

## Solar Heating

### How does it work?

The Earth receives a constant source of energy from the sun. This naturally occurring energy can be harnessed actively, using modern solar collector technologies to capture energy from the sun's radiation to generate heat or power for our day to day uses. Solar is a valuable technology which, when installed, can provide an energy system that runs on *free fuel*. **Solar Heating** technology is generally in the form of either '**flat plate**' panels or an array of '**evacuated tubes**'. In both systems, a fluid is circulated between the solar collector and thermal store, transferring the heat energy from the collector to its destination use in your building.

### Most common uses

- Replacing traditional electric immersion systems to provide domestic hot water for a community facility.
- Pre-heating swimming pool water in leisure centres using larger solar collector systems.
- The contribution of hot water/air to an existing heating system in a community building.



### Site and area suitability

- In general solar collectors tend to be roof mounted. To collect as much solar radiation as possible, collectors should be orientated with a southerly aspect (SE through SW) and be tilted towards the sun. However, as most roofs are pitched, there is already a suitable degree of tilt. Flat roof solar systems can be elevated to a suitable pitch using an A frame or similar system
- The structural stability of the roof should be taken into consideration with the additional extra weight of the solar panels before installation.
- Sites should be free from shade such as overhanging trees and anything that would obstruct the passage of the radiation to the collectors.
- Ideally, a system should be mounted close to the point of use. For example, if the solar system is to be used to heat water for the kitchen of your community facility then the collector and tank would be ideally located in the roof space above the kitchen. This prevents potential heat loss resulting from long pipe runs.

### Questions and Answers

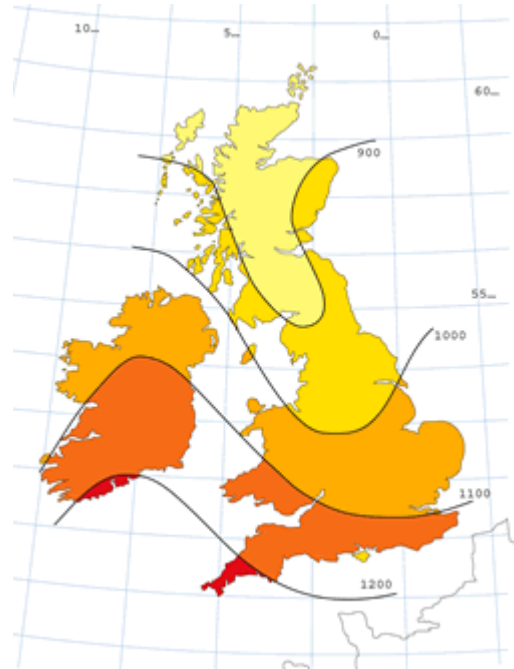
#### 🚧 Can I use Solar Thermal systems for space heating?

A typical heating season in Scotland can range from September through to April. Solar gain is highest in the summer months, tailing off towards the spring and autumn and at its lowest through the winter months, when heating is required most. For this reason, the solar cycle is said to be 'out of phase' with the heating cycle in Scotland and hence unlikely to make a meaningful contribution through the winter

months. However, during the shoulder months of the year, in spring and autumn, there is more solar radiation available and heating is still required. In these periods, a solar heating system could make a modest contribution to the heating load of a building. A note of caution as this option will always have to be assessed for cost effectiveness, given the increased capital costs of the larger system for perhaps a relatively small gain in power output.

### **Are solar systems better suited to certain areas of Scotland?**

This map to the right <sup>1</sup> of the UK solar energy shows very general data for the average annual amount of solar energy per m<sup>2</sup>. More specific data can be found by entering the latitude and longitude of your site on this NASA website: <http://eosweb.larc.nasa.gov/cgi-bin/sse/sse.cgi?+s01#s01>. It is very likely that there are significant differences across Scotland in the amount of solar gain but one of the values in this technology lies in the fact that the fuel is free and the economic value depends on the cost of the fuel you are replacing.



<sup>1</sup><http://www.solar-trade.org.uk/solarenergy/ukresource.htm>

### **Which system is more suitable for my project: evacuated tubes or flat plates?**

This will depend on your situation and location. Evacuated tubes are a modular system that looks similar to fluorescent tubes. System heat losses are minimised by the vacuum in the tubes. Due to their tubular shape they are able to collect energy for longer as the sun moves through the sky throughout the day. For this reason they may perform better over the shoulder and winter months, when the sun is at a lower angle and in lower light areas. Flat plate systems can be less expensive in some cases, generally less efficient and less susceptible to damage.

### **See for yourself**

**Timespan Visitor Centre and Cafe:** This project sees the installation of 20m<sup>2</sup> of solar thermal panels to a visitor centre and cafe. The system is fully metered to provide the group with actual energy production from the panels.

**Bridge of Don Community Swimming pool:** – 180m<sup>2</sup> of evacuated tubes collectors collect solar energy which is transferred via a heat exchanger to heat the pre heat the pool waste reducing the amount of fossil fuels required to power the swimming pool

**Ardross & Aness Bowling Club:** This group installed 4m<sup>2</sup> of flat plate solar collector to help with Domestic Hot Water requirement in their ‘Solar and Insulation ‘project which also saw the group substantially upgrade the insulation of the building to improve energy efficiency.