INTEGRATED-ELECTRICAL SERVICES

Solar Photo Voltaic (PV) Systems

Solar Collectors

How solar collectors work

During daylight hours the sun's radiation warms the earth. This energy can be captured and used to heat water. Solar energy is an unlimited resource that produces no harmful emissions and requires no transportation or supply pipelines. Most households can generate a good proportion of their domestic hot water needs using a modern, maintenance free, well engineered solar energy system.

Solar benefits

- Free, energy-efficient, renewable technology – helps to lower your carbon footprint
- Produces up to 60% of the typical family's hot water requirements
- Simple, reliable technology
- Quick and easy to install
- Suitable for both domestic hot water and under floor heating
- Supported by Government grants of up to £400 towards the cost of installation
- Low environmental impact – reduce carbon dioxide emissions by up to 400kg per year

System control

The integrated solar pumping station supplied with every system accurately meters the temperature of the roof panels ensuring that free energy is harvested whenever the hot water cylinder can accept it. Full thermostatic control of all elements of the system is important to prevent heat from the cylinder's store being pumped back through the panels and lost to the atmosphere.

Where should collectors be sited?

Any roof with a 0˚(flat) to 60˚ slope and facing between southeast and southwest is suitable for solar collectors. The optimum angle is between 30˚ and 45˚. Larger collectors can be fitted to compensate if the orientation is less suitable but north-facing roofs should be avoided.

How many solar collectors are needed?

We will individually size each solar system for your project and location in the UK

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Solar hot water cylinders?

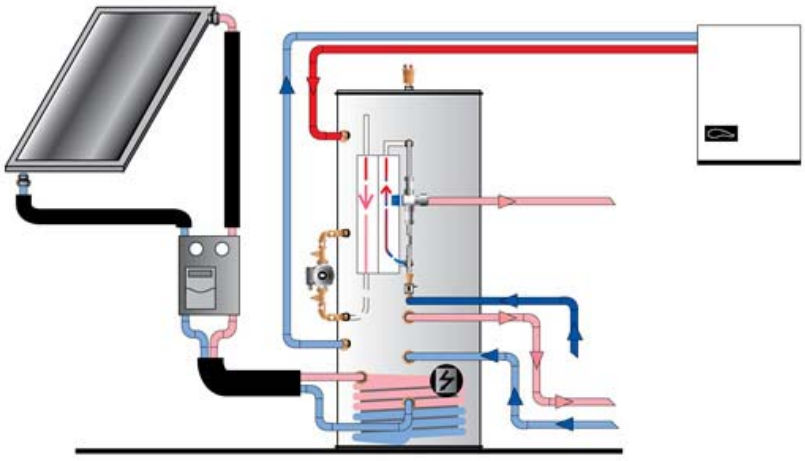
We supply a range of solar hot water cylinders suitable for use with its collector systems. From the EnergyMaster2 Solar™ to more sophisticated dual coil cylinders with integrated electronic sensors, we will advise you on the model that best suits your requirements.

System control

The integrated solar pumping station supplied with every system has simple-to-operate controls. It accurately measures the temperature of the roof panels ensuring that free energy is harvested whenever the hot water cylinder can accept it. Full thermostatic control of all elements of the system is important to prevent heat from the cylinder's store being pumped back through the panels and lost to the atmosphere. It also acts as a safety feature to prevent cylinder overheat.

On some options, an intelligent control system will optimise the provision of hot water to when each technology is at its most efficient. For example, solar panels only collect energy during daylight hours whilst heat pumps operate at all times of the day and night. It therefore makes sense to take advantage of solar energy when it is available and switch to the heat pump for the rest of the cycle. This also coincides with the times that electricity to power the heat pump is available on an economy tariff, further reducing running costs.

Type SC01 (PV1)
This system is configured for use with conventional boilers to optimise solar energy harvested for domestic hot water production whilst also contributing to the under floor heating in spring and autumn, further reducing energy bills.



