Case Study – SCHRI Capital Project

Auchencairn Enterprise Centre, Ground Source Heat Pump

Introduction

Auchencairn is a village of 373 inhabitants in the parish of Rerrick, 7 miles from Kirkcudbright, and is seated by the Bay of Auchencairn, or Balcarry. In 2002, the community faced the issue of closing the local post office and village shop. This had a detrimental effect on the community, which is in need of regeneration. Due to the importance of such a place for the community for meeting and exchange of information, a community owned solution needed to be in place.

A new build was planned to stabilising the future of the post office and village shop services and capitalises on the attractiveness of the area as a place to visit and work, and enhance rural regeneration.

In addition the building allows space for a children's play group and a flat upstairs, and provides space for diverse community activities.

The building combines high insulation standards and space heating is provided by a ground-source heat pump connected to under-floor heating. The new build and the installation of the heat pump were supported by the Big Lottery (£225,000), the Dumfries & Galloway Council Capital Fund (£200,000) and the Scottish Community & Householder Renewables Initiative (SCHRI) with a grant fund of 50% of the total installation costs for the heat pump (£14,975).

The building was fully occupied on 17th January 2008.

Aims and Objectives

The organisation wanted to install a heating system which would provide a demonstration of "good energy practice" to add value to the centre.

Using a renewable energy source for heating the whole building, the project can present itself as a useful case study in the region, raising awareness amongst the community and visitors.

Who was involved?

The Initiative was formed by George Brockbank and David Dunstan who undertook provision of temporary premises with the help of Ross Paton and Roy Wilson who joined the Initiative. Funds for this were provided by the Scottish Enterprise, Leader+ and the D&G Council. The permanent project manager was David Dunstan with help from all the directors of the Auchencairn Initiative and, in the later stages, by a number of other village residents.

The heat pump installation was a sub-contract undertaken by Connect Plumbing & Heating of Castle Douglas. The drilling was carried out by Raeburn Drilling Ltd.

Auchencairn Initiative	Project leader
A.C. Wolffe & Partners	Architects
Asher Associates	Civil and structural engineers
Big Lottery	Funder
Connect Plumbing & Heating	Supply and installation of heat pump and ground loops
Energy Agency	Adviser
Energy Saving Trust	Funder
McGowan Millar Partnership	Quantity surveyors
Raeburn Drilling & Geotechnical Ltd.	Drilling of boreholes
T Graham & Sons (Main contractor)	Excavation and backfilling of trench to the building

The Approach

The Initiative obtained funding for a feasibility study and business plan from Scottish Council for Voluntary Organisations (Direct Grants) with the help of the Stewartry CVO. This gave a positive outcome which enabled

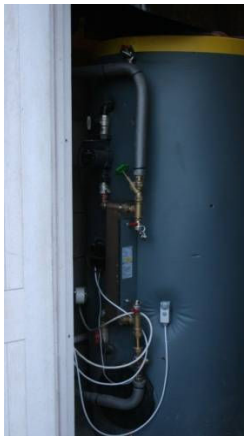
the Initiative to obtain funding for the purchase of a central village site from the Scottish Land Fund and D&G Regeneration Unit. The project won the 2006 Dumfries & Galloway Capital Grant competition. This was followed by success with funding from The Big Lottery and Leader+.

With the assistance of the local SCHRI Development Officer from the Energy Agency, the Auchencairn Initiative considered all options for supply of renewable energy sources in detail. After consideration of the site and the architect's plans, a ground source heat pump was the most practical and appropriate option.

Results

As the ground water table was too high to allow trenching, two bore holes were to be used for the ground loops. The first bore hole was completed satisfactorily but the second hit quicksand and artesian water. This bore had to be plugged at a lesser depth and consequently some shallow ground loops had to be added to balance the system. The artesian water broke through and additional drainage had to be installed to take this off the site.

The installed system incorporates a 10kW heat pump (power input 3kW) and a 500 litre mains-pressure hot water store. It supplies underfloor heating throughout the building and hot water for the first floor residential accommodation. The heat energy generated is expected to be 18,547kWh per annum. Because of the difficulties encountered in installation the cost was higher than expected. However, the system is working extremely well with only very minor commissioning snags, quickly overcome. The building is very comfortable and the room thermostats provide simple control.



Tank

Heat Pump

Over a life time of more than 20 years Carbon savings of more than 10 tons can be expected using the heat pump instead of an oil-fired heating system, assuming a CoP of 3. Estimated cost savings for the heating are £270 per annum.

Lessons Learned

The whole project had been coordinated by a local architect on a volunteer bases and benefited from this kind of consultation. His valuable expertise in building construction combined effectively with the renewable energy expertise of the SCHRI Development Officer. The coordination of the different installers and specialists had been experienced as positive. The only unforeseen expense was that of the use of advanced technology for the borehole drilling.

During site clearance, trial holes were undertaken, but these were purely for structural loading purposes; with hindsight they should have been more extensive. If so, we would have been able to avoid abortive work attempting to install ground loops. The costs due to quick sand and artesian water could not have been foreseen.

Insistence on a greater degree of investigation by the drillers prior to tendering for the work may have prevented this delay, but it is likely that they would not have been prepared to do this speculatively on a job of this small scale.

Advice for other groups: The cost of installation will almost certainly exceed conventional heating systems but the benefits are worthwhile in the long term, however:

1. Check the land area available is adequate and above the water table for ground loop installation.
2. Provide sufficient contingency allowance in the budget for the unpredictable costs of underground work.

Be very careful to select a contractor who understands the system thoroughly. The Auchencairn Initiative were fortunate but there are more and less experienced installers.

Further Information

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