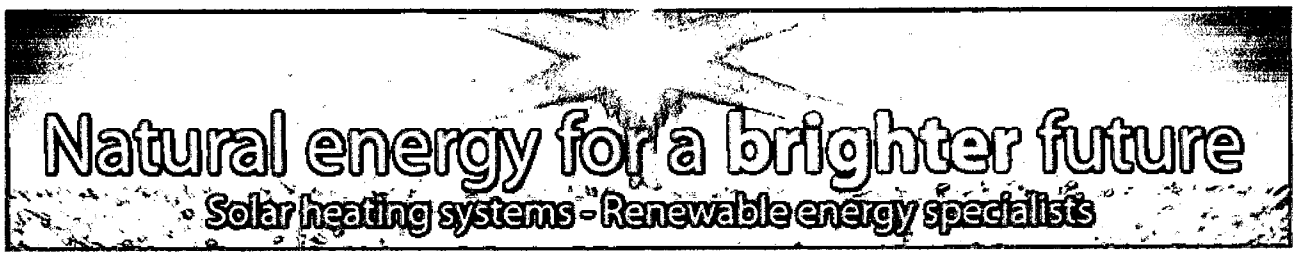
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eco2solar

0845 291 3772
(all calls charged at local rate)

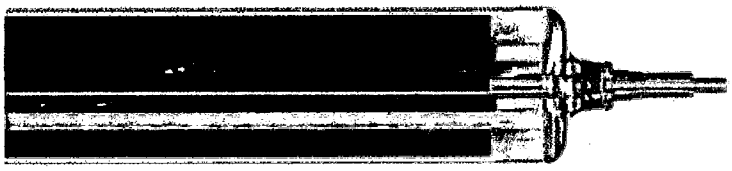


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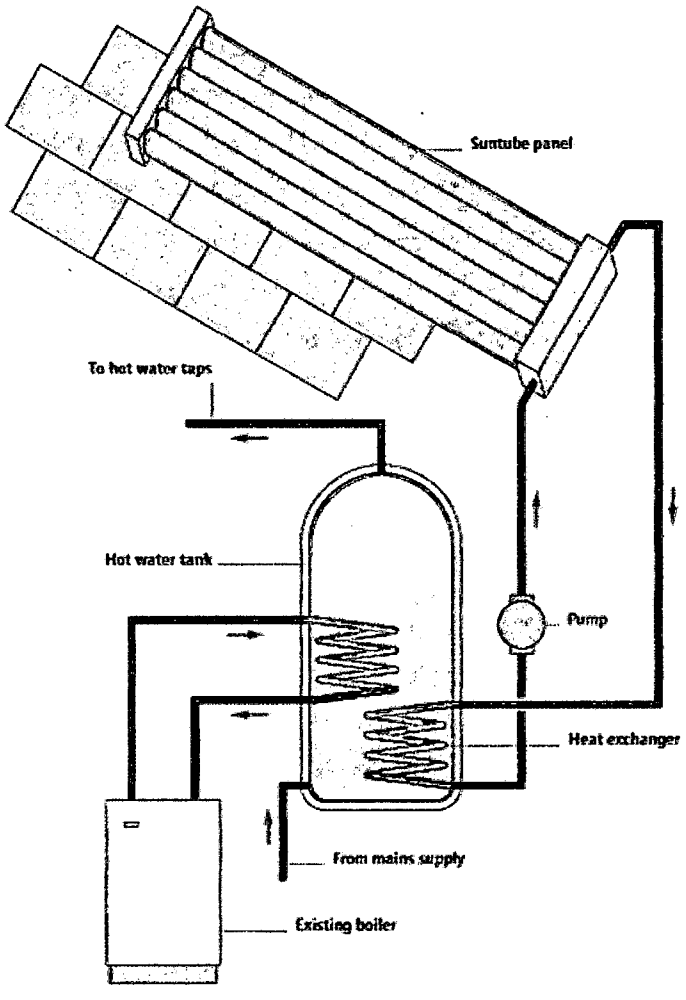
Solar Panels

The Ecotube is an advanced solar water heating system from Riomay, widely recognised as a world leader in the design and construction of vacuum tube devices.



