

# Solar Energy



**Application: hot water for  
creep mats or washing**

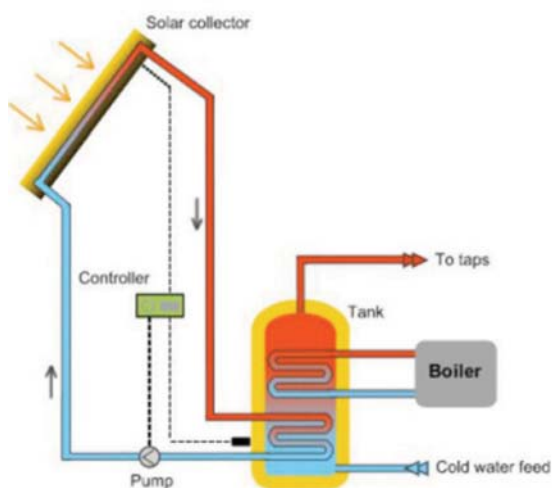
Solar heating panels (middle) and Photovoltaic panels (right) fitted to the roof of the Centre of Renewable Energy

**Solar Thermal systems use direct heat from the sun. The technology is well developed with a large choice of equipment to suit many applications.**

**Solar panels or collectors are fitted to roofs and collect heat from the sun's radiation.**



Six 1 kW solar heating roof panels by Hoval



## Solar Thermal

Approximate costs and output:

Capacity:	6 kW
Capital cost:	£8,500
Annual output:	7,900 kWh (Nottingham)
Annualised payback:	~ 19 years (at £0.069 per kWh achieved by an oil-fired boiler; not including fuel inflation)

Grant funding or the proposed Renewable Heat Incentives should greatly reduce payback.

There are two main types of collector:

- Flat plate systems (photographed above) which comprise an absorber plate with a transparent cover to collect the sun's heat
- Evacuated tube systems, which comprise row of glass tubes that each contain an absorber plate feeding into a manifold which transports the heated fluid.

Also required is a heat transfer system to collect the heat to heat water; plus a hot water cylinder to store the hot water heated during the day and supply it for later use.

**Tariffs for Solar Thermal** are also being proposed under the Renewable Heat Incentive. This is under consultation until April 2011 when figures will be confirmed. Progress can be monitored at:

[http://www.decc.gov.uk/en/content/cms/what\\_we\\_do/uk\\_supply/energy\\_mix/renewable/policy/renewable\\_heat/incentive/incentive.aspx](http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/renewable/policy/renewable_heat/incentive/incentive.aspx)

### Photovoltaics (PV)

Eg owner using electricity with surplus exported to grid:	
Capacity:	1.05 kW
Annual production: 1,196 kWh @ Generation Tariff of £0.31 kWh =	£371pa
Export of surplus: 239 kWh @ Export tariff of £0.05 kWh =	£12pa
Own consumption: 957 kWh @ Buy-in Tariff of £0.12 kWh =	£115pa
<i>See paragraph on Tariffs</i>	
Operating costs:	£60pa
Capital costs:	£9,189
Payback:	21 years without funding



Six 175 W photovoltaic roof panels by Schuco

PV or Solar Electric is the application of solar cells for energy by converting sunlight directly into electricity. The PV cell consists of one or two layers of a semi conducting material, usually silicon. When light shines on the cell it creates an electric field across the layers causing electricity to flow. The greater the intensity of the light, the greater the flow of electricity. PV cells are referred to in terms of the amount of energy they generate in full sunlight, known as kilowatt peak or kWp.

For maximum output PV systems should be arranged on open banks facing south. However PV cells can be installed on any roof or wall that faces within 90 degrees of south, as long as no other buildings or large trees overshadow them. If the cells are in shadow for parts of the day, the output of the system decreases.

**Hybrid** PV solar thermal systems are being developed that are photovoltaic panels which have a coolant circulating round them. This keeps the panels cool which maximises efficiency. The coolant is then used to heat water as a solar thermal system.

**Planning permission** may be required for some solar panel installations.

### Financial support

Currently Renewable Obligation Certificates are issued to accredited generators of renewable energy for each Mega Watt hour (MWh) produced. These are purchased by electricity suppliers to supplement their obligation to source renewable energy. The current rate works out at £0.045 for every Kilo Watt hour (kWh) of electricity produced from renewable technology.

Alternatively, technologies below 5MW will qualify for 'Feed In Tariffs' from April 2010. These will be paid for total electricity produced (Generation tariff) plus a supplement for electricity actually fed into the grid (Export tariff). In addition, money will be saved by not buying-in electricity off the grid.



Banks of photovoltaic panels at the AFBI Hillsborough NI

**Tariffs** The tariffs used in the costings for PV are taken from the table below:

Technology	Scale	Generation tariff (p/kWh)	Export tariff (p/kWh)	Buy-in tariff (p/kWh)
Solar (PV)	<4kW new build	31	5	12
Solar (PV)	<4kW existing roof	36.5	5	12
Solar (PV)	4–10kW	31	5	12
Solar (PV)	10–100kW	28	5	12
Solar (PV)	100kW–5MW	26	5	12
Solar (PV)	Stand alone	26	5	12

### Grant funding

The Rural Development Programme funds larger renewable energy projects via the Regional Development Agencies:

<http://www.defra.gov.uk/rural/rdpe/rda.htm>

Funding may also be available from the next round of the Bio Energy Capital Grants Scheme: <http://www.bioenergycapitalgrants.org.uk>

Micro generation may be funded via the Low Carbon Buildings Programme: [www.lowcarbonbuildings.org.uk](http://www.lowcarbonbuildings.org.uk)

*Grant funding may forfeit support from tariffs, so check with the funding body before accepting a grant.*

### Tax relief

The Enhanced Capital Allowances scheme provides 100% first year tax relief on capital expended on many renewable technologies.

<http://www.carbontrust.co.uk/energy/takingaction/eca.htm>