

Data Transmission from Wind Farm to Distribution Center

Background

Customer:

Cavalum

Website:

www.cavalum.com

Region:

Western Europe

Industry:

Electric power generation based on renewable sources

Solutions

SYNC 2101 RTU

Challenge

Cavalum was building a new wind farm that required it to connect to the Distribution System Operator's (DSO) Dispatch Center using the IEC 104 protocol to ensure compatibility with the DSO's SCADA system. The DSO also required automatic upload of fault records from Interconnection Protection Relays (IPR) in COMTRADE format in addition to sending the fault records to the DSO's protection system department via FTP.



Business Need

Cavalum is a private company in Portugal, that produces and develops electrical energy production using renewable resources. Renewable energy sources include hydro, wind, photovoltaic, biomass and thermosolar and natural gas electricity.

The company embarked on a wind farm project, Norte dos Candeeiros, located about 120 km north of Lisbon. The wind farm was targeted to product 28 gigawatt hours of electricity annually. A requirement was for the wind farm to be connected to the DSO Dispatch Center, EDP Distribuição, using the IEC 104 protocol for compatibility with the DSO's SCADA system.

Additional DSO requirements included automatic upload of fault records from Interconnection Protection Relays (IPR) in COMTRADE format, as well as sending the fault records to the DSO's protection system department's IT system via File Transfer Protocol (FTP). Due to space limitations, Cavalum desired both a compact and cost effective solution.

Solution

Cavalum desired a solution that would meet the DSO's requirements as well as their own. To meet their needs, Kalkitech partnered with QEnergia, a Portugal-based reseller of components and systems for industrial automation and buildings, equipment for verifying electrical installations, and power management.

Kalkitech supplied a wall cubicle housing a **SYNC 2101 Micro RTU** and a Cisco 3G router for installation at the Norte dos Candeeiros wind farm. The SYNC 2101 RTU supports the IEC 104 slave profile with a broad spectrum of available Application Service Data Units (ASDU), ensuring full compatibility with the DSO's Dispatch Center SCADA system. Information exchanged included analog measurements (voltage, active and reactive power), digital signals (Interconnection Protection Relay Trip and active settings group, breaker status, auxiliary power failure, etc.) and commands (protection relay settings group exchange). Analog information (measurements) was collected directly from Interconnection Protection Relay (GE F650) via Modbus TCP protocol whereas digital signals and commands relied on hard-wired connections to substation secondary systems. The total number of signals exchanged with the DSO's Dispatch Center was 12 Inputs/Outputs.

The SYNC Micro RTU supports both digital and analog outputs which enabled the hard wired data acquisition. It offers the flexible enough to meet the requirements of different integration scenarios, eliminating the need for separate PLC / acquisition modules.

Another major requirement from the DSO was automatic retrieval of fault records. This would eliminate the need for the maintenance crew to periodically visit the wind farm to manually retrieve fault records from Interconnection Protection Relays. The automated collection of fault records from Interconnection Protection Relays was achieved using the Modbus TCP protocol with SYNC 2101 RTU converting records to a common format, COMTRADE. Files were named according to IEEE naming conventions. Time synchronization was also part of the solution; the SYNC RTU was synchronized using the IEC 104 protocol and Interconnection Protection Relay was synchronized using Modbus TCP protocol. The SYNC RTU also met the critical requirement for accurate time tags on data and fault files sent to the Dispatch Center to enable post fault analysis.

The SYNC RTU implemented FTP client functionality thus enabling a scheduler based replication of fault record files (temporarily stored on SYNC's flash memory) to a remote folder. Fault record files are now always readily available to the DSO's protection engineers to conduct fault analysis. They no longer have to wait for time consuming manual fault data retrieval. The wind farm is now connected to the distribution center in accordance with the DSO's requirements.

Results

The solution helped Cavalum achieve the following:

- Eliminate the need for a maintenance crew to periodically visit the wind farm site to manually retrieve fault records
- DSO's protection engineers have near real-time access to fault record files to conduct fault analysis rather than having to wait for manual fault file retrieval
- Time stamp on fault record files is available for accurate post fault analysis
- Real time remote monitoring to identify location of fault areas, reducing fault detection times, improving service quality and reducing operating costs.