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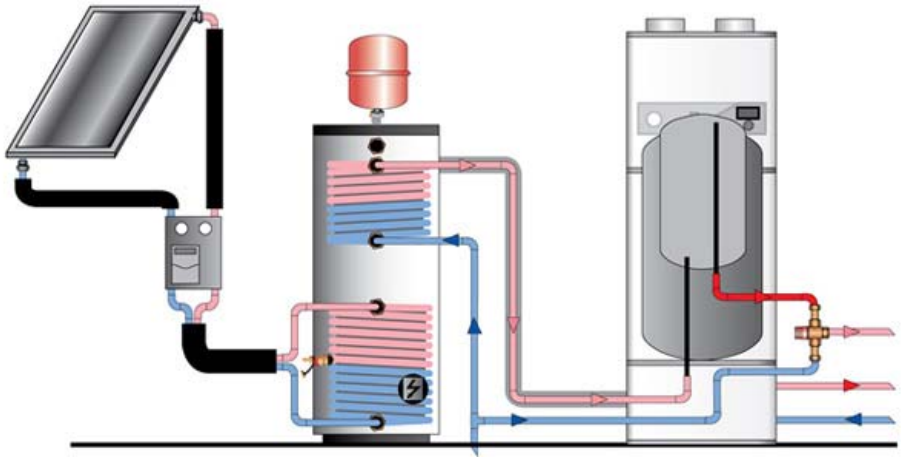
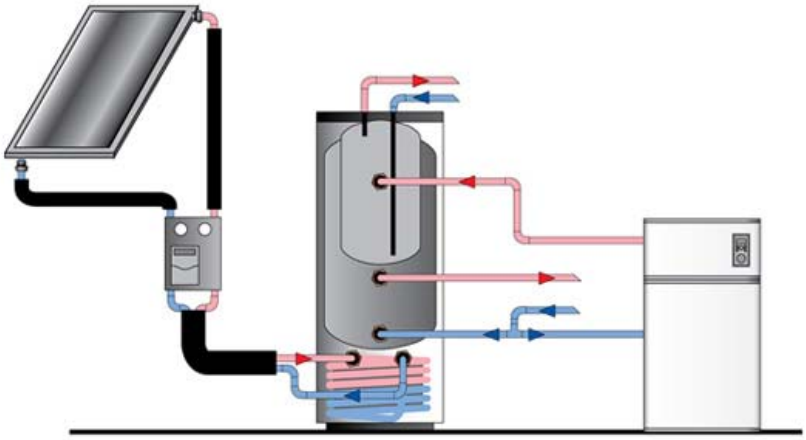
Type SP01 (PV2)

This system is configured to optimise solar energy harvested for preheating the domestic hot water before it is fed to a 360P Exhaust Air Heat Pump. It is particularly suitable for flats, apartments and houses up to 100m2 and can help achieve Level 4 of the Code for Sustainable Homes.



Type SC02 image PV3

This system is configured to optimise solar energy harvested for domestic hot water production whilst also contributing to the space heating in spring and autumn, running in conjunction with a ground source or air source heat pump. It can make a valuable contribution to achieving Level 4 of the Code for Sustainable Homes.



Solar Photo Voltaic (PV) Systems

Solar - How it works

During daylight hours the sun's radiation warms the earth, even when the sky is overcast. This energy can be captured and used to heat water. Solar energy is an unlimited resource that produces no harmful emissions and requires no transportation or supply pipelines. Most households can generate a good proportion of their domestic hot water needs using Nu-Heat's modern, maintenance free, well engineered solar energy system. This figure can be as high as 100% in the summer, but falls during the cooler months giving an average annual provision of up to 60%. Every Nu-Heat quote states the estimated annual proportion of hot water the solar collector will supply based on the individual demand for the household.

The complete package – An integrated solution

We supply a complete package with all of the parts needed to install the system*. Our range of collectors fully integrates with both our under floor heating systems and heat pumps or can be fitted independently. All components are designed, manufactured and rigorously tested to the highest standard.

* Excludes electrical wiring and sundries.

