

SCHRI CASE STUDY – CAPITAL PROJECTS

BRICC House Heatpump Project

(South West Scotland)



Introduction

Ballantrae Rural Initiative for Care in the Community (BRICC) is a charitable company established in 1995.

BRICC House incorporates a pair of semidetached town houses in Ballantrae on the South Ayrshire coast on the A77 from Glasgow to the ferry ports of Cairnryan and Stranraer.

BRICC purchased the building and is developing it into a day care centre for local elderly and disabled people who currently have no such facility in the local area. The building will also offer training facilities and meeting space for community groups. Recycling of furniture and household goods, tin cans, composting, etc at the site will involve about 60 volunteers in raising funds for BRICC activities, which include providing transport to those not adequately served by the public transport system.

The SCHRI capital grant was £35,822, 74% of the total cost of £48,244 including the underfloor pipework and various other project costs. A grant of £11,580 was also provided by the SCHRI energy-efficiency fund for energy-efficiency measures.

Aims & Objectives

The aim of the project is to provide a cost-effective heating system with low maintenance, low running costs and simple operation. Three heatpumps, using three boreholes for their heat source, are expected to provide this solution, delivering heat through underfloor pipes which gives the added benefits of space saving and improved comfort levels.

It will be an important building in the village and the use of renewable energy to heat it will raise the profile of this heating option amongst local people.

South West Scotland is very short of examples of modern heatpump installations and this one will provide a useful case study as interest in this technology grows.

Who was involved?

BRICC Ltd	Owner/Project Manager
Energy Agency (SW Scotland's Energy Efficiency Advice Centre) - Adviser	
South Ayrshire Council's Sustainable Communities Team	Introducer and funder (£761)
Energy Saving Trust	Grant funder (£35,822)
Scottish Enterprise Ayrshire	Grant funder (£761)
The Northern Rock Foundation	Grant funder (£11,000)
Geothermal Ltd	Heatpump installer
All Systems Go	Underfloor heating installer
Raeburn Ltd	Borehole contractor

The approach

BRICC Ltd owns the property and will run it as a community facility. South Ayrshire Council's Sustainable Communities Team was involved in the project and introduced the Energy Agency (South West Scotland's Energy Efficiency Advice Centre) to the group. The first meeting was in February 2003 when the planning of the facility was at an early stage. The SCHRI Development Officer assisted BRICC in obtaining advice and quotes and in applying for SCHRI and other grants from Scottish Enterprise Ayrshire and South Ayrshire Council.

The Northern Rock Foundation also provided match funding for a heating system. Solar water heating, including the possibility of using solar panels to preheat the borehole circuit, was considered but rejected on the grounds of it not offering worthwhile additional cost savings. The group submitted their grant application at the end of April 2004

As the area of the property is too small for horizontal trenches to be used for the length of ground pipework, boreholes were required.

BRICC obtained quotes from three heatpump specialists. They chose Geothermal Ltd who appeared to have taken the most scientific approach to sizing the system and boreholes and who's heatpumps, coming with a relatively long 10 year guarantee, would provide 100% of the heat and hot water without resorting to immersion heaters for an unknown proportion of the time. It was not the cheapest quote. Three American Water Furnace heatpumps, using three boreholes for their heat source, were specified.

The system is split in two because of the possibility that the upper floor of the building, which is being developed to be independent from the ground floor, could some day be sold separately from the ground floor. Two heatpumps with 12kW thermal output serve the ground floor, with its much larger floor area and higher heat demand, and a smaller 6kW one is installed upstairs. The second of the ground floor pair will operate only when the first is unable to meet the immediate demand.

The Trustees gave the green light for the order to be placed in May 2004. The borehole drilling was carried out in late July and the system was commissioned on 14th September.

In accordance with the grant application conditions, various energy efficiency measures were considered. These included internal insulated dry-lining of the external walls (too complicated/expensive as the building had already been rewired and has intricate corncing which would have been spoiled) external insulated cladding (possible but expensive at c.£24,000 due to glass-covered veranda around half of the building making scaffolding difficult) and double-glazing. It was also considered that insulating the walls without double-glazing in place would be likely to lead to condensation problems. As double-glazing also turned out to be the cheaper option it was opted for. The cost of re-glazing the ground floor, £11,580, was funded by the SCHRI energy-efficiency grant fund. Additional loft insulation is also to be installed.

