Solar Water Heating

As part of the renovation of old farm buildings as Mucknell Abbey, solar water heating was installed on the old north wing barn and new community building to supply part of the Abbey's hot water needs.

Technical Details

Manufacturers and models:
AES Type J Landscape Serpentine flat plate solar collectors
Resol FlowCon B and DeltaSol BS pump and flow control systems
Ferroli AquaCyl hot water cylinders

Installer:
1 World Solar, www.1worldsolar.co.uk

1 World Solar and the system installed are Micro-generation Certification Scheme accredited.

North Wing
Module area: 8.8 m²
Orientation of roof: tilt about 35°, azimuth 180°
Cylinder capacity: 510 litres

Community Building
Module area: 17.6 m²
Orientation of roof: tilt 13°, azimuth 180°
Cylinder capacity: 1,000 litres

Nominal power output: 18.5 kW th

Expected annual generation: 17 MWh

Each solar thermal system comprises the panels on the roof, a closed loop containing 60 litres of water-glycol mix, and the pump, control panel and expansion vessel in the plant room. The system can operate at temperatures down to -23 °C. The panels are self-cleaning (though ideally should be tilted at more than 20°).

About Mucknell

Mucknell Abbey is a contemplative monastic community of nuns and monks living under the Rule of St Benedict and part of the Church of England.

More information on sustainability at Mucknell, and further factsheets on the renewable technologies and grounds are available at www.mucknellabbey.org.uk.

System Integration

In each plant room, the solar thermal closed loop heats the water in the pre-heat cylinder, which is then fed into the hot water tank, and topped up as necessary by heating flow from the boiler shed to provide space heating and hot water. To prevent legionella in the solar pre-heat cylinder, especially during winter, water at 60 ºC is pumped once a week from the hot water tank into the pre-heat cylinder.

Year round, the solar thermal systems will provide the 'base load' heat, but will not always be able to fulfil demand for space heating and hot water. The solar thermal systems were sized to cover the demand for hot water during the summer months – June, July and August – when no space heating is required. During these months, the biomass boiler is switched off and the LPG boiler provides the top-up heat. During the rest of the year, the biomass boiler provides the top-up heat, with the LPG as a back-up.

Environment

Day by day operation of solar thermal systems is almost entirely carbon and other pollutant free, apart from the electricity consumed by the pump and control panel, which is supplied by Green Energy. The energy required to manufacture the whole system should be recovered in about 2 years, depending on latitude, module orientation and technology.

Alternatives: evacuated tube collectors are more efficient at converting the sun's energy to useful energy but have a higher unit cost, and for us overall a shorter payback period; photovoltaics are less efficient, but any extra electricity generated can be exported to the grid, whereas the solar thermal system was sized not to waste heat during minimum summer demand; hybrid PV-thermal systems are available, but are not yet tried-and-tested.

Revenue Funding and Grants

The system was part-funded by the Low Carbon Building Programme Phase 2, a government grant scheme which has now closed. The Renewable Heat Incentive (or Clean Energy Cashback), due to be launched in June 2011, will instead provide income for generating heat from renewable sources. Or investigate:

EDF Energy – Green Fund

ScottishPower – Green Energy Trust

E.ON – Sustainable Energy Fund

Big Lottery – Awards for All

Landfill Communities Fund

Naturesave Trust – Community Renewable Energy Project

Malvern Hills AONB – Sustainable Development Fund

Cotswolds AONB – Sustainable Development Fund

Worcestershire LEADER Programme (Local Action Group)

… and other AONBs, LAGs across the country