How is it used?

The Riomay Ecotube forms part of a simple, yet highly efficient energy transfer system that can heat water throughout the year. Whether your system is domestic, commercial, small or large, the principle is the same.



The heat transfer fluid passing through each panel is a solution of water and non-

toxic antifreeze. This fluid absorbs heat from the Ecotube array and is pumped to a heat exchanger (coil) in the hot water tank. The heat then passes into the water, and the fluid is pumped back to the solar panel.

The pump is controlled by an electronic device that detects the temperature difference between the solar panel and the hot water tank. When the temperature in the panel is lower than the temperature in the tank, the system remains on standby. But when the sun raises the temperature in the panel to 4°C above the temperature in the tank, the temperature controller switches on the pump.

The system prevents energy losses at night and during the darkest days of winter, and the heat transfer fluid eliminates any risk of freezing.

How does it work?

Contact us for more information

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The Energy Saving Experts

Fact Sheet – Solar Photovoltaics (Solar PV)

Introduction

Solar photovoltaic cells (PV) convert light into electrical energy. The amount of electrical energy produced depends on the amount of light that falls on the PV material. PV requires only daylight, not direct sunlight, to generate electricity although the output from a PV cell will vary with the intensity of the light.

PV cells come in all shapes and sizes and can be connected to the national grid or simply to a battery bank. In any event, they will significantly reduce the running costs of any building in which they are fitted.

How does a solar PV system produce electricity?

A PV cell processes sunlight into electrical energy using semiconductor materials such as silicon, gallium arsenide, cadmium telluride or copper indium diselenide. The crystalline silicon solar cell is the most commonly used.

When light shines on the cell it creates an electric field across its layers, causing electricity to flow. This electricity is then conducted away by metal contacts as direct current (DC).

The basic PV building block is the cell, from which larger systems are assembled. There are three principal PV cell types:

- Monocrystalline. Generally appear matt black in colour and have the highest light-to-electricity conversion efficiency (around 15-18%).
- Polycrystalline (also known as multicrystalline). Usually blue in colour with clearly visible individual crystals. These have an efficiency of 10-12%.
- Amorphous silicon (also known as thin-film). Generally appear brown in colour, although some will have some colour variation due to refraction.

PV cells operate at a low voltage, typically 0.55V for crystalline and 0.9V for thin film amorphous silicon. Therefore, individual PV cells are connected in series to increase the voltage and to form a module. Modules are then linked together to form an array, in order to provide sufficient power for household or commercial needs.

Higher voltages are achieved by connecting modules together in series (strings) to add voltages. Higher power levels are achieved by connecting strings (of equal nominal voltage) together in parallel to add currents.

Why install a PV system?

Installing a PV system enables the generation of on site electricity. This helps to reduce electricity bills and carbon emissions.

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PV systems are work equally well in any environment (urban or rural) as they can be easily installed on the roof of just about any building and they can be easily connected to a buildings electricity supply.

Other reasons to install a PV system are:

- It is the most practical and economically viable option for many applications in remote areas.
- PV arrays can be integrated into the fabric of a building.
- Electricity can be supplied at the point of use.
- The system operation is silent.
- Minimal maintenance is required.
- PV systems are modular, and can be added to at any time.
- PV systems generate no greenhouse gases, saving approximately 450kg of carbon dioxide per year for each kWp installed.
- Can be integrated into or mounted on an existing roof.

How much does a PV system cost?

The cost of a complete PV system, including installation, can vary dramatically depending on the type of system to be installed (grid-tied or standalone) and the installation method to be used (roof integrated, on roof, flat roof, ground mounted, canopy or facade).

As a rough estimate, systems start at around £8,000 before grants for a typical domestic installation of 1.5 kW. Please contact EcoFirst for a detailed quote as we will be able to advise you of the most appropriate system for your specific project.

How much energy does a PV system produce?

