Appendix 1:

Property Group - Oakwood House - Maidstone
Bedroom Block Renewable Energy Case Study

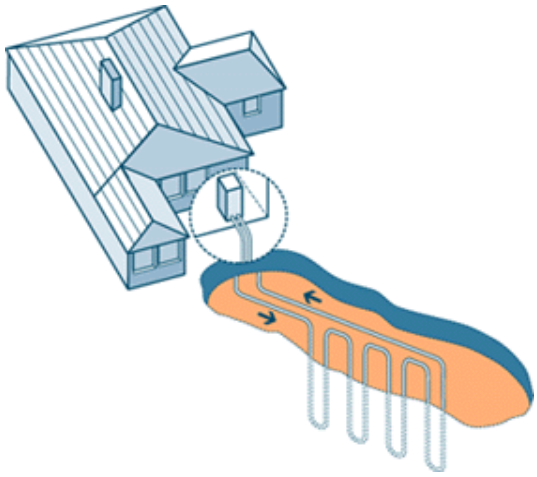
As part of the modernisation of assets programme a project was identified to modernise and refurbish the bedroom accommodation at Oakwood House in Maidstone. The accommodation comprised 36 rooms with en-suite facilities that were dated and particularly inefficient in the use of electrical heating and hot water systems, it was therefore decided to progress with a project for a major overhaul and refurbishment.

A works project was set up and an Architect and Service Engineers were appointed to design 40 new bedrooms to include for 27 standard rooms, 12 superior rooms and a large presidential suite. Due to the original rooms having electrical heating and hot water supplies and the overall site supply being at its limit a top priority for the project team was energy reduction and the incorporation of renewable energies. It was therefore decided to make an application for funds from the Exemplar projects fund in the Environment Highways and Waste (EHW) directorate and funding was granted for us to incorporate ground source and solar heating systems.

Ground Source Heat Pump (GSHP)

Being in its own grounds with extensive garden areas it was decided to utilise a ground source heat pump system for heating. The preferred design option was for a gas fired rather than electrical system because it would run at higher temperature and allow for smaller radiator sizes in the bedrooms. This however precluded us from obtaining a Government grant from the Low Carbon Building Programme because grants at the time were only associated with electrical systems. It was considered that the gas fired system would serve two purposes, the first being that it allowed for smaller radiators where space was at a premium in the smaller rooms and secondly it allowed us to trial an innovative system.

The design team completed their design with a gas fired system to provide heating for the entire bedroom block and a deep well system was chosen as the most appropriate solution. This has been installed, tested and commissioned and is now in full operation and being monitored.



The system has been designed and installed by Earth Energy Ltd and has an output of 30KW.

Energy Benefits

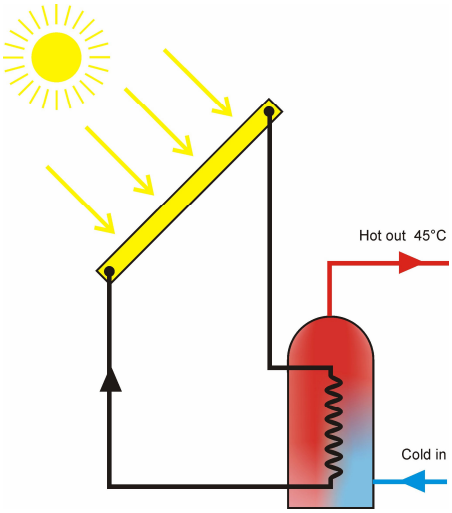
Annual Heating Load	165,830kWh
Net Energy Delivered by GSHP	86,232 (KWh/pa)
Carbon Emissions Reduction	17 (Tonnes/Year)
Carbon Emissions Reduction %	52 % of heating design load
COP of GSHP	2.5
Gross efficiency of Boilers	85%
% of Heating from GSHP	52%

Solar Hot Water

Solar Hot Water is a well proven technology and compared to other renewable technologies is relatively inexpensive and cost effective with low maintenance. Funding for this project was been granted as with the ground source heat system from the Exemplar fund managed by EHW.

At Oakwood House 28m^2 of high efficiency evacuated tube collectors have been located in a south facing position at about 30º to the horizontal on the "inner "roof of the accommodation block. Access is gained through a plant room located on the second floor level giving easy access for maintenance and repair.

The panels are a well developed and robust product and are fully installed, commissioned and in full operation providing hot water to the 40 bedrooms supplemented by a gas fired condensing boiler. The equipment installed on this site is manufactured by MHS boilers Ltd and is part of their Auron package



Energy Benefits

Active area of panels	28 (m2)
Energy output from panels	412 kWh/m2 pa
Annual DHW Load	134,262 KWh
Net Annual Energy produced from panels	11,120 KWh pa
Carbon Emissions Reduction	2.17 (Tonnes/Year)
Carbon Emissions Reduction	8.25 (% of HWS design load)