

The best technology for a renewables project

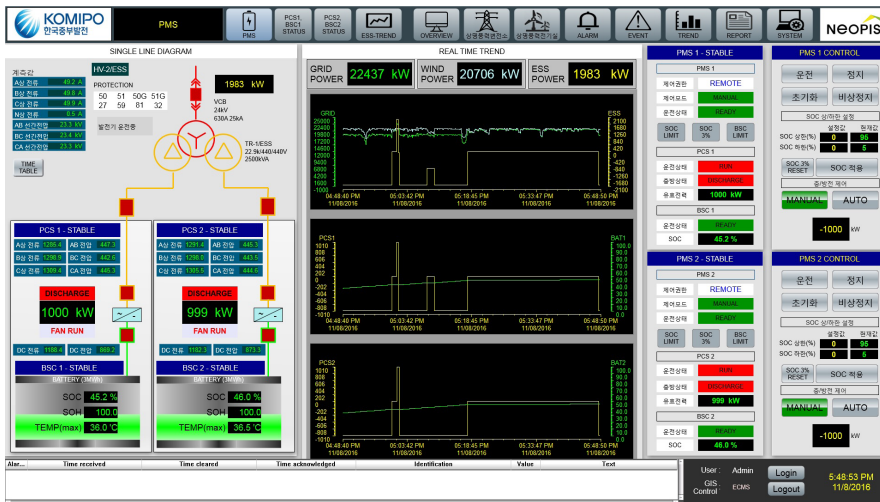
zenon controls the energy storage system at Jeju Sangmyeong wind power plant

The Korean island of Jeju is no stranger to leading-edge energy technology, after being selected, in 2009, as the location of a Smart Grid test-bed that would underpin the Korean Government's ambitious Smart Grid infrastructure plans. When Korea Midland Power Co. Ltd (KOMIPO) created a new wind power plant and energy storage facility on the island, it looked to COPA-DATA partner NEOPIS for an equally revolutionary solution based on the energy automation software zenon.



KOMIPO is a subsidiary of the Korea Electric Power Corp. and is one of five public power suppliers in Korea. It operates thermal and renewable energy power plants across Korea and, in 2015, began work on a new 21MW wind power plant consisting of seven wind turbines on the Korean island of Jeju.

Project architects for the new Jeju Sangmyeong wind farm were aware that, as with any renewables project, fluctuations in supply – that don't necessarily match fluctuations in demand – can cause problems in the planning and delivery of a reliable electricity supply.



The Power Management System overview screen displays real-time status and trend information of different devices, e.g. charging and discharging of the batteries.

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HYEON HUI CHOE,
MANAGER AT NEOPIS

In order to tackle this problem head-on, the new wind power plant was designed to include an Energy Storage System (ESS) equipped with a high-performance lithium-ion cell technology Battery Management System (BMS) developed by LG Chem specifically to support the stabilization of power supply in renewables operations.

The scope of the project, therefore, included the need for a secure and reliable Electrical Equipment Control and Monitoring System (ECMS) and a Power Management System (PMS) which would be able to visualize and control the electrical equipment and also connect to the Energy Storage System. It was vital that the new software system would be flexible enough to fulfil the requirements of all included subsystems – and deliver highly reliable redundancy between the ECMS & PMS Primary Server and the ECMS & PMS Secondary Server to underwrite the security of supply.

KOMIPO undertook a rigorous tender process to identify a solution that would meet the utilities’ needs. Jun Seon Lee, the Project Manager at KOMIPO with responsibility for the Jeju Sangmyeong wind power plant project, explains: “We were convinced by the bid submitted by the NEOPIS team because of their expertise in our sector. NEOPIS is the leader in the field of renewables control and management here in Korea. We felt

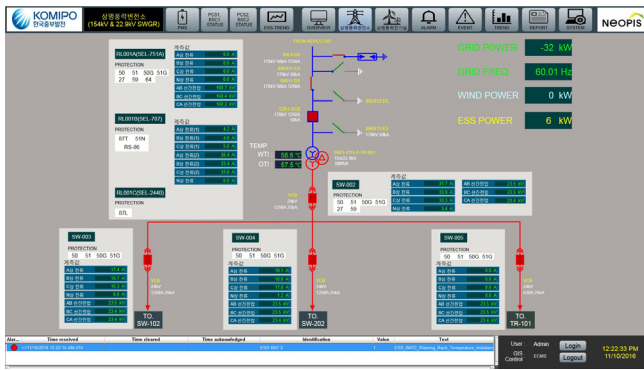
confident the NEOPIS team would be able to deliver a high-quality solution and implementation.”

