



HITACHI ABB POWER GRIDS

Condition-based malfunction forecasts for wind turbines



- **CASE STUDY**
- Deployment of a prognostic asset management solution at a wind power generation company

The customer

One of Europe's largest producers of electricity and heat, the company is a market leader in both onshore and offshore wind power generation, with around 50 wind farms in operation across five countries. Wind power is a growing pillar of the company's business strategy, and the leadership team recognised the importance of optimising operation and asset management as key to ensuring any wind project's profitability.

The challenges

With an increasing number of wind farms, the company needed a better asset management strategy to reduce costs along the entire value chain. One of the major factors driving asset management cost was unscheduled downtime. Offshore wind farms added additional logistical challenges – marine vessels or helicopters had to be arranged to transport parts and work crews that might not be readily available or might be heavily backlogged. If wind turbine component failures led to unscheduled downtime, wind farms would lose an important share of their capacity for an uncertain period of time, ultimately impacting revenue from electricity sales.

Wind farm operators recognized the value of proactively anticipating breakdowns instead of running wind turbines to failure, and considerable efforts were being made to control and forecast such failures. However, robust data and prognostic analytics were not always available, so expert technicians had to rely on personal experience or “gut feel” to make asset-related decisions.

To meet their needs, the company selected Lumada Asset Performance Management (APM).

The solution

The company approached Hitachi Power Grids because Lumada APM's prognostic functions had been successfully deployed previously at another wind farm. This experience proved to be extremely valuable, because the machine learning solution had already been configured to recognize and anticipate wind turbine malfunctions. The Lumada APM team was able to import the company's historical data into the solution and verify that the asset models worked with this new fleet of wind turbines, with minimal adjustments.

Working with the company's in-house analytics team, the on-premises solution was up and running within four weeks. The management team verified that the solution was able to achieve highly accurate prognostic forecasts based only on the available SCADA data. There was still potential to further improve the forecasts by including live operating data collected from the vibration monitoring system.



The results

Lumada APM’s prognostic reports provide essential information for scheduling asset management activities. From the user-friendly interface, operators are able to anticipate the probabilities of malfunctions and downtime at the overall fleet level, drilling down to the individual turbine units, and finally to the component level such as the main bearing and gearbox. The solution serves as an early warning system, alerting operators to any deviation in the condition of the wind turbines, allowing time for corrective actions to be taken before anomalies can lead to expensive failure and downtime.

The Lumada APM solution provided three major benefits:

- **Demonstrated potential reduction** of maintenance and downtime costs by anticipating wind turbine gearbox and main bearing defects more than six weeks prior to the events.
- **Quantified and differentiated** the value of SCADA, vibration and lubricant parameters for effective wind turbine monitoring, diagnostic and prognostic purposes.
- **Defined a robust and transparent** asset management process that considers downtime risk profiles for wind farms with a multi-week prognostic horizon.



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