Case study

76 Westfield Crescent, Brighton BN1 8JA

Overview

Period / age of house: 1946

Type: Semi detached

No of rooms: 3 bedrooms, 3 other rooms

No of floors: 2

Floor area: 90m^2

Wall: Cavity

Cost of improvements: £5K (£10K loan for photovoltaic panels)

Features

+ photovoltaic panels

+ insulation

+ wood burning stove

+ LED lighting

+ grey water recycling

Introduction and approach

Tom, Francesca and their two teenage daughters moved into their semi-detached home in Hollingbury in 2006 and have since been making eco improvements. The house was built in 1946. The house had recently fitted PVC double glazing but there were few other improvements; thin loft insulation; an old inefficient boiler; and the cavity walls hadn't been filled.

An average unimproved semi detached house of this age would normally be responsible for around 7 tonnes[1] annual CO_2 emissions. The carbon footprint has been reduced to 1.69 CO_2 tonnes (76%) against this baseline on a fairly modest budget.

Gas and electricity meter readings are taken monthly, because of this the energy savings made by each measure can be easily identified. Measures are mainly simple and low cost, with around £5,000 spent up front on saving energy and making the house warmer.

Reducing gas use

Gas use has been reduced by 54% through undertaking basic improvements like cavity wall insulation (with a grant from the city council) and fitting a new gas condensing boiler: Worcester Greenstar 30CDi.

Installing a 4.6kW Morso wood-burning stove has also meant that the gas central heating can be used less. The stove was one of the first measures to go in, and is definitely the favourite improvement. Logs are delivered by a local woodsman. Underfloor insulation was installed when the kitchen floor was lifted (100mm Xtratherm). Loft insulation has been topped up to 300mm and heavy (second hand) curtains added to most windows.

Reducing hot water use

Hot water use accounts for about one third of gas use in homes. HW use has been reduced by installing a small bath (1500 x 500mm) and a water efficient shower head (Bristan Ecosmart). The hot water pipes have been insulated where they are reachable, and extra insulation has been put on the hot water tank. Most domestic hot water systems lose around 1000kWh/yr (about what an average solar hot water system produces) so lagging pipes wherever possible is essential.

Reducing electricity use

Emissions from electricity use have been reduced by 100% in total, with over 20% through efficiency measures. All lighting is now low energy, either CFLs (Megaman) or LEDs (GreenLED with GU10 fittings) in the kitchen and bathroom. All major appliances (fridge, oven, dishwasher) are now A and A+ rated and the Baumatic fridge is smaller than previous.

Effort is made to switch everything off when not in use, but as the girls have grown up, so has their energy use on laptops and gadgets.Despite this and more home-working, electricity use has continued to drop.

Renewables

In 2010 a government 'Pay As You Save' trial offering an interest free loan was taken up from British Gas to install photovoltaic panels. These were fitted in July 2010 costing £10,000 and consisted of 1.4kW PV array of 8 x Sharp 175W panels each 1318 x 994mm totaling 10.5m^2.

1 Quoted from the Energy Saving Trust 'Sustainable Refurbishment:towards an 80% reduction in CO2 emissions' CE309 (2010). Avaiable on the EST website: www.energysavingtrust.org/housing

The array was predicted to generate 1190kWh a year but has generated over this at 1275kWh in year one.

The Feed in Tariff (FIT)[2] for PV retrofitted onto existing housing before April 2012 pays 41.3p per kWh generated, plus 3p per kWh exported to the grid. In 2010-11 this paid £565, and savings from not buying grid electricity boosted this to about £600. Loan payments for the PV system cost £31.85 monthly. This has provided a total £200 credit for year one.

This also means that the family is zero carbon in electricity use as they produce pretty much the same amount as they use. Electricity is still bought from the grid as most of their usage is in the evenings when the sun is not out and the panels are not producing electricity. Having PV has changed the way the family uses electricity – appliances are run and gadgets charged while the sun shines.

Future changes

The next tasks will be: more draught-proofing; replacing the front door with an insulated, airtight door; and insulating the rest of the ground floor. A solar thermal hot water system will be next, finance allowing (evacuated tubes because of little roof space). Space at the top of the stairs is allocated to a larger HW tank for this. Next step will be external wall insulation to reduce heat loss from the 3 external walls.