PARTNERING UP FOR UNIQUE RENEWABLE PROJECTS

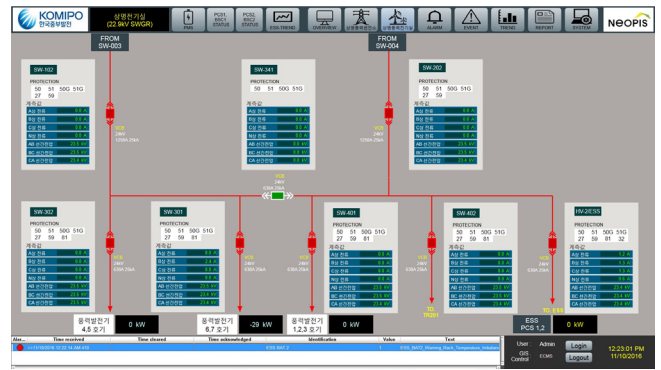
As well as offering system integration for substations, traditional power plants and renewable energy plants, NEOPIS produces its own range of hardware designed for use in the energy sector, including power protection panels, protection relays, etc., and has been a member of the COPA-DATA Partner Community since 2014.

Hyeon Hui Choe, Manager at NEOPIS, explains why his team selected COPA-DATA’s zenon automation software for use in the Jeju Sangmyeong wind power plant: “We know zenon has a proven track record in the energy industry and supports crucial communication protocols such as IEC 61850, IEC 60870 and IEC 61400-25. zenon is also a highly flexible solution that would enable us to meet the stringent requirements for both elements of this control and management solution and deliver the redundancy needed.”

The seven wind turbines are controlled using the ECMS based on zenon and using the IEC 61850 protocol; a typical substation automation application that provides secure and effective local control.



This single line diagram gives a comprehensive overview of the high (154kV) and low (22.9kV) voltage grid network and switchgears, including detailed transformer information.



Single line diagrams such as this low voltage switchgear screen display vital information in a clear and visual way.

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JUN SEON LEE, PROJECT MANAGER
AT KOREA MIDLAND POWER CO. LTD (KOMIPO)

COST-EFFECTIVE ENERGY STORAGE CONTROL

The Power Management System (PMS), the software that controls the ESS, was also implemented by NEOPIS using zenon. zenon displays and provides control over how much energy is stored in the batteries and how much is transferred directly to the grid. Rules can be set in the system to define when energy is stored.

This includes, for example, relative cost; during the night energy is cheaper because of limited demand and so, to optimize profitability, energy is sold back when it can achieve the best price. zenon offers the flexibility to automate these processes in the PMS or the operator can adapt them to meet current circumstances manually.

