POWERSYSTEMS™
HIGH VOLTAGE SPECIALISTS
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CASE STUDY 15382

Clocaenog Wind Farm

27 Wind Turbines with a connection capacity of 96MW capable of powering 63,800 Homes

120 MILLION £ | 24 MONTHS | RENEWABLE ENERGY | 24% CONNECTED

innogy

JONES BROS CIVIL ENGINEERING UK

Scope of work & major design considerations:

Clocaenog Forest wind farm is located in Clocaenog Forest, south west of Denbigh and to the east of Brenig reservoir North Wales.

The wind farm consists of twenty seven 3.6 MW Vestas Wind Turbines, each with a tip height of 145 m.

The 27 turbines will be erected within the working forest, managed by Natural Resources. This site was specifically designated by the Welsh Assembly Government as suitable for a large scale development of renewable energy.

Clocaenog Forest wind farm will have an installed capacity of up to 96 megawatts - enough renewable energy for the equivalent domestic needs of up to 63,800 average UK households per year.

The Balance of plant and electrical works are being undertaken by Powersystems UK Ltd on behalf of Jones Bros Civil Engineering and on behalf of the wind farm developer Innogy Renewables. Clocaenog Forest Wind Farm is a potential £120 million renewable energy project and construction could present significant opportunities for the local supply chain.

The wind farm development:

Powersystems have been appointed to design, supply installation, testing and commission a 132kV grid connection consisting;

- 2 x 70MVA 132 kV/33 kV Grid Transformers and associated Circuit Breakers
- Disconnectors / Earth Switches 132 kV busbar network
- Cabling to connect to 27 x 3.6 MW Vestas Wind Turbines, located within the Clocaenog Forest
- Within the Control Building duplicate 33 kV Switchboards with circuits to feed six wind farm arrays
- Bus-coupler arrangement to give running flexibility should one Grid Transformer be out of service
- Plus the necessary Control and Protection Panels for the complete 132 kV / 33 kV systems, incorporating state of the art Point on Wave relays for the two 132 kV Circuit Breakers
- Compound and sub-station earth system installation and testing, including the adjacent SPEN Bryn Bach 132 kV compound earthing
- All necessary building fit-out works comprising Lighting and small power with intruder and fire alarm systems
- Within the Clocaenog Forest itself, the installation of 33 kV Power and Fibre Optic and Earth cabling works to all 27 x 3.6 MW Wind Turbines.
- All wind farm cabling to connect into the Control Building

Project Facts and Figures:

- Number of turbines: 27
- Wind turbine capacity: 3.6 MW
- Totalled Installed capacity: 96 MW
- Connection Voltage: 132 kV
- Size of site: 1,600 ha
- Energy for 63,800 households
- Length of onsite 33 kV cabling: 181.50 km

Wind Farm Project Timings:

Construction of Clocaenog Forest wind farm began in late March 2018 with mobilisation on site which involved preparing the ground for construction activity. Turbine component deliveries commenced in Jan 2019.

132 kV

Powering the Transition to a Sustainable Future

Clocaenog - Wind Farm Project - Renewable Energy

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400kV 132kV 11kV 33kV 275kV 66kV

Specification of equipment:

- UK Grid Solutions Ltd - 2 x 145 kV Dead Tank CB's for POW switching.
- UK Grid Solutions Ltd - 4 x 145 kV Double Break Disconnectors.
- Kelvin Power Structures - Complete set of 132 kV Structures.
- Schneider Electric Ltd - 2 x 33 kV WS Switchboards.
- Schneider Electric Ltd - 2 x 200 kVA Auxiliary Earthing Transformers.
- Batt Cables plc - Wind Farm 33 kV Cables.
- Premier Cables - Fibre Optic Cables.
- Arteche - 3 x 145 kV Combined CT/VT.
- GE Grid Solutions - MiCOM P643 and MiCOM P14N relays for Grid Transformer Protection.
- Schneider Electric - P849 Relays for HV Scada Interface Panel.
- Visimax - SynchroTeq Plus Point on Wave Controllers.
- Cleveland Cables - 70 mm^2 earth cable for Wind Farm and Turbine Base Earthing.
- Centriforce - Tape Tile for Wind Farm Cabling.
- Earthmet - Cadweld+ equipment for Sub-Station / Compound and Wind Farm Earth connections. Also earth tape for compound / building.
- Cable Jointing Solutions - 33 kV Cable joints.
- PE Systems Ltd - 2 x 110 V Battery Charger Systems.
- R & M Electrical Group Ltd - Compound Lighting fittings and columns.
- GPS - LVAC Changeover Panel.

How Powersystems have helped:

- Electrical Design
- Switchgear supply, installation and commissioning
- Transformer supply, installation and commissioning
- 132 KV Busbar System and support structures design and install
- Cables supply and installation
- Cable jointing
- HV testing
- SAP provision
- Panel fabrication
- Generator supply

The results

The work is still work in progress. Powersystems are in the commissioning stage of 132 kV compound. Turbines are still being delivered/erected. Approx. 90% of the wind farm cabling is installed in trenches.

Environmental Benefits

Clocaenog Forest wind farm will generate enough clean/green energy for the equivalent domestic needs of up to 63,800 average UK households . The project will play a significant role towards helping Wales to meet its renewable energy targets.

Economic Benefits

Clocaenog Forest wind farm local community, will receive an investment fund from innogy worth up to £768,000 per annum, throughout the lifetime of the project, once the wind farm is operational.

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