Shackleton & Wintle Ltd

PLUMBING & HEATING ENGINEERS

CASE STUDY

Stroud District Council Ground Source Heat pump Refurbishment Programme

An ideal and competitive solution for off gas properties.

Overview

When it comes to upgrading social housing stock Stroud District Council in Gloucestershire always take the view that the replacement they install should provide the best environmental solution within the budget they can afford. Stroud D C are keen to improve their housing stock SAP rating as part of their effort to improve the energy efficiency right across all their housing stock. Solid fuel and oil systems are the least energy efficient and expensive to run of all the traditional types of heating and hot water systems. If a solid fuel or oil heating and hot water system needs replacing they want to deliver a high efficiency and sustainable heating solution that meets the latest carbon reduction and renewable technology targets.

An important added benefit of improving energy efficiency and therefore reducing their customers' energy bills is that this contributes to reducing the number of their tenants defined as in Fuel Poverty Fuel poverty is defined as where the annual energy costs amount to 10% or more of the annual household income.)

In a rural county like Gloucestershire many houses are not on mains gas and have either solid fuel, oil fired heating systems or night storage heating. Over 200 of Stroud's social housing properties have either solid fuel or oil heating and hot water systems.

Ideal Solution for Stroud District Council

The ideal solution for Stroud District Council for refurbishment of the older hot water and heating systems in properties off the gas network would be:

- A solution using an affordable renewable energy source
- A reduction in carbon emissions
- Energy efficient system
- Affordable operating costs for the customer
- Controls that are easy to operate
- Low maintenance costs
- Safe and clean operation
- A fully functional central heating system
- Ample hot water.

3 Station Mews
Old Station Drive
Leckhampton, Cheltenham
Gloucestershire
GL53 0DL.
T: 01242 222641
F: 01242 529200
www.shackleton-wintle.co.uk

- Installation cost that does not exceed that of oil systems
- Minimum disruption for tenants of occupied homes
- Improved EPC and SAP ratings
- If a renewable technology is adopted, the installer must be a MCS Accredited. (Microgeneration Certification Scheme)

Ground source heat pumps extracts heat from the ground using a high surface area pipe coil that is filled with water or brine mixed with antifreeze. The coil is either located in a deep borehole (depth 70 metre) or in a large area located around 1 metre deep. The recirculating brine solution collects low-grade heat from the ground, delivers it to the heat pump, which coverts it to higher grade heat via a refrigeration cycle of compression and expansion. The high grade heat (up to 50oC) from the heat pump is used to provide domestic heating and hot water.

Stroud District Council decided that ground source heat pump technology could satisfy all the above objectives and therefore decided to run a trial to replace old solid fuel and oil heating and hot water systems with ground source heat pumps.

A group of 11, mainly 3 bedroom terrace properties in Ann Wicks Road had old solid fuel or oil heating systems that were due for replacement. SDC decided to use these properties to thoroughly evaluate the ground source heat pump solution. As part of the controlled trial they would use experts from the Energy Saving Trust to monitor performance over a defined period.

As a major heating contractor working for Stroud District Council Shackleton & Wintle is involved in the provision of new heating systems for the refurbishment of older properties. As the largest heating company in the area, Shackleton & Wintle has developed expertise in renewable heating solutions. This includes the installation of both ground source and air source heat pump systems. Having already installed several ground source heat the company was asked to provide recommendations for these properties.

Solution

Shackleton & Wintle proposed the following solution:

- Dimplex 6kW Ground Source Heat Pump
- The underground heat transfer brine coils would be located in a borehole at the front of the house under the driveway.
- The heat pump unit would be conveniently located next to the front outside wall of the properties in a purpose build system housing frame.
- The hot water cylinder would be located in the airing cupboard.
- Low temperature radiators would be installed in the house as required. Where any of the old radiators were in good condition, and with the right heating capacity, then these would remain and would be integrated in the new system to help minimize the installation costs.

3 Station Mews
Old Station Drive
Leckhampton, Cheltenham
Gloucestershire
GL53 0DL.
T: 01242 222641
F: 01242 529200
www.shackleton-wintle.co.uk

- The control of the system would be using a simple wall mounted controller linked and integrated to the heat pump control system.
- Removal of the old solid fuel system, hot water tank and partial radiator heating.
- The EPC rating and the SAP calculations for the new system would met the objectives of SDC.
- The new system would quality for grant funding under the CERTscheme.

Installation

The engineers from Shackleton & Wintle have great experience in replacing old traditional heating systems with the latest renewable technology.

A borehole was prepared ready for the installation of the collection coil.

The main installation work included:

- Removing the old system.
- Installing the underground brine pipe coil and connect this to the heat pump system.
- Mounting and installing the outdoor heat pump.
- Installing the hot water cylinder in the airing cupboard or the loft.
- Plumbing in all the new low temperature radiators and integrating any old radiators that were suitable and all were fitted with control valves.
- Plumbing in all the system pipe work valves and pumps.
- Flush and treat the heating water system.
- Connection of the heating and hot water system to the ground source heat pump.
- Commission and test the whole system.

The installations were carefully carried out ensuring all pipe work was either under floorboards or carried in conduit ensuring that there were no issues with unsightly pipe work. All work excluding the preparation of the borehole was completed in 4 days.

Benefits of the New Ground Source Heating System for Stroud District Council

- The system has been in operation since January 2009 and is being independently monitored by Stroud District Council and the Energy Saving Trust as a test site.
- Already the tenants are seeing reduced running costs from the installation. In the previous year the combined solid fuel and electric bills was between £1100 and £1200. After 6 months the estimated annual electricity cost will be near to £550. Economy 10 tariff has yet to be implemented and with this a further 30% reduction in energy costs can be expected.
- The first estimate is that hot water and heating energy cost will be around £1.86 per day on average.
- In terms of life style the tenants reports that it is so easy compared to solid fuel. No more carrying new coal in and hot ashes out.

3 Station Mews
Old Station Drive
Leckhampton, Cheltenham
GL53 0DL.
F: 01242 529200
www.shackleton-wintle.co.uk

- The new system takes a little time to get used to but the tenants seem very happy with the system, reporting no problems at all.
- The systems are still under test but initially the results when compared to the old solid fuel system should more than satisfy the aims and objectives of the renewable source heat pump strategy of SDC for replacing homes where gas is not available.
- Grants up to £5,500 were obtained for the new installations under the Low Carbon Building Programme /CERT schemes and these ensured that the new system installation costs were comparative to installing a new oil fired boiler system.

"When it came to refurbishing of heating and hot water systems in off-gas properties Stroud District Council had to ensure that the new ground source heat pump solution had a similar installation cost compared to similarly sized oil fired system. With grant funding we were able to achieve this aim and also provide a system that is far more energy efficient and reduces carbon emissions by 50%. Potentially the installation of a ground source heat pump for replacement of worn out heating systems in properties where no gas supply is available will help us meet our strategy to reduce the level of fuel poverty for many our customers. Ground source heat pump systems have met our objectives so far."

Ruth Kirkup,
Stroud District Council Housing Asset Manager

3 Station Mews
Old Station Drive
Leckhampton, Cheltenham
Gloucestershire
GL53 0DL.
T: 01242 222641
F: 01242 529200
www.shackleton-wintle.co.uk