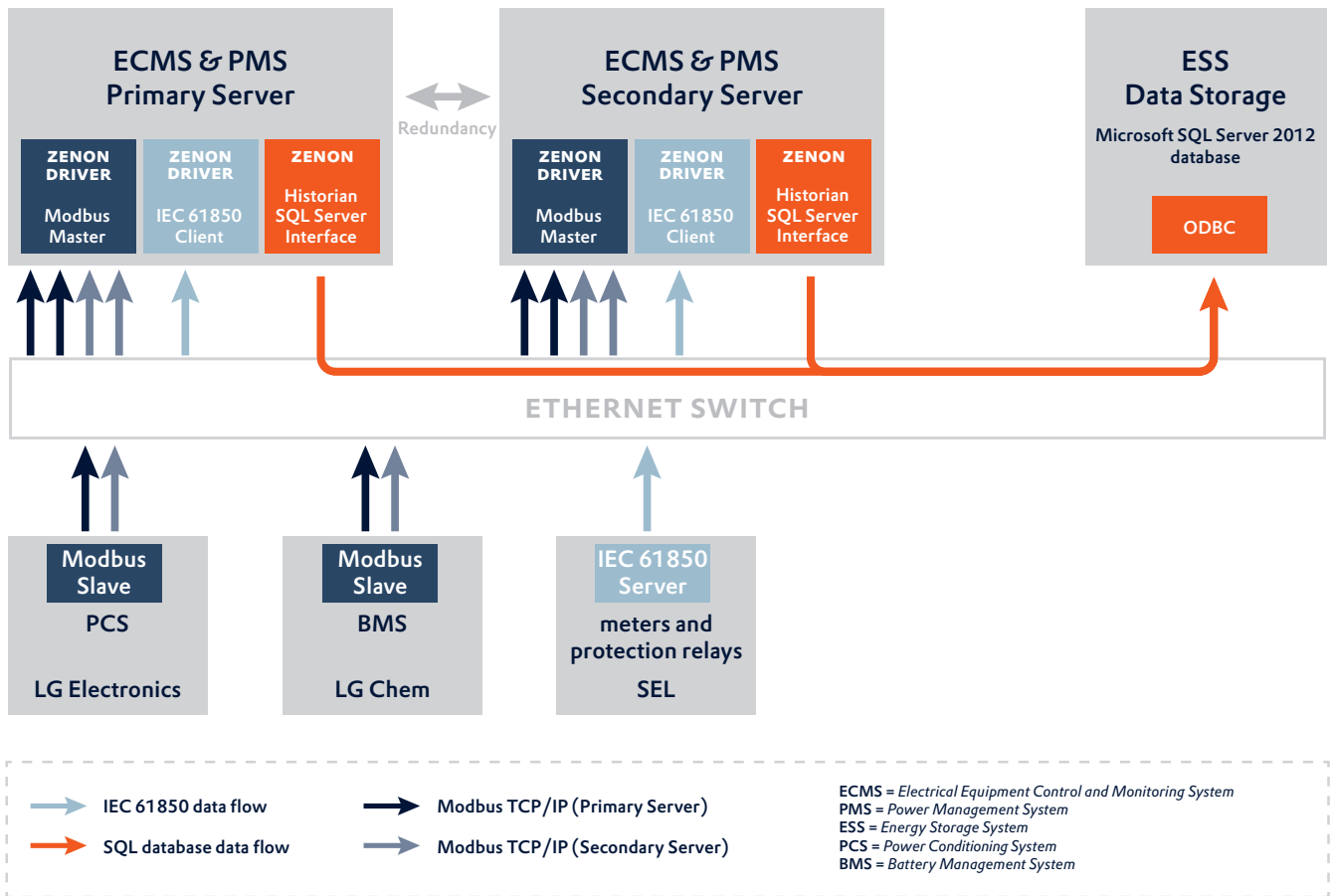
Project Manager Jun Seon Lee states: “zenon has proven to be a highly intuitive system for the control and operation of the plant. It has enabled us to automate the processes around

energy storage in such a way that we can optimize revenue generation. We are really pleased with the performance and operation of the system. In zenon, we have a single solution for control and monitoring of both the wind farm and the energy storage operations with built-in redundancy that would allow operation even in the event of a system blackout occurring.”

AN INTEGRATED SOLUTION

Another key advantage of zenon, which convinced NEOPIS it was the best solution for the job, is its integrated zenon Logic which serves as a Soft PLC.

The IEC 61131-3 programming interface zenon Logic has been an integral component of zenon for many years and provides automation engineers with considerable benefits. zenon and zenon Logic access a shared database, and shared variables and data types can be created, amended or deleted by either system. NEOPIS has programmed unique functions



Network diagram of ECMS & PMS, including system components, data flow, and redundancy.

within zenon Logic to address the specific requirements of this renewables project – which have much potential for energy suppliers such as KOMIPO.

Hyeon Hui Choe at NEOPIS explains: “zenon Logic provides extremely reliable control while being a far more cost-effective solution than any other viable alternative. What’s most exciting for us is that zenon can fulfil many roles on one physical device: soft PLC, HMI, database server and data analysis – all backed up by flexible and rapidly configurable out-of-the-box redundancy options. This makes zenon now our first choice for projects of this kind.”

HIGHLIGHTS:

- ▶ IEC 61850-compliant Electrical Equipment Control and Monitoring System (ECMS)
- ▶ Flexible Power Management System (PMS) for control and monitoring of energy storage
- ▶ Rapidly configurable built-in redundancy
- ▶ Integrated IEC 61131-3-conforming Soft PLC (zenon Logic)
- ▶ Unique combination of Soft PLC, SCADA, HMI, database server and data analysis in a single system