Bury Road, CB22 5BP

Bill and Valerie Powell – Bill says:

When we inherited our house I saw the opportunity for an eco project, and to make the house ready for the next 50 years – to make it 'future proof'.

I used to work for Warwickshire Borough Council as a Housing Portfolio holder, which made me acutely aware of just how much need there is in the UK for a model of a low cost, reliable, simple, efficient, flexible, and easy to install heating system.

After extensive research I found that Underfloor heating and fan assisted radiators (Ecovectors) would reduce energy and be suitable for many forms of heating, therefore future proof.

I discovered an Exhaust Air Heat Pump being used in Scandinavia – a new thing – so I looked for suppliers, and found a low cost British source.

The beauty of the system I’ve designed is that it could be done by any local plumbers – there are no unusual skills needed to install it.

Low Energy Measures

Building works included extending and developing the kitchen, and adding a fourth bedroom upstairs, but the main focus was on energy efficiency and the heating system in particular.

The cavity walls had been insulated already. During the building work new walls were insulated to current standards and loft insulation was topped up. Windows and doors are double-glazed with trickle-vents. Low-energy lights are fitted in all rooms.

An Exhaust Air Heat Pump in the airing cupboard draws in air from the kitchen-diner below, extracts and concentrates heat from it, and blows out cold air through the loft. (The flue once used used for a kitchen stove serves as an air duct)

This provides Hot Water and heat to the underfloor and Ecovector heating system.

A flueless gas fire in the kitchen-diner pre-heats the air in winter if necessary, and fan-assisted Ecovector radiators heat the bedrooms and hall. The underfloor heating materials were relatively low cost, and installing it was simple.

Underfloor heating pipes were laid in a 25mm dry sand and cement ‘pug’ mix supported on a 50mm layer of insulating foam between the joists.

However the upheaval of renewing the floor system was the most expensive element (£4,500 ground floor approx.).

Photovoltaic (PV) cells were recently installed.

Overview

<table>
<thead>
<tr>
<th>Age, Type</th>
<th>1957, Semi-detached</th>
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</thead>
<tbody>
<tr>
<td>Wall type, Floor area</td>
<td>Brick cavity, 135 sq m</td>
</tr>
<tr>
<td>Project timescale</td>
<td>1 yr</td>
</tr>
<tr>
<td>Cost of heating system</td>
<td>£10,000</td>
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</tbody>
</table>

Energy usage – 2 adults

| electricity (2011) | 49 kWh per sq m pa | 22 kWh per sq m pa gas (2011) |

Key features

+ insulation: cavity walls, loft, extension, underfloor
+ windows and doors: double-glazed, triple-vents
+ exhaust air source heat pump system: simple, low cost, easy to install
+ exhaust air source heat pump
+ heat recovery system: Bill’s own design
+ flueless gas fire, ecovertor radiators
+ underfloor heating system: low cost, easy to install
+ underfloor heating pipes: laid in ‘pug’, supported on insulation between joists
+ photovoltaic (PV) cells
+ heating controls: careful timing
+ high performance appliances
+ induction cooker
+ water conservation: water butts, low water toilets
**System Performance**

The **Exhaust Air Heat Pump** copes well with outside temperatures down to 7°C, and with help from the flueless gas fire down to 0°C. During the coldest months of 2010, the **immersion heater** was occasionally used.

**Savings**

A **68% energy improvement** over its 1957 build standard, was reported when the **Sustainable Energy Academy** inspected our re-furbishment. Our heating cost £767 in 2010. I estimate the cost would have been £1,400 with normal radiators and a condensing boiler.

Electrical power for other purposes has fallen from over 7,000 kWh in our previous house to about 3,000 kWh per year.

**Value for money:** This system cost £10,000. This could have been reduced to under £7,000 if I'd used Ecovectors throughout instead of underfloor heating.

**Future Plans**

I am looking forward to greater energy efficiency when **fuel cells** become available.

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**Professional Contacts**

**Design:** Bill Powell designed the exhaust air source heating system.

**Builder:** Ray Tweddle of Debray Builders, 01223 693982 or 07837 124205

**Sustainable Energy Academy:** Old Home Superhome [www.superhomes.org.uk](http://www.superhomes.org.uk)

**Products and Costs**

**Total cost of project:** £110,000, including £10,000 for the heating system.

**Photovoltaic (PV) cells:** 10 x 1950 watt cells, £6,275, installed by Midsummer Energy [www.midsummerenergy.co.uk](http://www.midsummerenergy.co.uk)

**Insulation**

**Underfloor:** Insulated by 50mm insulation board (Celotex) as part of underfloor heating.

**Exhaust Air Source heating system**

**Underfloor heating materials:** piping, pumps, controls from Wundafloor [www.wundafloor.co.uk](http://www.wundafloor.co.uk) (£1500)

**Exhaust air source heating pump:** Ecocent 300L from Earth Saving Products [www.esavep.com](http://www.esavep.com) (£1,800)

**Ecovector radiators:** models LL1200 and LL2000 from [www.smiths-env.com](http://www.smiths-env.com) (4 x £260)

**Flueless Gas Fire:** Typical cost £350 for 2 kW model from B&Q.