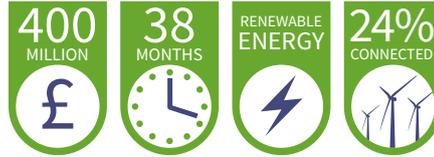




CASE STUDY
13855

Pen y Cymoedd

Onshore Wind Farm Project - Renewable Energy



Scope of work and major design considerations:

In 2015 Natural Resources Wales signed a lease agreement with Vattenfall. The project saw the installation of 76 turbines with a peak power of 228 MW, planned to operate for 25 years. And to generate up to 0.6 TWh/yr, an amount enough to power up to 140,000 homes with an annual consumption of 4266 kWh. During the planning process, Vattenfall agreed to contribute about £1.85m annually to a community fund and to invest £3m in a habitat restoration scheme.

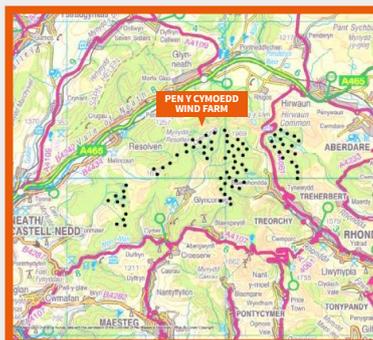
Project facts and figures:

- ▶ Number of turbines: 76
- ▶ Wind turbine capacity: 3 MW
- ▶ Total installed capacity: Up to 228MW
- ▶ Connection to Grid: New substation located on the Hirwaun Industrial Estate (underground cables)
- ▶ Size of site: 4,683ha
- ▶ Energy for 140,000 households
- ▶ Length of onsite access tracks: 80km
- ▶ Length of onsite cabling: 80km
- ▶ Jobs supported: 600+
- ▶ Total Investment in project to first generation: More than £400m
- ▶ Annual homes equivalent production* Approximately 140,000 (enough electricity to meet the annual domestic needs of both RCT and NPT combined)

Wales's largest onshore wind farm:

Pen y Cymoedd wind farm, is Wales's largest onshore wind farm which started operating at full power, 38 months after construction started in the upper Rhondda, Cynon and Afan valleys. The 76 turbine Pen y Cymoedd wind energy project is capable of meeting the electricity needs of more than 13% of households in Wales. It also boosts delivery of Wales's climate change ambitions, displacing in an average year more than 300,000 tonnes of CO2 from fossil fuelled generation.

The generation site consists of 76 Siemens SWP 3.0 direct drive wind turbines. The wind farm, with a total capacity of 228 megawatts (MW) generates at 33kV which feed into the Pen y Cymoedd Sub-Station, which steps up the voltage from 33kV to 132kV. A second sub-station some 9.2km away in Rhigos steps up the voltage from 132 to 400 kV to feed into a 400 kV National Grid substation. The turbines were arranged in 11 Arrays of varying quantity of turbines over four regions of the site, with the final region being completed and handed over operationally on 1st June 2017.



VATTENFALL

What the client wanted:

Vattenfall is a European energy company their goal is clear: they want to make fossil-free living possible within one generation.

How Powersystems helped:

Powersystems involvement started with soil resistivity readings being taken at all of the 76 turbine base locations, long before the construction got underway. From this data, the earthing studies were produced and the installation designs formalised.

- ▶ Powersystems designed and installed the 33kV distribution from Pen y Cymoedd sub-station to the turbine cable terminations
- ▶ This involved some 312km of 33kV single core power cables, which required 2 x fibre optic network cables and earthing cables all laid into trenches alongside access tracks
- ▶ Followed by commissioning, energisation and SAP control up to hand-over of all the 33kV cabling from the Primary Sub-station to 76 turbines
 - ▶ requiring some 312km of power cables
 - ▶ 27 x 33kV Sub-stations in high security GRP enclosures
 - ▶ full fibre optic network to all turbines
 - ▶ 27 sub-stations
 - ▶ 3 Met Masts, earthing (including necessary studies) on the completed site
 - ▶ testing and energisation 900 terminations
 - ▶ 33kV terminations conducted in total
 - ▶ 94 x 3ph in-line joints
 - ▶ 194 x 3ph T connections
 - ▶ 12 x 3ph Pfisterer connections



The results:

- ▶ Pen y Cymoedd Wind Energy Project was officially opened in September 2017
- ▶ The project is the largest onshore wind farm in Wales
- ▶ Of the £400mn investment to build the Pen y Cymoedd wind energy project, 52% went to businesses in Wales, securing work for more than 1,000 workers in Wales over the past three years
- ▶ Pen Y Cymoedd boosts Wales' drive to carbon reduction, it accelerates Vattenfall's shift to be fossil free in a generation and it helps the Welsh economy to grow
- ▶ Vattenfall and their contractors have spent £220mn in the Welsh economy since construction started in 2014, 52% of the total investment they have made in Pen y Cymoedd.



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For more information

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