Wind Farm Management
Operational Management, Maintenance & Service,
Technical Assessment, Products
As a student working with ABO Wind, Stefan Klose loved to climb wind turbines. Years later he continues to work with us and is still fascinated by the technology of the elegant giants.

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ABO Wind is one of the pioneers of wind energy. We have been in the business for more than twenty years now. In 1996, Dr. Jochen Ahn and Matthias Bockholt started the company as a two-man operation and began to develop wind farms on their own.

In the intervening years, wind energy has grown up, and so has our company. Our staff of more than 350 highly-trained professionals develop, finance and construct wind farms, take care of operational management, maintenance and services, and are experts for technical assessments of wind turbines and their respective components.

So far, ABO Wind has installed more than 1,100 megawatts of wind energy capacity. But we don’t rest on our laurels. On the contrary, we have maintained our dynamic pioneering spirit from the initial years. We know what the market needs from our daily work experience, and we constantly strive for progress.

In recent years we have greatly expanded our wind farm services and recruited new technicians. Our most recent achievement: The German Wind Energy Association BWE has accredited our newest subsidiary company for technical assessments.

We use our broad practical experience to continuously develop new products and technical solutions to optimise wind farms, such as our intelligent access control „ABO Lock“ or our simple data transfer system for batcorders called „ABO Bat Link“.

We benefit from the expertise of our colleagues with their varied professional backgrounds: ABO Wind employs experienced engineers from different fields such as construction, energy supply, or electronics, but also IT specialists, financial experts and technicians. Many of them have been working in the wind energy sector for more than a decade.

This brochure will give you an overview of the wide range of our wind farm management services: traditional operational management, maintenance and services, technical assessments, and new products.
Dr. Jochen Ahn and Matthias Bockholt (from the left) started ABO Wind in 1996. Together with Andreas Höllinger (right) they still form the company’s managing board. Matthias Bockholt is responsible for wind farm management.
Maximising the potential of your wind farm

Starting with the very first wind farm we ever constructed, ABO Wind also provided operational management after commissioning. Since then, ABO Wind has continuously grown with the challenges. Today our engineers, technicians and business specialists manage wind farms with a total capacity of more than 850 megawatts in six European countries. To us, wind farm management involves anything related to the smooth operation of a wind farm, from operational management, maintenance and services to technical assessments and add-ons for optimisation.

Our technical wind farm managers calculate availability, take care of the fault elimination, keep an eye on all deadlines and manage the correction of faults. As a central contact, our wind farm managers stay in close touch with our customers. Our key account managers are there for any additional needs and advise you on further optimisation options for your wind farm.

Our technical assessment team consist of experienced civil engineers, experts for environmental compliance and electrical engineers. They support our operational management team with their insightful technical knowledge and vast experience within the industry.

The work areas of our wind farm management are closely intertwined: Technical and commercial management, control room, service technicians, and technical experts are constantly interchanging information. In addition, our wind farm management can consult with the other colleagues of ABO Wind, for example the engineers of our construction and electrical departments. Together they develop innovative solutions for wind farms.
As team leader of the technical wind farm management, Beate Schneider keeps an integral view on operations. She knows our customers' wind farms like the back of her hand.
Antje Herzbach is responsible for commercial operational management and accounting. The biggest challenge with regard to liquidity planning of wind farms is the fluctuating wind.
Integral view for smooth operations

Lots of contracts, bills and administrative burdens are involved when it comes to operating a wind farm. Our commercial operational management efficiently takes care of accounting, billing cycles and fiscal matters, but also manages liquidity planning, all sorts of contracts and the commercial optimisation of your wind farm.

Contracts and contract controlling

We stay cool when things get hectic: From the moment of acquisition of the wind farm by the owner, we keep track of the multitude of contracts regarding feed-in contracts, direct marketing, insurances, power purchase agreements, or land lease agreements. Our contract controlling team manages the complete contract lifecycle from daily correspondence and billing to compensation and renegotiations.

Accounting, commercial management and optimisation

Sound liquidity planning, competent bookkeeping, and responsible account management are the foundation of any project company’s smooth operations. Our business specialists take care of the VAT return, and they control procurement, process matters of the commercial register, and organise the general meeting.