Collectors

Flat plate collectors are made by one of the leading German manufacturers and utilise the latest collector technology including prismatic glass and titanium oxide absorber coating, both of which maximize performance. The metal sheet absorber sits between the glazing and insulation and collects the radiation that passes through the glass. This heat is transferred to the water/glycol mix, which flows through the copper pipes in the panel. The fluid is then pumped along circulating pipes before passing through a heat exchanger in the hot water cylinder or thermal store where the heat is given up.

Solar Photo Voltaic (PV) Systems

System control

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Solar hot water cylinders

We supply a range of solar hot water cylinders suitable for use with its collector systems. From the sophisticated Energy Master Solar™ series cylinder to more traditional dual coil cylinders, we will advise you on the model that best suits your requirements for both heating and domestic hot water.

Where should collectors be sited?

Any roof with a 0˚(flat) to 60˚ slope and facing between southeast and southwest is suitable for solar collectors. The optimum angle is between 30˚ and 45˚. Additional collectors can be fitted to compensate if the orientation is less suitable but north-facing roofs should be avoided.

Solar PV Siting

There are five main factors that will impact how much energy a solar PV system will generate.

Shading

Orientation

Angle

Array Size

Shading

First thing in the morning and last thing in the evening it is possible that surrounding buildings or trees may partially shade a PV array, when the sun is low in the sky. Providing this is however for only about an hour after sunrise or before sunset, this will only have a very small impact on the annual energy generation, as very little power will be generated then anyway.

It is important however to ensure that your PV array will not be shaded during the main part of the day and so avoid placing your array where there will be significant shading from surrounding buildings or trees.

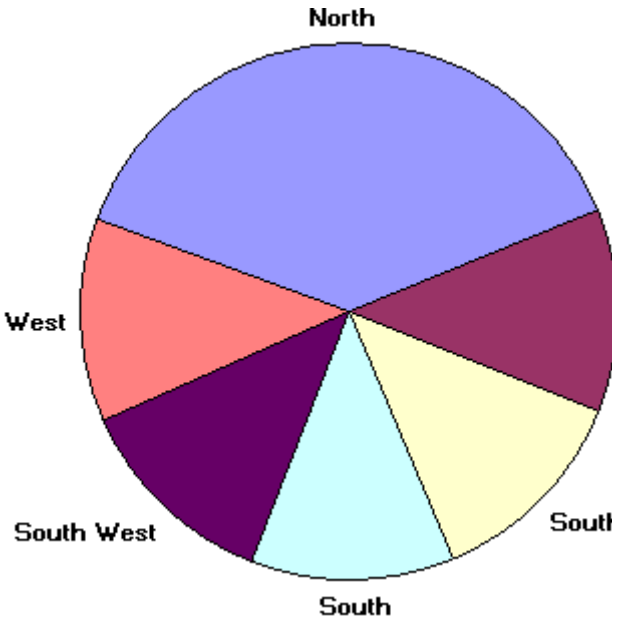
Detailed below is the official definition of shading that Segen uses in its calculations.

Overshading	**% of sky blocked by obstacles.**	**Overshading factor**
Heavy	> 80%	0.50
Significant	60% - 80%	0.65
Modest	20% - 60%	0.80
None	< 20%	1.00

Orientation

The sun rises in the East and sets in the West, but never goes North. Clearly therefore the more that a solar PV array is facing South the more direct sunlight it will receive and the more energy it will produce.

In general you should only site a solar PV array so that it faces between the South East and the South West otherwise its energy generation will be significantly reduced.

