



Achieving Reliability: Enhancing Operations in Wind Power Generation

Client Background

Our client holds a significant position in the renewable energy sector, operating multiple wind power plants across various regions. We conducted an audit of multiple wind power plants, evaluating key operational aspects such as:

- The Operation & Maintenance (O&M) governance framework
- Quality, Health, Safety, and Environment (QHSE) issues
- Inventory management practices for spare parts and equipment
- Preventive maintenance schedules, frequency of inspections, and the effectiveness of maintenance activities
- Efficiency and effectiveness of power generation, focusing on metrics such as capacity factors, energy yield, and operational availability

Audit Objectives

Protiviti deployed a team of technical and commercial experts to conduct O&M audits, focusing on two key areas:

- The primary focus was on assessing the plants' technical performance, verifying compliance with engineering standards, and confirming adherence to design specifications.
- Additionally, a comprehensive review of the project's financial and contractual aspects was conducted to ensure alignment with budgetary objectives and contract terms.

Outcomes

- We found discrepancies in preventive maintenance works, with some tasks done without appropriate notice to the Original Equipment Manufacturer (OEM) by the OEM team on site. To remedy this, we implemented a sound system of OEM payment tracking and reporting on the basis of actual work done.
- This strategy greatly minimized disputes and warranty issues. The preventive maintenance plan was also revised, leading to a significant reduction in breakdown hours during peak wind periods.
- The analysis found that recurring failures of the gearbox and yaw systems were largely attributed to the OEM's failure to maintain the availability of

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essential spare parts. This led to penalties for the OEM, encouraging improvements in spare part availability, minimizing breakdown occurrences, and improving the mean time to repair.

- We discovered variations in power generation, attributed to blade pitch angle problems. Benchmarking recommended power curve verification tests. We therefore implemented a strong maintenance and monitoring regime to rapidly

identify blade calibration issues and performed the required power curve verification tests..

- Identified penalties associated with the Deviation Settlement Mechanism due to generation falling short of scheduled targets, aggravated by excessive reactive power draw. Implemented effective measures that resulted in a 19% reduction in these penalties, while also bringing reactive power to draw under control.

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