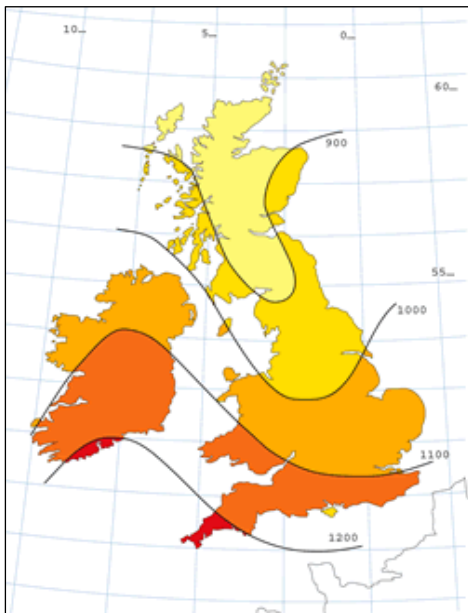


Natural Generation is dedicated to providing the most cost effective renewable energy solutions in the south west, tailor-made to your needs. We passionately believe that by taking responsibility for our environment now, we are safeguarding future generations.

Solar energy resource in the UK is far greater than most people imagine. In the summer, when items such as car bodies are often too hot to touch we become aware of the Sun's heat. A well designed solar hot water heating system will provide almost all your hot water over the summer months and up to 60% annually.



UK ANNUAL SOLAR IRRADIATION

Source: Solar Trade Association

The map shows the average annual solar radiation falling on one square metre surface inclined at 30° to the horizontal, measured in kilowatt hours. These figures bring out the remarkable fact that the amount of solar energy falling on the total roof area of an average house is many times that required to provide all its heating and hot water. Despite this, it is important to remember that solar thermal systems are generally designed to offset and not replace the conventional heating supply. The conventional water heating source often not being needed at all through the summer months, and used during the winter to top up the temperature when the solar energy is more often only preheating the water.

Solar hot water heating has been usefully installed in domestic, industrial, commercial and public sector buildings for over half a century. Where hot water use is larger, increased returns will be made on the investment. Particularly good examples being in the tourism and leisure sector where summer demand is greatest, and also in swimming pool heating.

There are two primary types of solar water heating collector that can be used to harvest radiant energy from the Sun: flat plate and evacuated tubes.

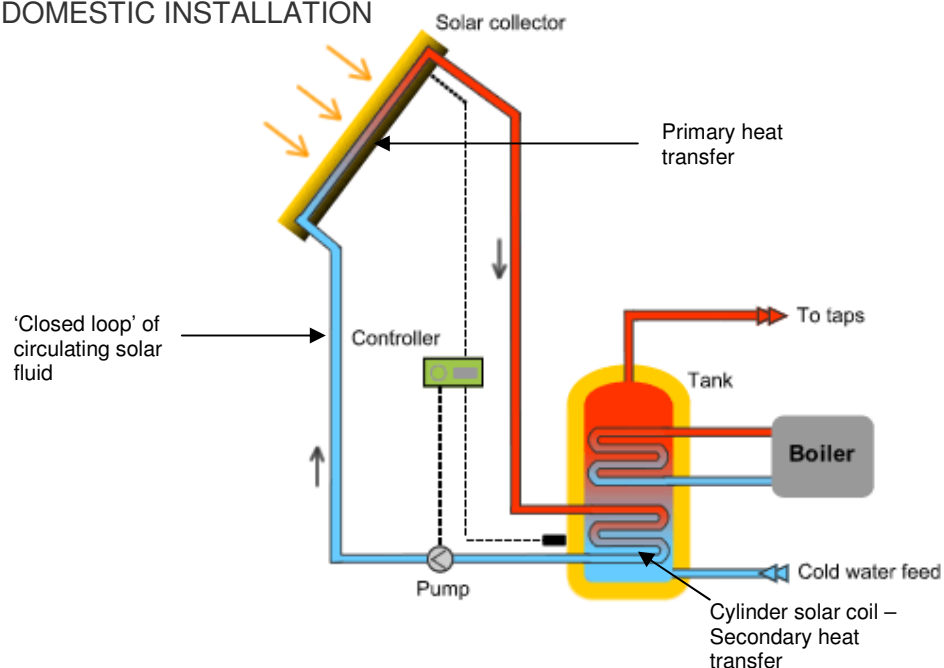
FLAT PLATE COLLECTORS: Solar water heating panels are constructed from a highly absorbent selectively coated sheet of metal which maximises heat collection and retention. The Sun's heat energy is transferred to fluid circulating in narrow-bore pipes bonded to this metal sheet. The metal sheet is embedded in a highly insulated box and covered with toughened glass or plastic on the front. The panels are usually installed on, or in the roof, and typically occupy an area of 2m² each.

