specialists at STEAG Energy Services are ready to systematically evaluate for you the information supplied by our powerful IT solutions in detail. We provide own server capacities at our premises for the data reception from the SCADA and CMS systems of your plants.

We develop projects

- Project planning: project initialization, scheduling, cost planning
- Technical studies
- Checking and assessing wind measuring campaigns and wind assessment reports
- Technical due diligence of onshore projects
- Plan of concept of the wind farm including structural and electro-technical infrastructure as well as grid connection

- Technical responsibility in procurement and approval processes
- Building ground analyses and preparation of recommendations of establishment
- Clarification of the grid connection including negotiations with the grid operator

We implement projects

- Provision of the project management and project controlling: tracking and control of costs and schedule, reporting, document management
- Contract management: contract analysis, claim management, risk management
- Quality management:
 - Preparing and checking quality management plans
 - Monitoring of the quality assurance and the expediting in manufacturing
 - Damage event analyses and coordination of repair concepts
- Design review and optimization of the implementation planning



up to the monitoring

- Electro-technical design calculations for the wind farm and verification for the external grid operator:
 - Dimensioning of the components of the electrical grid within the wind farm
 - Sensitivity analyses, protection concept, proof of selectivity, harmonic analyses
 - Static and dynamic calculations according to the Ancillary Service Ordinance SDL Wind or for checking compliance with the requirements of local grid codes
- Construction site set-up planning, organization, management, and monitoring
- Interface planning and interface coordination of all parties involved in the project
- Engineering for SCADA systems and plant/turbine-specific systems that provide data
- Planning, organization, management, and monitoring of construction and commissioning
- Support of acceptance measurements and their assessment





We monitor projects

- Demand-oriented: we offer customized solutions adjusted to customer requirements.
- Qualified: our systematic SCADA and CMS data analysis ensures that warnings and alarms are only generated when they are relevant.
- Intelligent: our IT solutions enable an early detection of creeping process changes and sudden deviations.
- Comprehensive: we react to each relevant alarm with a comprehensive, IT-based root cause analysis.
- Detailed: owing to our accurate analyses, non-availabilities can be attributed precisely.
- Up-to-date: our detailed regular as well as extraordinary reports keep you informed about the current performance of your wind farm at all times.



IT Solutions with Extra Added Value

Intelligent IT technologies have long proven themselves in many areas of the power industry. They are also indispensable in wind energy as they lead to continuous improvement processes, more efficient workflows, faster reactions, and a higher data transparency, among other things. In addition, they pave the way for new, effective strategies for plant optimizations. The application of clever as well as tried and tested IT solutions offers entirely new potentials to lastingly increase the availability and thus ultimately the revenue of wind turbines.

STEAG Energy Services has decades of experience in developing powerful IT technologies for the energy industry.

With SR::SPC, SR::EAGLE, and SI®/PAM we offer you three tried and tested IT solutions with real added value for wind energy.

SR::SPC – online monitoring and analysis

SR::SPC (statistical process control) is an intelligent IT solution that has been used in the power industry with outstanding success for many years, in perfect interaction with a powerful database and visualization. SR::SPC enables a continuous online monitoring of wind turbines with a sophisticated data analysis.

- Continuous, automatic analysis of the really relevant data from the information of the SCADA and/or CMS system
- Early detection of creeping changes
- Automatic alarm message in the event of faults or creeping changes
- Systematic identification of immediate and fast process changes
- Valuable gain in time for the timely planning and control of maintenance measures
- Cost-efficient planning of service operations
- Lasting cost reduction by avoiding extensive repairs or expensive component changes

SR::EAGLE – systematic decision support in the root cause analysis

Changes in the operating behavior of plants can lead to deteriorations and sudden failures. Tracing the exact causes of these incidents is often very time-consuming. SR::EAGLE is an IT solution for the systematic decision support if you want to track down the causes of fault or error messages more quickly.

