

Warwickshire **Climate Change Partnership**

27 November 2007

Submission Form for Case Studies

Individuals

Name: Keith Sinfield, Local Resident, Church Lawford

Name of Project: Installing Solar Panels at Home

Category: Energy

Date: August 2007

Please return to: Dr. Jacky Lawrence, Strategic Energy Manager, Environmental Management, E&E, WCC, PO Box 43, Warwick CV34 4SX.

Email : climatechange@warwickshire.gov.uk, Web : www.warwickshire.gov.uk/climatechange



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1 Why I carried out this project.

I have always had a personal interest in energy efficiency and have noted my gas & electricity consumption readings since 1978.

I became interested in renewables technology after I helped organise an exhibition on energy efficiency at my local village, working with WEEAC (Warwickshire Energy Efficiency Advice Centre).

I was originally interested in installing a small wind turbine but our house is not well placed for this kind of device (i.e. *not* located at the top of a hill with clear approaches for wind from all directions), and so turned our interest to solar renewables instead, particularly as we have, ideal, south-facing roofs.

2 Project Concept - what I did.

Below is a description of my project: what I did, how it was expected to work; what had to be done to make the project succeed and what the expected benefits of the scheme were.

As a first step we decided to install solar thermal (water heating) panels, as opposed to solar photovoltaic (PV) (electricity generating) panels, because of the faster pay-back on investment. Under the terms of the grant scheme then operating (Clear Skies programme) it was necessary to use installers and equipment from an approved list - we chose two installers covering our area, requesting cost estimates from both. Installer a). (Sterland & Elgar) recommended that we replace our old boiler with a more efficient 'condensing' type and gave us cost estimates for the boiler plus solar thermal (evacuated tube) panels. Installer b). (SolarTech) gave us a cost estimate for solar thermal (flat) panels only. We elected to purchase the new boiler from installer a). and the, less expensive, solar thermal flat panels from installer b). Grants were not available to offset the cost of the boiler but we applied for and received grants for the solar thermal panels from the Clear Skies programme (£400), and from Daventry Town Council (£200); the latter our installer helped us to access. The total cost of the solar thermal panel installation was £3809.40 which, with £600 in grants, meant a net cost of £3209.40.

The solar thermal panels were installed in Spring 2005 and have performed well, so much so that we re-examined the case for solar PV panels. We subsequently decided to have a solar PV array installed and this work was carried out in Spring this year by installer b). above. To comply with the terms of the current national grant scheme (Low Carbon Buildings) it was necessary for us to increase our loft insulation thickness to 270 mm.

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In the above picture the solar thermal panels are situated to left and right of the chimney – the installation includes a solar PV panel, situated directly below the chimney, to power the circulating water pump. In the foreground, to the right of the two Velux windows, there is a larger solar PV array rated at 1kW.

We already complied with the other conditions of the scheme by having cavity wall insulation, a boiler with modern heating controls and low energy light bulbs fitted throughout the house. A number of years ago we also installed triple glazing.

We were successful in obtaining grants for the solar PV panels from both the Low Carbon Buildings programme (£3300) and Rugby Borough Council (£1000), reducing the cost from £8589 to £4289.

The solar thermal panels require direct sunlight to heat water running through them, while the solar PV system is capable of working on indirect, ambient light. In fact, we've noticed that direct sunlight seems to work against the PV system and on sunny days this summer we recorded higher output readings mid-morning rather than mid-afternoon when the panels had absorbed a lot of heat. SolarTech confirmed this and said that the electrical current produced depends on (non-heating) (UV) irradiance; the higher the intensity the higher the current. Also, voltage is reduced as the material heats up; this is apparently a characteristic of the silicon material used. It will be interesting to see what sort of readings we get during the

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3 Project Partners – who was involved.

The names of all the people and all other organisations who helped me deliver this project are listed below.

1. Warwickshire Energy Efficiency Advice Centre (WEEAC)
2. Rugby Borough Council – funding for solar PVs through the 'Building Sustainable Communities' Renewable Energy Grant
3. Low Carbon Building programme – funding for Solar PVs
4. Daventry Town Council – funding for solar thermal panels
5. Clear Skies Programme – no longer running – funding for solar thermal panels
6. Solar thermal panels were installed by SolarTech; manufactured by Filsol Solar Ltd, based in Wales
7. Solar PV panels were sourced through Solartec; supplier was Filsol Solar Ltd, but the panels were shipped in from Finland and the 'Sunny boy' control gear came from Germany

4 What I learned from the project

A description of what I learned in carrying out this project can be seen below, i.e. what the easy successes were, the overall outcome and any problems I had.

What worked?

The solar thermal panels installation was very straight-forward as we were just dealing with one company - SolarTech. We have found that the solar thermal panels work extremely well; during the summer they provide us with lots of hot water to the point where we rarely have to switch on the boiler. This saves us a lot of money and we've worked out that the system should pay for itself within its first ten years of use. Before we installed the solar thermal panels we were using about 2000 units of energy during the summer quarter. With the solar thermal panels this has reduced to virtually zero. The condensing boiler is very controllable and when we do need to 'top up' the domestic hot water temperature we can do this within a degree or so of the desired temperature.

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What worked? (continued...)