Lessons learnt

In retrospect, it would have been better to lag all the hot water pipes when there was work being done in the kitchen and bathroom. Also when the new boiler was installed, it would have been more efficient to have put in zoned thermostatic areas so that heating for upstairs and downstairs could be put on independently.

Professional contacts

Stove installers: www.bolneystoves.co.uk
Water efficient plumbing: Blue2Green@live.co.uk
Local logs: www.fromthewood.com
Sharp PV panels Model ND-175(E1F): www.sharp.co.uk
Brighton & Hove City Council grants: www.brighton-hove.gov.uk
LED lighting: www.greenled.co.uk
CFLs: www.edwardsandhope.co.uk 5 New Road Brighton
Greywater diverter: Jandy Valve (from USA)

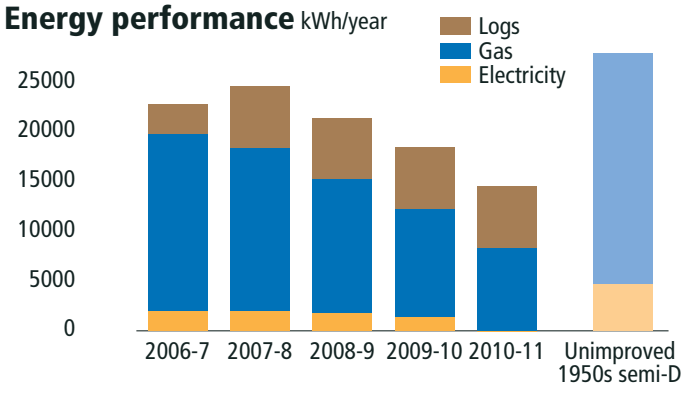
2 Information on Feed in Tariff from Dept of Energy & Climate Change: http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/renewable/feedin_tariff/feedin_tariff.aspx

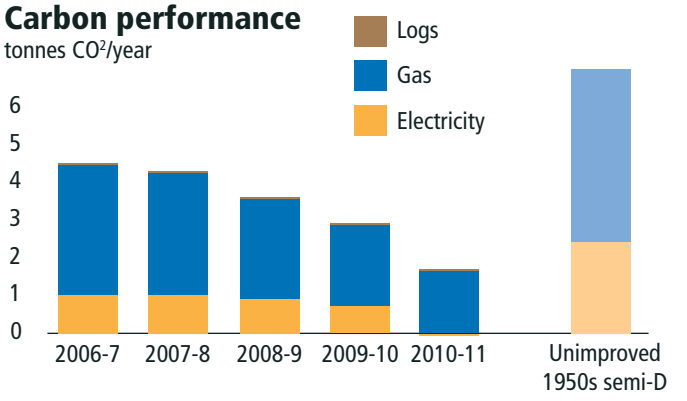
Measures to reduce gas use

	Gas	Reduction	Measures
2006-7	17765 kWh		Cavity wall insulation 4.6kW Wood-burning stove
2007-8	16408 kWh	8%	Benefits from measures 1+2
2008-9	13442 kWh	19%	Condensing boiler & TRVs Small bath, efficient showerhead Under floor insulation
2009-10	10886 kWh	39%	Heavy curtains Loft insulation to 300mm
2010-11	8274 kWh	54%	From measures above

Measures to reduce electricity use

	Electricity	Reduction	Measures
2006-7	1973 kWh	0%	
2007-8	1957 kWh	1%	Behaviour
2008-9	1761 kWh	11%	A+ rated appliances LEDs and CFLs
2009-10	1370 kWh	27%	1.4kWp PV (month 10)
2010-11	-92 kWh	>100%	PV panels: +1275kWh Grid energy use: -1183kWh





Eco Open Houses is an annual collaborative project between Brighton Permaculture Trust, Low Carbon Trust and Brighton & Hove City Council. This year the event is run as part of the EcoFab 2 project and has been selected within the scope of the INTERREG IV A France (Channel) – England cross-border European cooperation programme and is co-financed by the ERDF