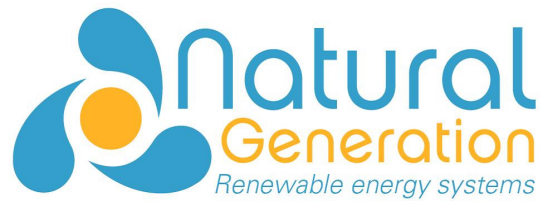
EVACUATED TUBES: This system is based on a series of glass tubes grouped together. The tubes are highly insulated, due to the vacuum inside the glass tube, and although they are very slightly more efficient than flat plates, they are not as robust. Typically occupying 1.5 - 2m² each, the Sun's energy is focused within each tube by metal reflectors, and the absorbed heat is transferred to the fluid in the manifold.

There are generally quite subtle performance differences between the various approved makes and models available, so a site visit is essential for us to identify and discuss with you which product might be most appropriate to your needs.

Fortunately, the average angle of a UK roof is approximately 30° - 50° to the horizontal, about the optimum for receiving solar energy in the UK. But anything between 10° and the vertical can be used successfully. The roof should ideally be south facing although anything between south east and south west makes little difference to performance. An east/west system may be considered where a southerly aspect is not available but has slightly higher cost implications. Ideally, the roof should not be affected significantly by shading. Collectors can be roof mounted, roof integrated (in new-build or new roofing situations), hung on gable-end walls, or mounted on A frames positioned on flat roofs or the ground.

TYPICAL DOMESTIC INSTALLATION





The illustration shows a typical domestic active solar heating system layout. An electronic controller constantly compares the temperature of the solar collectors with the temperature of the water in the cylinder. Whenever the collectors are hotter than the cylinder, the controller switches on the system's circulating pump, provided the cylinder has not reached its target temperature – usually 60°C. A glycol mixture (providing frost and corrosion protection as well as good heat transfer properties) is then circulated through the collectors and the cylinder's heat exchanger, heating the cylinder in just the same way as a central heating boiler. In most retrofit situations installation of a solar hot water system will involve upgrading your hot water cylinder to an efficient twin coil type. If you have a combination boiler, a solar thermal system is more complicated but there are two or three installation alternatives available. For swimming pool systems, energy can either be imparted through a cylinder or plate heat exchanger in the filtration loop. In larger domestic and commercial situations, solar thermal energy from banks of collectors can be used to pre-heat a water store that is subsequently brought up to temperature in a secondary store or passed through an instantaneous water heater.

COSTS AND PERFORMANCE

Active solar heating systems installed into existing households are typically priced in the range of £3,000 to £5,000 (depending on the size of house, type of collector, etc.). For new builds, system installation costs can be reduced - particularly in the case of large scale new building projects. Costs for larger domestic, commercial, and swimming pool heating systems may cost between £7k and £20k or more, depending on the scale of the project and the savings that can reasonably be made. All systems are quoted for after a free site survey to determine the feasibility of your project.

For a family of four, a well designed solar heating system (of approximately 4m² panel area) should contribute between 1,000kWh and 1,500kWh, which will be equivalent to 50 - 60% of the household's annual water heating energy needs. In commercial and larger projects, the solar array is sized to provide the optimum benefit, according to budget, and potential savings which can often be considerable. Solar hot water is also the only renewable energy technology which currently qualifies for Enhanced Capital Allowance in commercial situations. See www.eca.gov.uk for further information.

Quotes are subject to VAT which is charged at 5% on all domestic solar installations and at 17.5% on all public and commercial installations.

WARRANTY AND MAINTENANCE

Solar hot water panels generally come with a 10 year manufacturer warranty and require very little maintenance. In addition to this, Natural Generation will provide a two year warranty on all their workmanship. A 3 - 5 year service interval is typical for most systems, aside from a simple visual annual inspection by the owner.

GRANT FUNDING

Our engineers are fully BPEC¹ trained and the company solar approved on the DTI's² Low Carbon Building Programme, enabling customers to apply for government grants towards the cost of the installation.

Please see <http://www.lowcarbonbuildings.org.uk/about/> for further information.

¹ BPEC - British Plumbing Employers' Council

² DTI - Department of Trade and Industry



PLANNING

We recommend you consult your local planning authority early in the project. Although planning regulations are fairly relaxed for most small-scale solar hot water projects, requirement for consent is highly location- and scheme-dependant.

FURTHER INFORMATION

For more information on the workings of solar hot water heating systems, please see the online resources below:

<http://www.greenenergy.org.uk/sta/> and

<http://www.lowcarbonbuildings.org.uk/micro/solartherm/>

WHAT DO SYSTEM USERS THINK?

An independent survey of domestic hot water solar systems installed in the UK on behalf of the DTI found that:

- Active solar heating systems can meet around half the users' annual household hot water needs
- On average, active solar heating systems provide 20 years' or more useful service
- Systems are generally considered to be very reliable
- The majority of users say they are "very satisfied" with their systems

Please contact us to discuss your project further and to arrange a site assessment.



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