GROSMONT, CHARLTON DRIVE

CONSTRUCTION: 1930s detached house with cavity walls and sun room extension.

KEY FEATURES: Triple glazing, solar PV with backup batteries, sun room with passive solar gain, solar thermal hot water, wood burning stoves, LED lighting, energy management

What they did

The house already had loft insulation and cavity wall insulation, but the owners wanted to do what they could to reduce fossil fuel use and their carbon emissions. This was achieved with a range of insulation and renewable energy improvements, and using permaculture principles.

Main improvements	Cost	Savings per annum		
		£	kWh	CO2 equivalent
Loft top-up	£250	£60		280 kg
LED ceiling lights	£3 each	£2.50	16	6 kg
Shower reducer	free	£70		120 kg
Solar PV 3.8 kWp	£9,000	£735	746	
Solar thermal			1,500	
Wood burning stoves			20,000	3.7 tonnes
Triple glazing	£20,000	£160		

"Grosmont has 2 Clearview woodburning stoves which we use for most of our heating. The gas central heating only switched on late evening to heat the bedrooms and bathroom. As a result our gas consumption has dropped from 30,000 kWh to 10,000 kWh (a reduction of 3.7 tonnes of CO_2e emissions) per annum.

Some people are against woodburning stoves thinking they lead to biomass production at the cost of food production. However we source wood from local tree surgeons and a friend's wood."

Simple measures

Grosmont already had loft insulation, but it made sense to top it up to the recommended 270mm. This is a simple DIY measure, and advantage was taken of a special offer in B&Q. LED ceiling lights only use a tenth of the energy of halogen ones. Even if they are only used for an hour a day, they pay for themselves within a year. Water savings are made through rainwater harvesting, a low-flush toilet, and a "shower reducer" which saves both 30 litres per shower, and the energy needed to heat that water.

Passive Solar Sunroom

The sunroom at Grosmont replaced an ageing conservatory that was not insulated, got very hot in summer and very cold in winter. It is designed so that it will stay cool in summer, and utilise any solar gain in winter to heat the house. The insulation exceeds current Building Regulations. The ceiling is insulated with 30cm of Warmcel (recycled paper insulation), as are the internal timber framed breathing walls, and there are triple glazed windows and doors. The extra cost will be handsomely repaid with ongoing savings as energy prices rise.

The planter provides food throughout the year, using the permaculture principle of "Obtain a Yield" - there are always peppers, chillis, or saladings to be harvested, irrigated using rainwater harvested from the roof.

"Passive solar just means using the energy of sunlight without active mechanical means. if it's a cold dark dismal winter day we shut all the doors to the sunroom. If it's warm and sunny winter day we open the doors… that simple."

Solar PV with battery back-up

The photovoltaics were installed in 2008, before Feed in Tariffs. This online calculator provides an estimate of savings for new installations http://www.pvfitcalculator.energysavingtrust.org.uk/

People are often not aware that if there was a power cut during a sunny day, their solar panels would not generate any electricity. This is because the inverter shuts down if there is no mains power.

With a battery backup system, should there be a power cut the system isolates itself from the grid and uses power generated from the PV panels, or if they are not generating then power from the batteries will be used.

Even if there is no power cut, if demand in the house is higher than the power being generated by the PV panels, the system will draw power from the batteries before taking power from the grid. In 2016 Grosmont used 500 kWh from the batteries.

Water heating

The solar thermal system provides all the hot water needed in the summer. In the winter this is supplemented by an electric immersion powered by the battery back-up.

Power management

The energy management system works with the batteries and inverter so that power will be drawn from the batteries if demand is greater than the amount being generated. Similarly the inverter will charge the batteries before exporting energy to the grid. When the batteries are fully charged and the amount being generated is greater than demand then the inverter will export the surplus.

However, the system also manages the load by first dumping surplus energy into the hot water storage tank and a heated towel rail before exporting the excess. So during winter there may only be a surplus of 200 W but that would be dumped into the hot water tank supplementing the solar thermal collectors.