Heating

Case Study

Ysgol T Llew Jones School
April 2013

Making a World of Difference

PRIMARY SCHOOL FIT FOR THE NEXT CENTURY OPTS FOR GROUND SOURCE HEAT PUMP

When Ceredigion County Council (CCC) set out to create a state-of-the-art primary school it wanted a building fit for the 21st Century and the years beyond.

A new school was needed to replace four smaller schools, struggling with old premises and falling pupil numbers, which were due for closure. The result is the stunning, £5M, Ysgol T Llew Jones Primary School in Brynhoffnant, near Llandysul, in mid-Wales.

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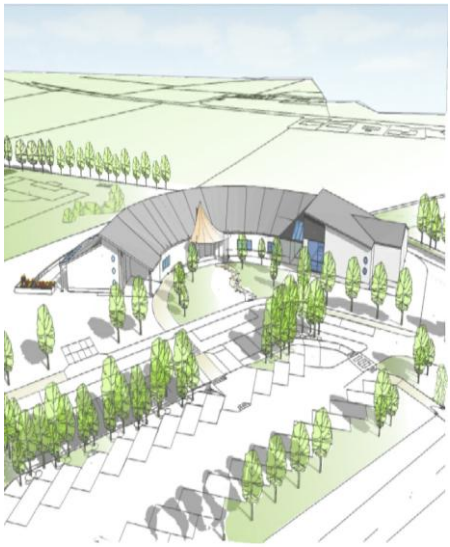

Ceredigion County Council needed a sector-leading, aspirational building, designed to use the latest in renewable energy technologies.

Jointly funded by the Welsh Government and CCC, the project called for a sector-leading, aspirational building, designed to use the latest in renewable energy technologies. In a bid to help minimise the building's impact on its surrounding environment CCC specified the use of a number of renewable technologies, including ground source heat pumps from Mitsubishi Electric.

"Ceredigion County Council is very aware of the need for energy efficient buildings that have minimal impact on their environment, so, for us, it was essential we use low-carbon technologies throughout," explained Steve Fincham, Principle Mechanical Engineer at Ceredigion Council who led the design team. "For the building's heating and hot water requirements we wanted a system that would befit such a magnificent building that was energy-efficient and reliable, too.

"It also had to assist in keeping the school's on-going running costs to a minimum," continued Mr Fincham. "Mitsubishi Electric's Ecodan CHQ Ground Source Heat Pump (GSHP) fitted our criteria and provided the ideal solution to our requirements."

The Council appointed Lorne Stewart a nationwide provider of building engineering services as Mechanical & Electrical Contractor for the project. Lorne Stewart set about creating a sustainable working environment within the new school which included the design for a GSHP.

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Certificate Number: MCS HP0002
Product Reference: PUHZ-W50VHA-(BS) PUHZ-W85VHA2-(BS), PUHZ-HW140VHA2/YHA2-(BS)

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Ground source heat pumps use closed or open loop circuits to extract heat from the ground. This is then used to deliver heat to the building via a ducted air or wet system.

"Mitsubishi Electric's new system had to meet with the exacting building and planning regulations that apply to all new facilities such as primary schools, including Part L of the building regulations and the CRC Energy Efficiency Scheme," said Cyril Locke, Regional Director for Lorne Stewart. "However, Lorne Stewart has a wealth of experience in this area and is confident that the GSHP will provide the school with maximum energy efficiency with considerable energy and cost savings, whilst requiring very little in the way of maintenance."

Mitsubishi Electric GSHPs are ideal for use in projects like Ysgol T Llew Jones School and the groundworks can be installed horizontally or vertically according to the amount of surrounding land available. In this case, a series of boreholes drilled into the earth hold a network of pipes that pump water underground and transfer heat energy.

Using a small amount of electricity the heat pump collects low-grade heat from below the ground's surface and upgrades it to produce a higher grade of heat which is then used to heat the underfloor heating and hot water within the building.

Lorne Stewart installed the mechanical and electrical infrastructure within the building and the primary install for the ground source heat pump including connections to the Ecodan CHQ units.

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Circulation pipework and pumps to connect the groundworks to the heat pumps have been installed in the plant room.

The company then called in Bristol-based, specialist heat pump installer, Perfect Green Ltd to assist in installing the external groundworks for the heat pump system.

“Perfect Green Ltd has extensive expertise in ground source heat pump systems so we were delighted to take on this project for Ceredigion County Council,” said James McNamara, of Perfect Green Ltd. “We began work by carrying out a number of geological checks to ensure land suitability and correctly sized heat pumps to suit the heating load required. Taking into account CCC’s heat loss calculations for the building combined with the results of our thermo and hydraulic checks, we put together a ground source heat exchanger design.

“Next we drilled a number of 100m deep bore holes to accommodate the vertical closed loops. Having installed the flow and return pipework system, we moved on to the plant room to fit the circulation pipe work plus run and standby pumps needed to connect the outside heat exchanger to the Mitsubishi Electric heat pumps.”

The new system incorporates five CHQ-P300YHM-A ground source heat pumps connected to a closed loop geothermal system. Two Ecodan CAW heat pump boilers then provide the under floor heating and hot water.

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The GSHPs harvest free renewable heat energy from the ground. This heat energy is upgraded to a useful temperature and transferred to the heat pump boiler from where it is then used to heat the school's sanitary hot water and provide underfloor heating.

The Ecodan® CAW skid system can provide up to 50°C water flow temperatures in 48kW and 72kW capacities. Low maintenance, a small footprint and easy installation combine with scalability of units to make the ground source system cost-effective for larger projects.

In addition to its other benefits the GSHP also qualifies for the Renewable Heat Incentive (RHI), a Government run scheme which offers financial incentives for the installation of renewable energy technologies.

The new primary school now caters for over 150 pupils and has been constructed using materials that ensure it will go on to serve generations of pupils to come. Sustainable initiatives such as rainwater harvesting and natural ventilation have also been added to the building to enable pupils to use it as a learning tool, monitoring the energy use of the environmentally-friendly features.

The first sod on the £5 million project to replace existing primary schools at nearby Blaenporth, Glynarthen, Pontgarreg and Rhydlewis was cut in June 2011.

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Having carried out the commissioning and set the new ground source heat pump system to work, Perfect Green Ltd, working together with Lorne Stewart, was delighted to be able to hand over the building to the school's headmaster in August 2012, an impressive six weeks ahead of schedule.

For further information on Lorne Stewart visit http://www.lornestewart.com

For further information on Perfect Green visit http://perfect-green.co.uk/ or call 0845 519 4608

For further information on GSHPs visit http://heating.mitsubishielectric.co.uk

Installation Summary

Application type:
Primary School

Product:
5 x Ecodan CHQ-P300YHM-A ground source heat pumps using a closed loop geothermal system
1 x Ecodan CAW400 heat pump boiler
1 x Ecodan CAW600 heat pump boiler

Capacity:
120kW at -3° ambient

Heat delivery method:
Underfloor heating and hot water

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