



## King Edward School

### School chooses renewable bivalent heating for sports hall

The King Edward VII School in King's Lynn, Norfolk became a specialist sports college in September 2000. The sports hall is a fundamental part of the school's specialism but it had become difficult and costly to keep up with the heating requirement.

The heating was provided by two 100kW gas boilers which were over fifteen years old and had become unreliable and costly to maintain. The energy consumption was excessive and led to high running costs.

As the client was keen to utilise renewable energy where possible, whilst still working within a budget, several options were considered including biomass boilers. However, air source heat pumps were chosen in favour of biomass. This was due to the logistics of managing fuel deliveries and the on-site fuel storage required for a biomass system.

#### The solution

To provide a renewable and cost effective solution to reduce energy costs and carbon emissions the two 100kW gas boilers were replaced with a bivalent heating system.

The bivalent system comprised an air source heat pump acting as the primary heat source, supplemented by a single 100kW gas boiler. This provided the client with the perfect balance between the utilisation of renewable energy and affordability.

The Daikin Altherma Flex system was chosen for the heat pump as it offered the most economical answer to the provision of heating in the sports hall and would result in reduced carbon emissions. This was easy to incorporate with the existing heat emitter circuit and installed within the available space.

The Flex system installed comprised of a single heat pump outdoor unit connected to three hydrobox modules to give a total heating output of 47kW. The modules were located in a plant room and are connected to the outdoor unit by small diameter refrigerant pipework.

As the existing heat emitters and low temperature hot water pipework in the sports hall were retained, a key requirement for the new heating system was to be able to produce a water flow temperature of 70°C. Although a challenge for most heat pumps, this was not a problem for the Altherma Flex system, due to its cascade refrigerant technology enabling it to provide water flow temperatures of up to 80°C maximum.

To maximise efficiency the heat pump includes weather compensation. This allows the heat pump to automatically vary the water flow temperature in line with the external temperature.



So when the outside temperature drops the water temperature increases and vice versa. This helps to boost the overall efficiency of the system and to further reduce both running costs and carbon emissions.

### A bivalent system

In the bivalent system installed at the King Edward VII Sports Hall the Daikin Altherma Flex heat pump acts as the primary heat source and a new 100kW gas boiler acts as the supplementary heat source. A Daikin EKCCW sequence controller was installed to seamlessly manage the control of both the heat pump and the boiler.

The heat pump is expected to meet all the heating requirements down to an outdoor ambient temperature of 7°C. Once the temperature drops below this the sequence controller will run both the heat pump and boiler in parallel to meet the total heating load. It is estimated that for this project the heat pump will meet 70-75% of the annual heating demand with the remainder covered by the boiler.

### The installation

The Daikin Altherma Flex system was installed by EOC Services, of Downham Market, Norfolk. Robert Hill, Technical Services Director at EOC commented:

*“As far as I am aware this is the first project of its kind in the UK so it was quite exciting to be involved in this. I am particularly proud to have been given the opportunity to work on this project as there were several design hurdles to overcome.*”

*“Alterations were made to the existing pipework to accommodate all the new plant, a steel frame was designed to enable stacking of the Altherma indoor units, a buffer vessel was required to ensure that all circulation pumps were not fighting with each other. A plate heat exchanger was also required to separate the heat supply circuit which is pressurised from the open vented heat emitter circuit.”*

The school's Business Manager, Steward Bunting, said:

*“We chose the Daikin Altherma Flex system, after having gone to tender, as this provided us with the best value for money solution as well as decreasing our carbon emissions substantially.”*

The Designer and Contract Administrator for the installation were the Architectural Designers and Chartered Surveyors at Russen & Turner, of King's Lynn, Norfolk. Their Building Surveyor, Tom Rawlings, commented:

*“We are pleased to have been involved with this project which led to fuel efficiencies in terms of reduced gas consumption and the prospect of saving 20 tonnes of carbon per annum. We were also pleased to work with EOC Services who undertook the works in a superb manner.”*

Prior to the installation of the new renewable energy heating system, the school was able to take part in the eFutures project which was a project partnership between the National Trust and Norfolk County Council. This is part of Norfolk County Council's plan for delivering a 25% carbon reduction by 2014.

Selected pupils were able to contribute ideas

to help improve the school environment and save energy during 'The Big Switch' energy saving week. This was then followed by the formation of an action plan to achieve a target saving of 10% of the fuel bills when compared to the previous year. The successful completion of this project enabled the school to secure £12,500 funding which was used towards the capital cost of the renewable heating installation.

### Conclusion

The Daikin Altherma Flex system, working alongside a traditional gas boiler aptly meets the demand for heating, with a reduction in ongoing energy bills and decreased carbon emissions. The ongoing savings for energy and carbon emissions are predicted to be over 30%.