Our services include:

- Control and accounting of power purchase contracts, feed contracts, and direct marketing contracts
- Control of legal and contractual conformity of the rate or remuneration including tax exemption
- Claims, control and approval of compensations
- Settlement of land lease agreements including land registry documentation
- Tendering and negotiation of follow-up agreements

Regulatory compliance

- Bookkeeping and financial statements of the wind farm and the infrastructure company (complying with country-specific accounting rules and IFRS)
- Liquidity management, liquidity planning and control
- Refinancing
- Optimisation of contracts
- Cost optimisation
- Audit and payment processing including billing and accounts receivables management
- Commercial register matters
- Commercial reports for owners and banks
Patrick Himmighofen is the team leader of our control room. His staff monitor a continuous stream of data from the wind farms and react rapidly and competently to any fault report.
Taking care of your wind farm

Regular operational management, remote control, or specific engineering services regarding environmental compliance or performance analysis: Choose the package that best fits your needs or combine it with optional add-ons. Our experts for technical assessments are independent from manufacturers and support our operational management teams with their in-depth knowledge about foundation, tower, blade, and gearbox.

On-site technical management
A local supervisor regularly checks the wind farm on-site, reacts flexibly and manages the access to the turbines. He carries out monthly acoustic and visual inspections of the turbines. Our well-trained in-house service teams conduct detailed regular in-depth inspections and report all results digitally.

Our services include:
- On-site supervision
- Monthly acoustic and visual inspections
- Regular in-depth inspections carried out by our own service teams
- Local services such as landscaping, and restarting after automatic switch-offs due to ice

Remote monitoring, data and fault management
Remote monitoring maximises availability of turbines. We keep an electronic logbook of the performance, weather conditions, and technical conditions. This way we can analyse and optimise the turbines in operation. Our control room monitors the wind farms and the infrastructure up to the medium voltage level and ensures the fastest possible fault clearance and repairs.

Our services include:
- Optional 24/7 remote monitoring
- Coordination of service calls, fault clearance and repairs
- Commissioning of repair works
- Preparation of technical solutions
- Solicitation and comparison of offers including award proposal to customers
- Monthly technical reports
- Auditing of technical services
- Examination of service reports
- Initiation and monitoring of remedial measures
- Identification of accumulations of malfunctions
Commissioning acceptance and recurring inspections

From the moment of commissioning of a wind farm, our employees make sure any noted defects are remedied by the manufacturer or the service company. Our deadline management is always on top of any legally or professionally necessary tests, ensures compliance with maintenance intervals and warranties, and monitors all warranties concerning contracts with suppliers, the turbines themselves and the infrastructure facilities. We evaluate audit reports and balance the results with the customer and the maintenance company. If necessary, we coordinate and organise the repair of main components and make sure the quality is meeting the industry standard.

Our services include:

- Support during commissioning procedures
- Check-up of remedy of defects
- Deadline management (monitoring of all deadlines from legal and/or technical requirements and from maintenance and service contracts)
- Monitoring of warranties and guarantees
- Commissioning, organisation and evaluation of technical assessment reports
- Commissioning, organisation and approval of repairs of large components

Environmental compliance

Especially in the first years of operation, wind farms have to comply with extensive environmental requirements from the planning permit regarding nature conservation and emission control. Our specialists organise and control monitoring campaigns on species protection as well as noise measurements, and ecological compensation measures. We ensure compliance with all relevant conditions from the planning permit.

Our services include:

- Compliance with environmental conservation requirements
- Monitoring campaigns for species protection
- Coordination of noise measurement campaigns

Condition and performance analysis

When required, gearbox endoscopies and in some cases additional systems such as Condition Monitoring Systems provide a multitude of data which can be used to optimise operations and to increase the life span of components. Our highly skilled engineers evaluate these data and the visualised performance curves of the turbine on a regular basis. We analyse options for optimisation and retrofitting offered by manufacturers, and we recommend measures to increase yields.

Our services include:

- Analysis of CMS data and performance curves
- Evaluation and recommendation of optimisation and retrofitting
- Evaluation of gearbox endoscopies
Dagmar Adolph is an expert for environmental compliance. She is involved during the planning and construction of our wind farms, but more importantly, she makes sure all environmental requirements are met during operation.
Always on the spot

Inspections, maintenance, electrical checks, or spare parts provision: ABO Wind offers all-inclusive packages or tailored service solutions for your wind farm. Our specially trained service teams are spread out all over Europe. Thanks to our service bases in different regions of Germany and a network of competent partner companies, we ensure a quick replacement or timely repair of defective parts. Our service teams are constantly in touch with the central storage and logistics management to ensure an optimal availability and high yields.