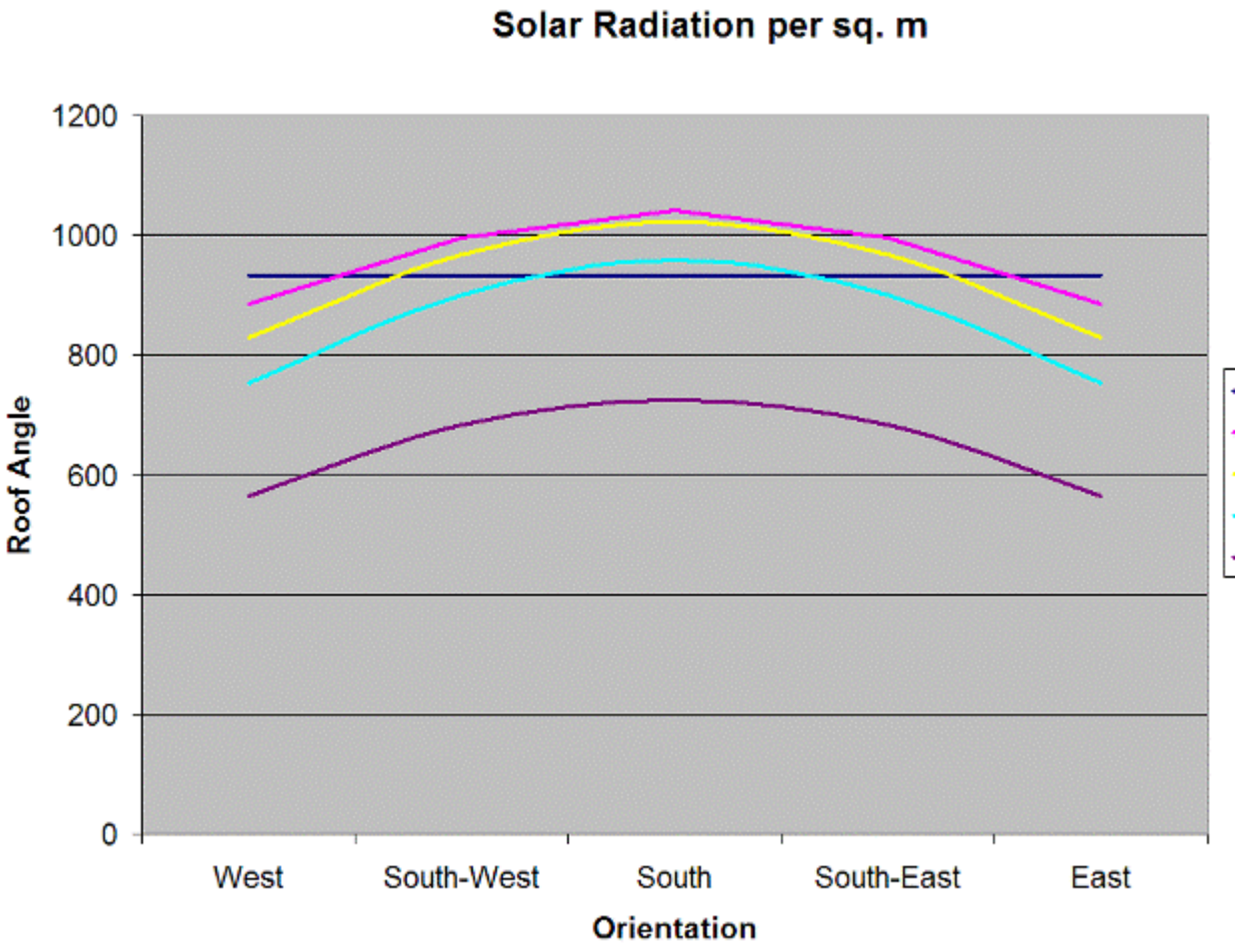


Angle

The sun spends most of time relatively high in the sky and therefore to ensure that a PV panel maximises its exposure to direct sunlight it should be mounted at an angle.

