# Elevating the Performance of Wind Power Plant in China

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**Project Introduction:**

As an alternative to fossil fuels, wind power is a plentiful, renewable, widely distributed, and clean energy as well as producing no greenhouse gas emissions during operation. Due to these characteristics, wind energy has, in recent years, become an important player in the world?s energy markets.

A large wind farm may consist of several hundred individual wind turbines which are connected to the electric power transmission network. Most wind farms are located in sparsely populated areas with harsh environments and only a few maintenance staff. Because of their location, the problem of how to ensure the wind power plant can be operated safely and reliably is an essential and very important issue.

**System Requirements:**

Our customer is one of five major power generation companies in China and has more than hundred wind farms around the country. They plan to adopt the Wind Power Management System (WPMS) with robust hardware devices to monitor their multiple power plants in real time. Therefore, the system not only needs to be able to be controlled via remote control to supervise the power generating capacity of each power plant but also to provide the data upload program to generate regular reports which can help administrators analyze the availability of the wind turbine or electricity generation.

Because the wind turbines are strategically placed in isolated windy locations, the hardware needs to support a wide operating temperature range and provide protection against interference. In order to enhance long-distance transmission and

data reliability, the network devices also need to support a fiber optic redundant ring backbone providing faster data transfer.

**Project Implementation**

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| WebAccess | Browser-based HMI/SCADA Software |
| WPMS | Wind Power Management System (Browser /Server Software) |
| IPC-620 | 20-slot Multi-system Rackmount IPC Chassis |
| TPC-1251H | 12.1" SVGA TFT LCD Intel® Atom? Processor Touch Panel Computer |
| EKI-7554SI | 4+2 SC Type Fiber Optic Managed Industrial Ethernet Switch with Wide Temperature |
| EKI-4654R | 24+2 SFP Port Managed Redundant Industrial Ethernet Switch |

System Diagram:

**System Description:**

Advantech?s WPMS is based on an advanced and reliable platform - WebAccess integrated the customer?s local wind power systems, including a wind turbine control system, high voltage station supervision system and video surveillance systems via a unified access interface as well as collecting real-time data to the control center in headquarters.

WebAccess is a web browser-based application for HMI and SCADA devices and has been written using a multi-threaded programming design. WPMS not only completes the data collection, storage and processing, configuration, and condition monitoring to meet the customer?s cluster management needs but also simultaneously communicates with multiple power station systems to ensure the timeliness, accuracy and completeness of the data. Its comprehensive report generation module can produce detailed and tailored reports to assist users in optimizing the productivity of power plants and the remote control feature enables customer to access and monitor the wind power plant from anywhere.

As for the hardware devices, each wind turbine tower is equipped with an EKI-7554SI fiber optic managed industrial Ethernet switch with wide temperature range and linked to the redundant ring via a single-mode optical fiber. The EKI-7554SI uses the proprietary X-Ring redundant network protocol which provides users with an easy way of establishing a redundant Ethernet network with an ultra high-speed recovery time of less than 10ms. Each of the wind turbine towers will

connect to the EKI-4654R, a 24-port managed redundant industrial Ethernet switch at a control center and transmit the data to an IPC-620 local server. The EKI-4654R has a long range voltage redundancy power input which provides a convenient and uninterrupted power supply to guarantee network safety.

All of these Advantech devices supports a wide operating temperature range are built with rugged designs to meet our customer?s needs. The Advantech X-Ring networking topology can construct a steady industrial network. Advantech also provides a durable and reliable platform - TPC-1251H, a 12.1" SVGA TFT LCD Touch Panel Computer, for the on-site mobile operation to transmit the wind turbines? data to the local wind power system via Ethernet.

**Conclusion:**

Because of China?s large land mass and long coastline, the wind power sector is being rapidly developed. China?s power companies need a well-appointed solution to monitor their multiple wind power plants. With Advantech?s total solution the WPMS is qualified to exceed the expectations of our customer in need of the distributed management to remote control their system in real time; meanwhile, our hardware devices with exclusive networking technology provided an effective and efficient network infrastructure to connect the hundred wind turbines not only improve the communication reliability but elevate the overall performance.