Electrical tests

ABO Wind has specialised in electrical tests on turbines from an early stage. By recognising problems early, we fix electrical faults before they can cause a fire.

Due to the technical complexity of the turbines, we develop an individual concept for each turbine and guarantee an extensive and safe testing procedure: We test the turbine from the basement to the nacelle on several hundred measurement points.

Our highly trained rope access technicians can even measure the lightning protection system on the rotor blades. We also maintain inverters from several manufacturers as well as transformers and transfer stations.

Our services include:

- Periodic inspection and testing of electrical installations
- Lightning protection measurements
- Maintenance of converter
- Maintenance of the transformer and transfer station
Marek Carbon was one of the first to develop a standard for periodic inspections and testing of electrical installations of wind turbines. ABO Wind is now among the leading providers of these electrical checks.
ABO Wind provides all services that are necessary for the optimal operations of any wind farm: We manage important safety tests, electrical checks, and reviews of the service lift, but we also handle necessary remedial measures on the spot.

Our experienced technicians are experts for troubleshooting: It is our aim to always fix faults quickly, cost-effectively and above all sustainably. This also applies to the elimination of defects and the replacement of components.

We offer bespoke maintenance and repair contracts for the entire 1.5 MW series by Senvion, Nordex and Fuhrlander, ranging from basic maintenance to availability guarantees or the replacement of major components.

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### Maintenance

- Semiannual and annual maintenance of the wind turbine
- 5-year maintenance
- Converter maintenance
- Lubrication/greasing works
- Winch and Blockstop maintenance
- Maintenance of on-board crane and chain hoists
- Oil change and taking of oil samples
- Maintenance of transformer and transmission station
- Condition-based blade inspection including lightning protection testing
- Gearbox endoscopies and transformer endoscopies

### Safety checks

- Periodic inspections and testing of electrical installations of wind turbines, transformers and transmission stations
- Renew certification of personal protective equipment
- Renew certification of climbing protection system
- Cooperation with licensed inspection organisations
- Renew certification of abseiling equipment
- Renew certification of first aid kits, fire extinguishers
- Condition-based blade testing including lightning protection
- Renew certification of fire fighting systems
- Lightning protection measurements

### Fault clearance

- Repairs of wind turbines
- Fault clearance of subsystems (bats, CMS etc.)
- Remedial measures from reports and inspections
- Replacement of main components
- Repairs of instruments such as climbing protection system and on-board crane

### Optimisations

- Retrofits
- Oil additives
- Drive train alignment
- Retrofitting of protective equipment
- Upgrading of communications equipment
- Retrofitting of subsystems (fire alarm system etc.)
Marc Schmidt has a head for heights and regularly climbs on rotor blades to check their condition.
A closer look at your wind farm

Our experts for technical assessment are particularly savvy and look back on years of experience in the wind energy sector. Our subsidiary for technical assessment is officially recognised by the German Wind Energy Association BWE and is a member of its technical expert advisory board.

We examine all the large components of a wind turbine, from foundations and towers to gearboxes and rotor blades, and we are experts for environmental compliance. Our independent assessments are accepted by banks, government agencies and insurance companies.

Concrete

The foundation and the tower form the backbone of a wind turbine. Our experts examine the concrete tower, investigate damage and its causes, and test the concrete for stability. They give comprehensive advice on necessary measures. We also keep an eye on the wind farm’s infrastructures and crane pads.

Our services include:

- Assessment of components
- Damage assessment
- Recommendations for renovations
- Coordination and supervision of the renovations including bidding and billing

Gearbox

Gearbox damages are the main cause for prolonged downtime in the life of a wind turbine. We offer bespoke condition-based technical assessments in order to plan ahead and to optimise any necessary repairs. This minimises additional damage or downtime and reduces repair costs and yield loss.

We offer specific damage assessment of individual components or a full scope video endoscopy of the gearbox. We determine the gravity of the situation and make expert recommendations on how to proceed. We always have the best interest of the owner in mind.