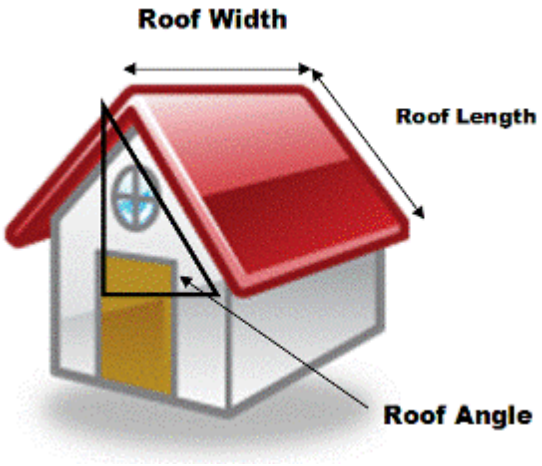
In the UK latitudes, the best angle is between 30 degrees and 45 degrees from horizontal.

The impact of different angles however is dependent upon the orientation of the array and the combined impact of orientation and angle is illustrated by the example graph below for Bristol.



Solar Photo Voltaic (PV) Systems

Array Size



Clearly the larger the array of solar PV panels the more energy it will generate.

A typical single PV panel is 1,600mm X 800mm and may be mounted either horizontally or vertically as required. Any number of panels may be combined into a single array as required.

A typical domestic system provided may consist of 8 PV panels in either a horizontal or vertical configuration with overall dimensions of 6.4m X 1.6m or 3.2m X 3.2m.

SOLAR PV Systems FAQ

How much does it cost?

The total installed cost of a PV system will depend upon the size of the system and how it is mounted. It is not therefore possible to give precise figure without a more detailed analysis of the property in question. As a general guideline however a solar PV system will typically cost £4,000 - £5,000 per kWp.

An average sized domestic system therefore of 16 panels totalling 2.8kWp would cost £12,000 - £13,000 fully installed.

How much energy will it generate?

There are five main factors that will impact how much energy a solar PV system will generate:

1. The total size of the PV array.
2. The latitude of the location.
3. Which direction the PV panels face.
4. What slope the panels are mounted on.
5. Anything which shades the panels.

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As an example south facing roof mounted 1.3kWp PV array in the Midlands should generate approximately 1,200 - 1,300 kWh per year, saving around £400 - £500 per year depending upon the price you pay for your electricity.

How do I get paid for my generated energy?

The Government announced in July 2009 the details of the proposed feed-in tariff for Microgeneration systems from April 2010. The **consultation** for this ended on the 15th October 2009 and the Government has now announced the final proposals as detailed below.

In summary the feed-in tariff (FIT) is expected to provide all generators of renewable energy with a **higher rate of income** from all their generated power than they currently receive, making renewable energy systems **significantly more economic**. The rate of income will be determined by the size of the system and the current proposals are as detailed below;

System Type	Size	Rate/kWh	Segen Systems
Solar PV	0 - 4kWp (new build)	36.1p	**NU180-16**, **NU180-22** or **ND220-18**
Solar PV	0 - 4kWp	41.3p	**NU180-16**, **NU180-22** or **ND220-18**
Solar PV	4kWp - 10kWp	36.1p	**NU180-40**, **NU180-55** or **ND220-44**
Solar PV	10kWp - 100kWp	31.4p	**NU235-408**
Solar PV	100kWp - 5,000kWp	29.3p	

All qualifying systems installed after July 2009 are expected to qualify for the feed-in tariff from April 2010.

Do I need planning permission?

Most properties will not need planning permission, but you should contact you Local Authority at an early stage to establish the situation for your specific project.

If planning permission is required, We will complete this application in conjunction with you and hte local planning council. For all properties you will need to inform your local building control department of the local authority, but they will not normally make a charge for this.

More information may be found in the Government's guidance for planning: **Planning: A Guide for Householders**.

How does it connect to the grid?

Your solar PV panels are all linked together and connected into an inverter which converts the DC power from the solar PV panels into mains voltage compatible AC.

For Solar PV systems less than 3.6kWp you do not need permission from your electricity company to do this, but you must inform them afterwards.

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Any power that you generate will first be used by your property thereby reducing your electricity bill. If you generate more power than you use then any surplus is exported to the grid and you will need to negotiate with your electricity supplier to get paid for any excess.

Please contact us for more detailed information and to arrange a site assessment before committing to an installation.