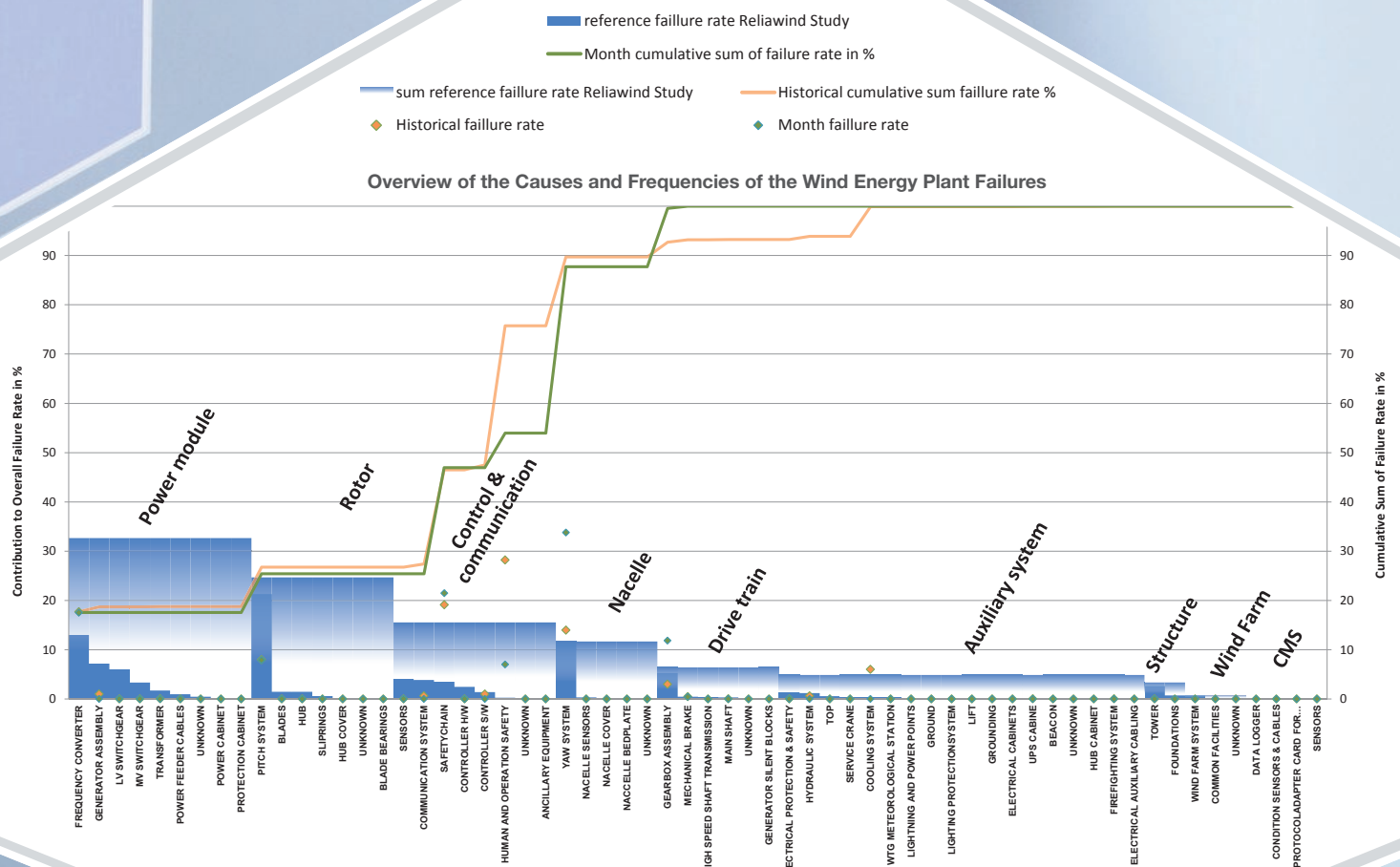
- Intelligent system based on a tree structure
- Simultaneous isolation of several causes of a fault message
- Automatic real-time evaluation
- Prompt diagnosis as early as seconds after an alarm

- Faster pattern detection in the case of recurrent fault messages
- Efficient use of gained insights for other wind turbines
- Permanent preservation of valuable knowledge for fleet-wide application

SI®/PAM – maintenance management

SI®/PAM, a modular, flexible IT solution developed by STEAG Energy Services, is used, among other applications, for the operation management and coordination of maintenance measures in wind farms. In combination with SR::SPC, SI®/PAM also provides the crucial basis for conducting non-availability analyses for the wind farm.

For a systematic monitoring, the WINDcenter has developed algorithms that allow to accurately attribute the responsibility for a non-availability in terms of time and to estimate the generation loss due to power limitations and/or unplanned shutdowns.





Your Wind Farm Is in Good Hands with STEAG Energy Services!

Qualified engineering, customer-oriented operation management, and intelligent IT solutions: complete versatility and high performance you can benefit from.

We keep a vigilant technical eye on your wind farm, at all times and to its full extent, monitoring each plant by means of highly efficient IT technologies. We inform you quickly

and specifically about all relevant faults as well as creeping and sudden changes, allowing you to take action early on and in a result-oriented way. You have access to the online data of your wind energy plant at all times. The data from SCADA and/or CMS systems are stored by us, so this information will be available to you even years later. Our regular informative reports will always keep you up to date on the performance of your wind farm.



Your benefits

- Professional technical wind farm management
- Continuous, complete online monitoring of wind turbines and wind farms using intelligent IT solutions
- Automatic analysis of all important and thus really relevant information from SCADA and/or CMS systems
- Automatic alarm in the event of faults and creeping changes
- Comprehensive root cause analysis of relevant alarms using IT solutions for decision support
- Fast reaction to imminent undesired events and error messages
- Cost-efficient planning and control of service operations
- Regular reports and damage analyses
- Transparent look at the availability of each wind energy plant and the entire wind farm
- Optimized operation management owing to continuous improvement process
- Informative availability analyses for investors and shareholders
- Precise non-availability analyses (compliance with contractual agreements regarding the availability of the wind turbines in terms of time and energy)

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