Results

Two of the holes were 87 metres deep and the third 65 metres. The drilling took most of three days at around 10m per hour.

Two of the three boreholes proved to be wet, which assists the transfer of heat from the ground to the pipes, but the third surprised by staying dry and so had to be grouted with bentonite, a clay-like substance which performs the same job as water, which added to the time taken to complete the job.

As the ground floor employs a pair of heatpumps, a buffer storage tank is required so more space is needed for these but the result is increased efficiency.

The actual benefits of the installation will be hard to determine as there are no records of heating costs prior to the redevelopment, but figures supplied by Geothermal Ltd with their quotation suggest that, compared with the chosen alternative of a condensing oil boiler, **the savings could amount to 9.66 tonnes of CO₂ and £2,300 per annum, or a 64% lower fuel bill** based on reasonable assumptions.

The finished installation has resulted in a cosy, comfortable ambience. Allowing for the cost of two separate oil-fired systems being approximately £8,500 installed, **the simple payback period should be in the region of 9 years, BUT as oil (as well as electricity) prices are likely to rise significantly over that time the actual payback should be shorter** and the

system should last twice as long so the cost of two replacement boilers, as well as significant servicing costs, should also be saved.

Pictures



The borehole pipes



The very long, rotating pneumatic drill at work



The fine 'biscuit' screed visible



The manifold for up to nine temperature zones



The borehole top showing the pipe



The two 12kW heatpumps in situ

The costs, including VAT, were: For the heatpump system:

Boreholes: £ 9,944
Heatpumps, pipes, fittings, delivery, installation and commissioning: £18,282
Total: £28,226

Plus, for the delivery system, the underfloor installation:	£11,825
Hot water storage tanks:	£ 1,523
In-kind and other miscellaneous project costs:	£ 6,770
Grand total:	£,48,344

Lessons Learned

It would have speeded the tendering and system design process had the group been able to arrange for an independent calculation of the building's heat loss for the benefit of the tendering installers. This should have cost around £200-£400. They obtained three names of qualified people but they were apparently all too busy to do the job.

The underfloor installation was made slow and more costly than expected because of the way in which the upper floor's floorboards were fixed over Edwardian sound-deadening materials. It is worth making exploratory checks under existing floorboards when costings are being calculated.

There were delays in the installation, some resulting in additional costs, caused by some lack of coordination between the various contractors involved, in this case drillers, plumbers, joiners and heatpump installers. Voluntary and charitable groups rely on the efforts of dedicated but generally unqualified project managers. It is therefore important for them, and those assisting them, to make extra efforts to anticipate potential problems of this type and to encourage the contractors to do so and to communicate more than they might naturally do.

Advice to other groups – Do not underestimate the additional work and time involved in incorporating a novel system with which non-specialist contractors are unfamiliar. Allow for this and the results should not disappoint.

Further information

Heatpump installer – Geothermal Ltd, Imex Centre, Broadleys Business Park, Craigleith Road, Stirling, FK7 7LQ, 01786 473666 geothermal@geoheat.co.uk www.geoheat.co.uk

Underfloor heating pipework installer – All Systems Go Ltd, Roslin, Bowling Green Road, Stranraer DG9 8AS Tel: 01776 702340

Community group contact

Mrs Rosemary Stevenson, Chair of BRICC Property Committee 01465 831490

SCHRI Development Officer contact

Carola Menzel
SCHRI Development Officer, Energy Agency, Donald Hendrie Building, Auchincruive, Ayr KA6 5HW
T: 01292 521896
E: carolamenzel@energyagency.org.uk
W: www.energyagency.org.uk

Scottish Community and Householder Renewables Initiative – General Enquiries

T: 0800 138 8858,
E: schri@est.org.uk
W: www.est.org.uk/schri