

SOLAR

Solar thermal in the UK – opportunities and developments



Kathy McVeigh argues that solar thermal has a bright future not just for individual buildings, but also as part of district heating schemes.

As pressure grows to meet renewable heating targets within the EU, there are growing opportunities for solar thermal to play an important part in decarbonising heating. While great progress has been made in Europe and the UK with renewable electricity, which now provides 27% of all power generation, renewables still contribute only 17% of the total demand for heating and cooling, according to the European Solar Thermal Industry Foundation. Heating and cooling demand makes up 49% of all energy demand in Europe, while renewable electricity represents only 42% – the figures speak for themselves in terms of opportunity.

Back in 2011, the solar thermal industry seemed to have an immediate bright future, with the much-heralded introduction of the UK's Renewable Heat Incentive (RHI) scheduled for the summer of that year. Cracks began to appear however, when the Domestic RHI was postponed by the incoming Coalition government, and further delayed by the Conservative government before finally being launched in December 2015.

While this should have been a

time for the industry to breathe a sigh of relief and sail out of the doldrums, an announcement followed shortly that there was to be a consultation on the RHI. One of the issues was whether or not to retain solar thermal in the RHI scheme. Hardly an environment to encourage the general public and industry to invest in solar hot water.

Confirmation from the UK government in late 2016 that solar thermal will remain in the RHI was welcome news and followed an intensive lobbying campaign by the Solar Trade Association (STA) and other interested industry bodies.

While slow to react to the changed market conditions in the first half of 2017, there are many opportunities now for solar thermal to boom again in the UK.

Domestic hot water and heating

The good news is that with the current RHI domestic tariff at 20.4p per kWh, the RHI can make solar thermal energy an attractive investment for homeowners – see Table 1. The payment and rate of return on investment does vary depending on the existing back-up fuel source, as well as other factors such as number of people in the household, all of which combine to calculate the RHI payment and fuel savings.

In *urban areas*, solar thermal is really the only sensible option when retrofitting a renewable energy source. With an older housing stock in most cities, and space at a premium, many properties are not suited to other options such as heat pumps or biomass. The efficiency of solar thermal technology averages at 65–75%, with optical efficiency at zero loss. This means that it takes up minimal roof area compared to PV, which has typical efficiencies of between 14 and 20%.

Solar thermal can provide up to 70% of a household's annual hot water demand, with the energy stored in the hot water cylinder, enabling the householder to use it

in the evenings when required. This is certainly a useful contribution to a home's energy needs and can make a difference to the cost of heating and hot water demand for those in fuel poverty. In a new-build home, solar thermal can be installed in a cost-effective, architecturally sensitive manner, maximising possible return on investment as well as energy efficiency.

In *rural areas*, solar thermal can also sensibly contribute to the heating and hot water demand of properties. Many households in rural areas do not have access to the gas grid, making hot water and heating costs expensive.

Solar thermal is normally installed with a back-up heating system such as oil or gas. However, uniquely within the RHI, solar thermal is eligible for support as a second technology, if installed in combination with biomass or heat pumps – that means the home owner will get support for both the heating and solar systems. It is therefore a very logical addition to any renewable heating system, as well as conventional oil or gas heating systems, providing hot water when it does not make sense to fire a boiler.

In the UK, the RHI has no provision currently for solar space heating support, which currently accounts for 20% of the total European market. This is a growing market sector in other northern European nations with a similar climate to the UK's such as Sweden (where solar space heating support is 72% of the market), Norway (67%), the Czech Republic (32%) and Germany (32%) and Austria (28%), according to International Energy Agency figures.

It makes sense to include solar space heating support in the RHI to enable the sector to develop and to provide a useful renewable heat contribution to heat demand as well as hot water.

Non-domestic solar thermal

For businesses, a tariff of 10.4p per kWh for the non-domestic RHI can bring interesting returns on investment with considerable savings possible, in particular for companies that have a high hot water demand. In addition to the RHI, firms investing in solar thermal systems in the UK may be eligible for an Enhanced Capital Allowance, which enables the business to claim a capital allowance on the investment for eligible solar thermal equipment against taxable profits.

A solar district heating project in Germany, where 2,400 m² of collectors from Wagner Solar feed into a heat network for the community of Bruhl in the city of Chemnitz

Photo: GreenOneTec, Austria / Eins Energie Sachsen

Solar industrial process heat is another market sector which is slowly growing, for applications requiring temperatures below 150°C and in market sectors such as food and beverage as well as agriculture, mining, chemical and pharmaceutical industries. This sector is one with massive potential, as industry takes advantage of the RHI and insulates energy costs from the unpredictability of future fuel prices.

Solar district heating

Solar district heating is an exciting, fast-growing sector and one that is expanding in European countries such as Denmark, Germany and Austria. During 2016, the Danish solar thermal market grew by 347 MWth of newly installed solar thermal systems, mostly due to district heating projects. Manufacturers such as GreenOneTec in Austria have introduced a range of products suited to these large-scale projects.

An interesting announcement was made at the end of April in Austria about an ambitious district heating project for the city of Graz, called 'Big Solar', where 450,000 m² of highly efficient large-scale collectors are in planning, offering a solar capacity of 250 MWth, and with seasonal storage of 1.8mn m³

| | 4-person home | 5-person home | 6-person home |
|--------------------------------------|---------------|---------------|---------------|
| Cost of installation | -£4,500 | -£4,900 | -£5,000 |
| Cost of maintenance (25 years) | -£708 | -£708 | -£708 |
| RHI (7 years) | £2,661 | £3,148 | £3,635 |
| Cylinder energy savings (15 years) | £302 | £302 | £302 |
| Savings by using own heat (25 years) | £5,326 | £6,302 | £7,277 |
| Net cash benefit (25 years) | £3,081 | £4,143 | £5,506 |
| ROI | 5.4% | 6.5% | 8.3% |
| Pay-back year | 14 | 12 | 9 |

Table 1. Economics for different size homes switching from gas to solar thermal

Data: STA

of water.

This type of project could fit perfectly with the UK's strategy to decarbonise the heating sector. The Department for Business, Energy & Industrial Strategy (BEIS) recently announced funding to help extend district heating with a £320mn budget. Solar thermal could play an important part in this strategy, with proven examples worldwide.

There is no doubt that the future looks good for solar thermal. The UK is lucky to have a strong manufacturing base, with companies such as Kingspan, Viridian and AES active in the global solar thermal market. The installer base has reduced in recent years due to the market situation, but as the STA continues to work to remove

barriers to industry growth in the UK, it is expected that many firms will return to the sector.

Looking to the future, if building envelopes and building regulations improve as predicted, heat demand will decrease, making solar thermal a sensible, cost-effective solution for hot water and space heating provision in any new build. The added advantage of solar technology is the fact that after the initial investment the energy produced is free, making it easy to calculate the return on investment over the life expectancy of the project – and cancelling out the unpredictable cost of fossil fuels. ●

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