Flexible Wind Service Solutions

At GE, we also understand the need for flexible solutions—that’s why we offer a complete program of wind energy service offerings tailored specifically to your needs.

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Remote Monitoring and Troubleshooting:
- Turbine monitoring for real-time equipment monitoring, maintenance and repair.
- Enhanced service quality for higher availability.

Routine Services:
- On-site technical support for quick response to field issues.
- Workload management improvement.

Preventative Maintenance:
- Predictive maintenance for failures.
- Accurate parts planning.

On-Site Support:
- Flight hours including troubleshooting and technical advisory services.

Parts Package:
- Forecasting, warehouse stocking and replenishment.
- Advanced inspection technologies, flow and removal parts.

Availability Commitment:
- Unplanned maintenance coverage for unplanned maintenance and repair.

Unplanned Maintenance Coverage:
- Unplanned maintenance including emergency inspection and repair options for reducing repair costs and downtime.

Condition Monitoring:
- Advanced vibration equipment and analysis for identifying drive train issues.

Turbine Performance and Life Extension:
- Fault forecasting, advanced inspection technologies and system upgrades.

GE’s Wind Service Packages

Monitoring and Remote Operations (MRO): This package brings GE’s technical expertise to provide a defined scope of planned maintenance, including routine inspections, consumable parts replacement, and labor required in the replacement of wear and tear parts, as well as improved availability and reliability with remote operation services including 24/7 remote monitoring (with remote reset capability).

Extended Parts and Services Agreement (EPASA): Adding coverage for manual resets, initial troubleshooting, competitive parts pricing and inventory management, and an availability guarantee together with performance analysis reports, the EPASA ensures the highest standards of operation for the project while offering customers competitive solutions to unplanned service events.

Full Service Agreement (FSA): Maximize turbine operating performance and life by adding predictive Condition Monitoring services, unplanned maintenance coverage, and advanced services, as well as options for turbine performance and life extension enhancement. Under this comprehensive package, GE provides the customer with worry-free operation and maintenance with the highest level of performance.

A tradition of improving reliability, availability and performance.

GE’s wind turbine fleet is one of the fastest growing and most reliable in the world. With a global installed base of more than 22,000 wind turbines and a diverse portfolio of renewable energy technologies that includes wind, solar and biogas, GE Energy has the worldwide resources and expertise to help customers meet their needs for cleaner, more reliable and efficient energy.

Building on a strong power generation heritage spanning more than a century, our world class services organization operates locally in over 30 countries and has decades of experience in delivering solutions to our customers. Our full suite of wind service solutions has been built on our continued commitment to maximizing customer value by increasing turbine reliability and availability, reducing down turbine time and improving lifetime performance of wind turbine assets world-wide.

Next-generation of Service Solutions

GE recognizes the value of the continual pursuit of product improvement. Advanced field services represent the future of our services offering portfolio, taking operations and maintenance to a new level. Leveraging GE’s wealth of knowledge and experience, GE continues to bring innovative solutions for condition monitoring, diagnosis, and fault forecasting, advanced inspection and repair technologies, and system upgrades.
Monitoring and Remote Operations Package
GE’s MRO package offers you scheduled maintenance and insight into your asset’s operations so that you can best operate your farm.

24/7 Remote Monitoring and Troubleshooting
GE’s remote monitoring and diagnostics capabilities increase equipment availability and improve performance while at the same time reducing down turbine time and operational and maintenance costs. Our customer support and remote monitoring centers offer capabilities developed using our in-depth product knowledge, service engineering expertise and years of successful fleet operation, helping us to respond quickly and accurately to the needs of our customers.

6- and 12-month Routine Services
Beyond monitoring the performance of your turbines, GE provides field operations support to help you to meet yearly maintenance requirements. GE’s annual and semi-annual routine service programs have been developed in accordance to the GE O&M manual and utilize GE’s extensive product knowledge and engineering expertise in order to help you to maintain the lifetime performance of your wind turbine assets.

Preventative Maintenance:
The continued upkeep of assets is integral to keeping your wind turbine operating at peak performance. GE’s preventative maintenance program covers the following areas:
- Break-in maintenance,
- Replacement parts required by normal wear and tear,
- Regular maintenance tasks with periodicities over one year, including oil changes and flow parts replacement.
In conjunction with the routine services, preventive maintenance supplies the complete maintenance plan for the life of the turbine.

Remote Operations Center
GE’s customer support and remote operations centers in Schenectady, New York, Salzbergen, Germany and Noblejas, Spain provide continuous monitoring and diagnostics services 24 hours a day, 365 days a year.
An on-site SCADA system connected to each turbine generator’s control system links to the customer support center, constantly tracking key operating parameters and relaying the information to specialists.
The SCADA system uses automated algorithms to detect abnormal conditions and if one should occur, GE specialists are automatically notified, provided with information regarding the event, and can troubleshoot or reset turbines from all remote locations.
Once event information is analyzed, a recommendation can be provided or the event can be escalated for engineering analysis. Additionally, GE specialists are in constant touch with the customer site and the supporting GE service organizations. GE relies on its team of highly skilled specialists to deliver this fully remote service on a 24/7 basis.
Extended Parts and Services Agreement

Building from a foundation of the MRO package, the GE’s EPSA offers the next level of service for customers looking troubleshooting and repair support.