PV cells, modules and arrays are rated at peak output power. Peak output power is usually quoted at Standard Test Conditions (STC). Watts peak (Wp) is the PV peak power in Watts (W) produced at STC. These conditions are rarely achieved in practice and so the Wp rating of a PV system is the potential maximum output power. The actual output depends on solar radiation levels which vary considerably during the day and also during the year.

For a well designed 1 kWp grid connected PV system installed in the UK around 750 kWh of electrical energy will be produced per year. This 1 kWp PV array will require around 8-15 m^2 of exposed area, depending on PV cell type and use a DC-AC inverter of 800 W. The array should be installed within 45° of South and on a roof pitch of 30° to 60° for optimal performance in the UK.

A typical three bedroom home uses 3290 kWh/yr of electricity, so typical domestic sized PV systems of between 1.5 and 2 kWp could provide between 30-40% of the total electricity requirements. This proportion would be greater in an energy efficient home of the same size, although demand may occur at a different time from generation.

Installations on commercial buildings are also particularly suitable for PV, as demand for electricity occurs at the same time as generation.

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What types of PV system are there?

PV systems fall into two broad categories, namely stand-alone (off-grid) and grid connected systems.

Grid connected

A grid connected system connects to the public electricity distribution network and has to comply with specific conditions regarding safety and quality.

Connecting a PV system to the distribution network will require permission from the Distribution Network Operator (DNO). The DNOs in the UK have different policies when it comes to connecting PV systems to their networks, and so different rates will be paid for exported electricity. EcoFirst will make the necessary arrangements for grid connection.

Unlike off-grid systems, grid-connected PV systems require no energy storage back-up (such as batteries) for periods of low light, as the electricity distribution network acts as a back-up power supply. So, at times of low local energy demand during daylight, surplus energy from the PV system is supplied to the grid. Conversely, any deficit is provided by the grid at times of low PV output, e.g. at night.

A grid connected PV system consists of the following main components:

- PV generator (PV array)
- DC Isolator switch
- DC cabling
- Inverter
- AC cabling
- AC isolator switch
- kWh meter

Stand-alone systems

Stand-alone systems require energy storage to compensate for the time lapse between the production of energy and the energy requirement. Rechargeable solar batteries are suitable for energy storage. The use of storage batteries requires a suitable charging regulator, for protection, and to guarantee a high availability and a long life expectancy. A typical stand-alone system consists of the following main components:

- PV generator (PV array)
- Charge controller
- Battery
- Loads

Some applications for stand-alone systems include:

- Mobile systems for cars, caravans and boats
- Remote housing (no national grid supply)
- Emergency telephones, ticket machines on car parks, buoys and similar items disconnected from the electricity grid
- Applications for horticulture and landscaping

- Solar powered pumping systems to support the supply of drinking water and irrigation

What shapes and sizes do the PV cells come in?

PV cells generally come in the form of rectangular panels of variable sizes, or in the form of individual solar slates, that are installed on the roof in very much the same way as roof tiles.

Both the rectangular panels, and the solar slates, are invariably fitted in multiples and they can be fitted in any configuration. For example, they can be fitted in portrait format, landscape format, in the shape of a T (to avoid roof lights), or in a random format.

The solar slates are always integrated into the roof but the rectangular panels can either be integrated into the roof or fitted on mounting brackets above the roof. The chosen installation method has no effect on the output of the panels.

EcoFirst supplies and fits high quality PV modules in a wide variety of shapes and sizes. We can also supply PV modules that integrate seamlessly with our solar water heating modules as they are constructed within the same rectangular frame system. A great solution if you are planning to fit both technologies.

How long will a system last?

The average lifetime of a PV module is in excess of 20 years; crystalline silicon modules in particular have a very long life span. They also require very little maintenance. Other system components will have a varied lifespan. For example, batteries in stand-alone systems can last between 2 and 15 years depending on type and quality.

As a strict principle, EcoFirst only supply top quality components that have some of the longest life spans in the industry.

What grants are available?

Government grants are available to help you cover the cost of a PV installation. For domestic properties, the grant can be up to 50% of the total cost. For the latest information please contact EcoFirst on 0845 257 5064. We can help process grant applications on your behalf.

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