'The Pod' Field Trials

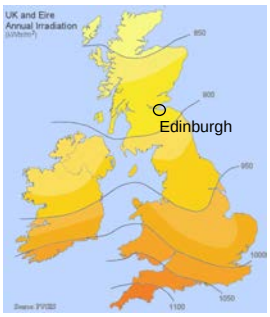
building type
domestic

solar thermal
6 kWth

annual energy generation
2,100 kWh

annual CO_2 reduction
0.64 tonnes

location



client

The Pod transforms the ease of solar water heating installation. Before its launch, Viridian Solar conducted a 12-month proof of concept in partnership with social housing provider Places for People.

Background

The Pod is a new product from Viridian Solar, aimed at making solar thermal installation quick and painless for domestic retrofits. The unit uses solar energy to preheat domestic hot water en-route to the existing heating system. The installer doesn't need to even touch the central heating circuit. Disruption in the home is minimised and installation time greatly reduced.

Viridian Solar tested two prototype systems in homes provided by long-time collaborator, Places for People, between April 2013 and March 2014.

Properties

The properties are located in Edinburgh and are both under the management of Castle Rock Edinvar.

House A is sheltered accomodation with 4 adult residents and one care assistant at all times (not resident). Although this property has electric showers, there is a reasonable demand for hot water for cleaning.

House B is an upstairs maisonette with a family of two adults and one child in occupation for the entire period of the trial.

Solar Installation

Two Clearline V20 in-roof solar thermal panels were fitted to each property by the maintenance team at Castle Rock Edinvar. Both properties have orientation 45 degrees from South and roof pitch of 30 degrees. Prototype Pod-ST units were placed in the loft space, connected to the solar panels and filled. The cold water feed to the existing hot water system was diverted to flow through the Pod.

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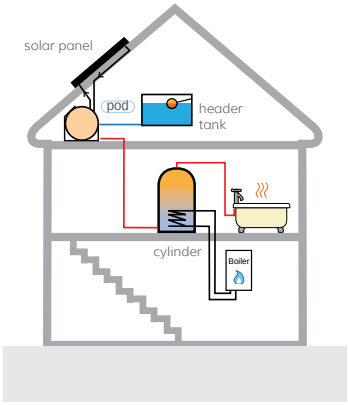
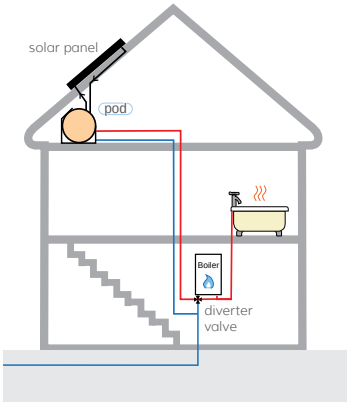
House A : Sheltered accommodation with 2 Clearline V20 panels

House B : Maisonette with 2 Clearline V20 panels



House A - Pod preheating water to an existing hot water cylinder



House B - Pod preheating water to a combi boiler

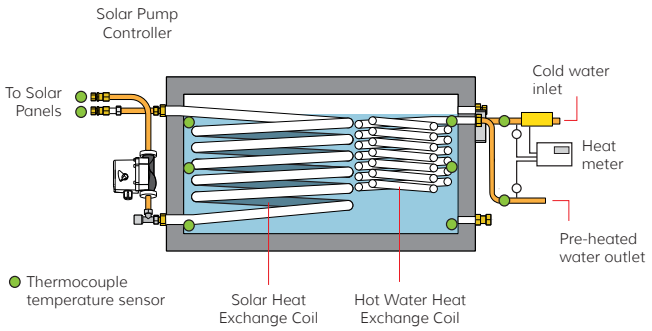


Diagram showing the measurements taken on the Pod

The heating system in House A consisted of a gas boiler and a conventional vented hot water cylinder with a header tank in the loft. The Pod was very simply added by diverting the flow from the header tank to the cylinder through the hot water heat exchange coil in the Pod.

The heating system in House B is a combi boiler, which would make fitting a conventional solar system a challenge. The Pod made it straightforward. Instead of feeding cold water to the combi boiler, a preheated supply from the Pod was brought down to the kitchen. The model of combi boiler was unsuitable for a high temperature infeed, so a combi diverter valve set with the following characteristics was used:

> When the water arriving at the boiler from the Pod is warmer than 48ºC, it by-passes the boiler and goes straight to the hot tap The boiler does not fire at all.
>
> When the water from the Pod is lower than 27ºC, it goes straight to the boiler to be heated to the hot tap temperature.
>
> When the water from the Pod is between 28ºC and 47ºC, cold water is mixed in to reduce the temperature to 27ºC and this goes through the boiler. Although it may seem a bit strange to add cold water, by doing this, it leaves more heat in the Pod for later use.

Results

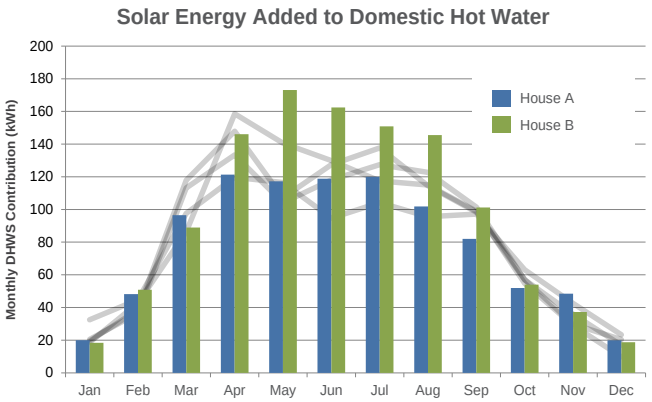
The systems were fitted with a heat meter to measure the energy added to the domestic hot water and with thermocouples to monitor temperatures as shown in the diagram above. Data was logged on a 3 minute interval and collected via GSM modem.

One concern was whether the Pod might develop a 'cold spot' around the hot water heat exchange coil, but temperature logs from the thermocouples showed no temperature gradient across the store.

The graph shows the energy added to the domestic hot water from the Pod during the 12 months for which the project ran. House A achieved a total energy output to domestic hot water of 946kWh and House B achieved 1147 kWh. Note that the heat measured was the heat added to the domestic hot water (as opposed to the solar heat added to the Pod, which would be higher as it includes heat losses from the Pod). If house A changed from electric showers, the savings would be significantly higher.

Taking into account the summer biased boiler efficiencies (MCS 024) the annual fuel energy saving was 1,231 kWh (House A) and 1,530 kWh (House B).

The solar energy yield compares favorably with a study of twin coil solar water heating systems trialed in 2007 (values shown as light grey lines).



Graph of annual energy output from the Pod compared with a study of four twin coil solar hot water systems (grey lines)

Viridian Solar
Atlas Building,
68 Stirling Way,
Papworth,
Cambridge UK
CB23 3GY

Tel +44 (0)1480 831501
info@viridiansolar.co.uk
www.viridiansolar.co.uk