### Parts Plan

Availability of parts is critical to wind power plant operations. GE’s Wind Parts Center of Excellence provides a full range of offerings to support your preferred level of service: from routine maintenance kits, wear and tear and flow parts, to capital parts such as gearboxes and blades.

GE’s world-class wind parts operations center, 24/7 parts call center, and regional inventory support are well aligned to support the continued operation of your turbine, providing essential parts when and where you need them. Here are some examples of how the Wind Parts COE can best support your needs:

- **Forecasting and spare parts**
  Utilizing fleet-wide parts consumption data configuration and management knowledge, our forecasting team is well equipped to provide customers with sophisticated parts forecasting capability. By partnering with our customers to anticipate future needs, GE is able to work with site operators to recommend onsite spare parts inventories and customized parts programs for both newly installed sites and off-warranty turbines.

- **Configuration management**
  Through the Wind Parts Center of Excellence, GE has developed tailored offerings that can provide ongoing inventory-level support and parts lead-time guarantees, in addition to parts discount programs. GE’s Wind Parts and Refurbishment program includes a membership to the capital parts pool, with a priority access to strategic capital parts.

### Technical On-Site Support

Should your wind farm require additional, hands-on, onsite operations support from one of GE’s highly-trained technicians. GE’s technicians are equipped to perform inspections—including fault inspections and technical advisory services and manual resets—in a timely and efficient manner.

Gathering the data from GE’s remote monitoring diagnostics and working together with GE’s engineering organization, our trained technicians can also help to identify technical upgrades or potential turbine outages. If an issue is detected, you can rely on our top-of-the-line repair and replacement capabilities and our highly skilled services team to fix the issue immediately.

### Availability Commitment

GE is confident that our industry-leading wind turbine technology combined with our state-of-the-art service support will maximize the performance of your wind farm. That’s why we offer our availability commitment, covering planned and unplanned events, to customers who elect the full suite of GE’s wind service offerings.
Full Service Agreement
Through the FSA, GE combines all levels of planned and unplanned maintenance support with lifecycle enhancements to help you make the most out of your investment while minimizing risks.

Unplanned Maintenance Coverage
GE combines unplanned maintenance parts and labor coverage with its advanced inspection and uptower repair capability to minimize the risk of costly repairs should unforeseen issues occur. Our suite of uptower repairs developed specifically for GE’s turbines can further reduce cost exposure by eliminating the need for cranes and additional labor.

Condition Monitoring
Utilizing GE’s own Bently wind ADAPT vibration condition monitoring technology, our specially trained Remote Diagnostic and Monitoring team identifies impending drivetrain issues before they become catastrophic. Building on their extensive fleet experience, the team is enabled with the information they need to provide a recommended course of action. Predicting failures before they happen can avoid costly failures by reduced downtime, labor and material costs, and crane and logistics expenses.

Turbine Performance and Life Extension
At GE, we are constantly evolving our product development in order to offer you best-in-class technology. Lessons learned from wind turbine designs and fleet wide data are incorporated into new offerings, which are then available as upgrades to our existing fleet. Examples of how our expertise is being employed today include advancements in fault forecasting, advanced inspection technologies and system upgrades.

Wind Turbine Upgrades
GE’s commitment to continuous technology improvements ensures that our customers benefit from our continuously evolving turbine design. Developed to improve reliability and availability, increase performance, and improve grid integration for better wind power plant management, upgrades can be a cost-effective way to maximize existing assets.

GE offers value packages to upgrade existing turbines to meet state-of-the-art turbine configuration and performance, as well as emerging grid codes. Upgrades are available as retrofits as well as on new units, and are performed by our highly trained wind services support team.

GE has dozens of turbine upgrades available today, and we continue to add to our portfolio. Please contact your GE Wind Services sales representative for the latest upgrades available for your turbines.

Examples of GE’s Wind Turbine Upgrades Include:

Reliability
• GE Converter Upgrade
• Oil Bypass Filtration System
• Composite Yaw Brake Pads
Availability
• External Main Switch Activated Reset Button
• TurbineCONTROL Software
Grid Integration
• WindRIDE-THRU (LVRT and ZVRT)
• WindFREE Reactive Power
• WindCONTROL
Performance
• PowerUp
Maintenance Optimization
• Climb Assist
• SCADA Upgrade
World Class Services Training

At GE, we provide customers and GE technicians with the high quality training they need to successfully operate GE’s wind equipment and maximize their potential. GE’s world-class wind services training centers, located in Niskayuna, New York and Salzbergen, Germany offer participants the ability to build life-long skills through hands-on learning.

Our courses incorporate numerous exercises that allow participants to integrate classroom elements into real-world scenarios. Knowing each customer has diverse needs, we provide a flexible curriculum that meets varying requirements—from self-paced multimedia training and published courses to customized training—we offer something for everyone.
Powering the world...responsibly.