Our services include:

- Continuous condition monitoring of the gearbox
- Full scope endoscopy of all accessible gearbox stages and the oil system
- Current condition assessment of the gearbox for example before a contract extension or at the end of warranty
- Reduced scope endoscopy focusing on typical damages for each particular gearbox type
- Evaluation of the endoscopy and recommendations for action
Florian Caprano and his team of savvy experts inspect and evaluate gearboxes, towers, foundations and rotor blades of wind turbines.
**Rotor blade**

The rotor blade is crucial for high yields: Exposed to wind and weather, it must function reliably over the course of 20 years. Only when the rotor blade is in perfect condition will the turbine deliver the desired yield.

Repairs that are not completed at the optimal time increase the cost of repairs and the yield loss many times over. Our experts thoroughly and competently inspect and evaluate the condition of the rotor blades in order to be able to plan timely repairs.

**Our services include:**

- Condition-based and recurring inspections of rotor blades
- All tests using rope access technology complying with any relevant standards, guidelines and insurance requirements
- Lightning protection tests from the rotor blades to the discharge onto the ground

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**Environment**

Bats, birds and other protected species often result in certain conditions of planning permits that have a significant impact on yields. Additional restrictions regarding noise, shadow flicker and ice-throw require competent expertise during the entire operational life of a wind turbine.

Our team of environmental experts benefit from their long-term practical experience in the field of nature and species protection and other environmental concerns. They implement solution-oriented and cost-effective measures to ensure environmental compliance.

We create innovative management concepts to minimise yield loss. Since 2010, we have carried out more than 100 bat monitoring campaigns. In addition, we develop sound measurement campaigns for complex sites and supervise them. Our staff evaluate monitoring and measuring reports and negotiate with authorities in the best interest of our customers in order to optimise the wind farm commercially and technically. In addition to our customers, our professional colleagues from other departments also greatly appreciate the expertise of our environmental experts.

**Our services include:**

- Implementation and analysis of monitoring and measurement reports
- Performance analysis and bespoke recommendations
- Concepts for yield optimisation and compliance with species protection requirements
- Negotiations with authorities in the interests of our customers
- Optimisation of the subsystems
- Ecological supervision of construction
New solutions for wind farms

We get creative whenever a new problem occurs. Experimenting, exploring options and inventing new solutions has always been part of our company’s philosophy. We tackle challenges in cross-functional teams: For example, an operational management technician, a business professional and an IT expert developed an intelligent access system for wind turbines. Together with an electrical engineer and a technician, our environmental experts came up with a solution to retrieve bat monitoring data from a distance. At our ABO Wind test stand, we developed a fix to keep turbines online when the service provider disconnects the ISDN line.

We offer the following hardware solutions:

- IP-Retrofit – Link with the future
- ABO Lock – Intelligent access control
- ABO Bat Link – Data transfer for bat monitoring

The Personal Protective Equipment (PPE) in wind turbines often has to be replaced even though it is still in perfect condition: A lot of times it is unclear whether it has been used and therefore if it is still safe or not. We have an easy solution: Our PPE barrel remains sealed and untouched until it is actually used.
IP-Retrofit

Link with the future

When a service provider turns off analog and ISDN lines and switches to digital broadband, some wind turbines face a serious problem: They depend on an analog signal. ABO Wind has developed a solution that protects those wind farms from losses: IP-Retrofit.

We retrofit Mita-controlled turbines so that they can be reached and operated with a digital broadband connection. IP-Retrofit can process all kinds of broadband connections, from ADSL to satellite.

Benefits of IP-Retrofit:

- High data security and variability with up to 30 independently active VPN connections for operators, service companies etc.
- Applicable to all broadband services (cable, mobile, satellite etc.)
- Several options for handling alarms (Rotorsoft, Mita SCADA Gateway etc.)
- Router certified with the official seal „IT Security made in Germany“
- Redundancy with two independent broadband connections
- Can be installed by the owner

Requirements:

- Service contract with the router manufacturer
- Broadband connection (cable, wireless, satellite)

Select additional options as needed:

Option „On-site installation“
- Professional installation on site
- Function test of existing uninterruptible power supply (UPS) of the master wind turbine
- Visual inspection of communications equipment
- Photo documentation

Option „Mobile“
- Added mobile option, when no wired broadband connection is available, or as a redundant system
- Analysis of the cellular quality at the site of the master wind turbine and recommendation to the customer
- Only in conjunction with on-site installation