It's still early days with the solar photovoltaic panels and we are finding it interesting to monitor the output we get from them. The panels produce DC current and to be able to use this it needs to be changed to AC current; this is carried out by an inverter in the loft space. The inverter has a wireless transmitter that communicates with a portable monitor unit. Interestingly this is powered by its own solar panel. The monitor displays power output throughout the day and also stores a month's worth of daily energy readings. We typically find that we're receiving output from the panels between 6am – 8pm during the summer; so far, working into the autumn, this has reduced to 7-30am – 4-30pm.

What didn't work?

We encountered some problems when we were trying to get the PV panels commissioned, as our installer had to work through a sub-contractor with the necessary authorisation to connect them to the grid.

It took a day and a half for the panels to be installed, which was a bit longer than we expected, so we had to arrange for someone to be at home for this extra day. And getting the inverter into the loft was hard work for the installation team as it was quite heavy.

Also, when the PV panels were first installed we couldn't get the system to work and it turned out that the inverter operating threshold had been set at too high a level for our situation. It was necessary for the unit to be returned to the supplier in Wales for adjustment.

Electricity produced by the panels, which we do not consume, is fed into the grid. Should we wish to sign up with a company such as Good Energy to receive payment for this we will require a connection certificate but we didn't know about this until after the work had been completed. We are presently arranging for a certificate to be issued retrospectively. It would have been a lot easier to sort this out at the installation stage had we known about it.

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What the unexpected knock-on effects of this project were - both good and bad.

The most positive thing is the satisfaction that we are making a difference and demonstrating our environmental commitment. There will be also be financial savings over time, which is also satisfying.

Having the solar thermal and PV systems has made us a lot more conscious of the energy we use and we have changed our daily habits to make the most of this 'free' energy. For example, we tend to shower later in the day when the water has had a chance to warm up and we tend to wait for sunny days before we put through laundry as this means we need to boost the energy by less, thus saving us money.

5 How emissions were reduced by doing this project – i.e. quantified fuel and energy savings

List here the fuel and/ or energy savings associated with this project.

The solar thermal system was installed in April 2005 and the solar PV system in April 2007. We make our energy payments for both electricity and gas by monthly direct debits, which are noted below along with details of any refunds. This will give some indication of how much energy/money we are saving. It should be noted that some of this will be due to the energy efficiency measures we have put in place as well as the solar renewable technology.

Initial monthly payment Feb 04	£59.12
Refund Aug 05	£338.51
Adjusted payment Sep 05	£56.08
Refund Jan 07	£242.11
Adjusted payment Feb 07	£49.28
Adjusted payment Aug 07	£36.00

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6 What I would do differently if I did this project again

Below is a description of what I would do differently in this project if I started again from scratch.

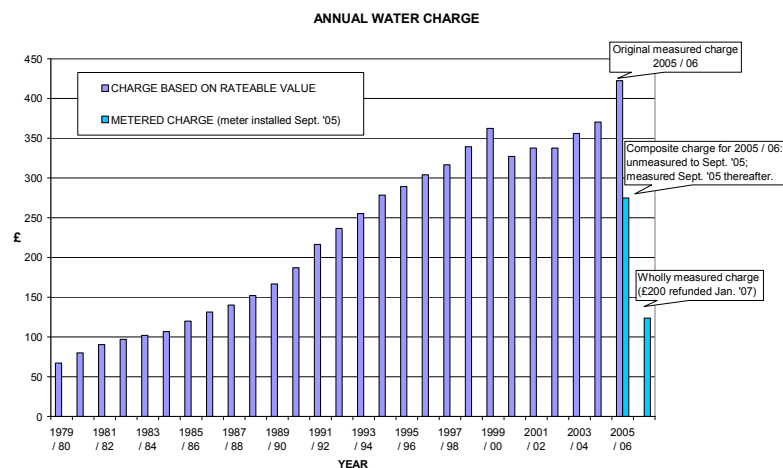
We approached our solar thermal and PV installation in a piecemeal fashion and it was a real learning curve. If we were to do it all again, it would be useful to learn from someone else's experience first so that we could follow a clearer schedule of works.

7 Continuous Improvement

Below is a description of what I intend to do next in tackling climate change as an individual. If nothing, please report.

We have recently had a free water meter installed and have discovered that our water bills have reduced dramatically as we have always been fairly frugal with our water supply.

We now intend to install a rainwater harvesting system so that we can direct rainwater from our roof into a storage tank that will be buried in the back garden. Once it is plumbed in, this system will allow us to use rain water to use in our washing machine, toilets and for garden watering. We then expect our water bills to be reduced even further.



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8 Contact Details – where to go for further information on the above project

Below is a list of sources of funding information and relevant contact details for this project.

Funding

Solar thermal panels

£400 from Clear Skies programme (no longer running)

£200 from Daventry Town Council www.daventrytowncouncil.gov.uk

Solar Photovoltaics

£3300 from Low Carbon Buildings Programme www.lowcarbonbuildings.co.uk

£1000 from Rugby Borough Council's 'Building Sustainable Communities' Renewable Energy Grant. Contact Stephen Marks on 01788 533827

http://www.rugby.gov.uk/site/scripts/documents_info.php?documentID=113&pageNumber=6

9 Any other useful information?

Sources of other useful information and links are given below.

Energy Saving Trust webpages provide information on different forms of renewable energy technology and a list of solar thermal and PV installers for the West Midlands:

www.est.org.uk