Option „Satellite“
- Added satellite broadband option if neither wired nor wireless broadband connection is available
- Also possible as a redundant system for cable and mobile version
- Only in conjunction with on-site installation

Option „UPS Check“
- Function test of the existing UPS to the master wind turbine to the entire wind farm
- Onsite replacement of defective UPS batteries
- Only in conjunction with on-site installation

Option „FO retrofitting“
- Fiber optic cable (FO) from the top box to the bottom box
Our staff permanently work on new technical products to improve wind farms. Pictured here is a comprehensive communications system for wind farms developed by our electrical engineers and our technical management team.
Intelligent access control

There are more than 26,000 wind turbines in Germany alone. Thousands of technicians have keys and access to a large number of these wind turbines.

One key gives unlimited access from the switch gear to the service lift, regardless of training and certification.

That creates problems:
- Keys get lost
- Administrative burden
- Keys in limited numbers increase service time
- HSE responsibility is not managed
- No mechanism for access control
- Lack of evidence in the event of damage, theft or accident

We have the solution: ABO Lock

Together with deister electronic, the leading supplier of secure lock systems, we have developed a smart lock system for controlled access to wind turbines without a key.

Our principle:
Customers manage access authorisations centrally and send out access codes as required. The authorised personnel access the turbines with their PIN and TAN code. They access work areas depending on their qualification and authorisation.

This way, owners can better manage their health and safety responsibilities. Customisable access time limitations are also available (for example for a fixed duration or a one-time pass).

Benefits for owners and operators:
- Easy handling
- Manage health and safety responsibilities with protocolled access
- Easy evidence logging
- Efficient workflows due to flexible access
- Works without a network connection
- Also available for transformer stations, biogas plants, etc.
ABO Bat Link

Data transfer for bat monitoring

In Germany, a bat monitoring campaign lasting several years is a very common condition from planning permits. In most cases a recording device, a so-called batcorder, is installed in the nacelle to log bat sounds near the turbine.

These batcorders store data locally, and the data needs to be directly retrieved from the chip card. Logged background noises can fill the chip card quickly, and it has to be exchanged regularly, in some cases even monthly.

Every exchange entails a chargeable service call. ABO Wind is responsible for more than 30 bat monitorings per year involving a considerable organisational burden. In some cases the recording device is installed at the tip of the rotor blade, making each service call even more complex and expensive.

We have come up with a solution to make this procedure much easier and far more cost-effective: ABO Bat Link.

ABO Bat Link enables owners to retrieve bat monitoring data from a distance.

We use the existing communications equipment of the turbine, or we transmit the data directly to a server via mobile communications. And the best thing: There is no need to interfere with the batcorder. ABO bat Link is available for batcorders of the series 2.0 upwards manufactured by Ecoobs, the leading provider of batcorders. Transmission of the data to external servers also decreases the risk of data loss and prevents data gaps for verification management.

Benefits for owners and operators:

• Retrieve data from bat monitorings from a distance
• High data security due to transmission and storage on external servers
• Reduced service time
• Available for Ecoobs batcorders 2.0 and up
Independence from manufacturers

We provide operational management for wind turbines from different manufacturers. After more than 20 years in the wind energy sector we benefit from our excellent business relations to these manufacturers, but we remain independent from them.

International experience

Presently, we provide operational management and services in six European countries. Our control room centrally monitors all of these turbines from Heidesheim near Mainz. Our activities in countries such as Ireland or Finland have given us access to valuable knowledge about operating wind turbines under special conditions, for example in a cold climate or on an island.

Qualified staff

Matthias Bockholt was one of the two founders of ABO Wind and is still on the company’s managing board. He leads the wind farm management including operational management, maintenance and services, technical assessment and products. As managing director, Dörte Nöltling is responsible for commercial management. She has worked for ABO Wind for many years and in the past took care of finances and the French subsidiary, among other things.

Managing director Andreas Fischer joined ABO Wind after having worked at a large operator of renewable energy facilities. His areas of expertise are technical management, maintenance and services, and technical assessments. The staff of about 60 engineers, technicians and business professionals provide operational management and services for a portfolio of around 850 megawatts in six countries across Europe.

There for you

If you would like more information on our company, our contracts for operational management or maintenance, our services and other offers, please do not hesitate to contact us. We are happy to prepare a bespoke service package for you.

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Wind Farm Management Facilities