

# Photovoltaic Systems



The UK, as with many other countries in the world, is striving to increase the proportion of energy that is obtained from green or renewable sources, such as the sun, wind or biomass.

A popular source is producing electricity from solar energy using photovoltaic (PV) panels. Following government incentives and support there has been a significant increase in the number of these systems installed in recent years.

Any new technology will introduce new challenges and new fire risks for property owners, installers, Fire and Rescue Services and insurers to consider. Fires involving PV systems are rare but incidents have been increasing in line with the growth in this sector. Much can be done to ensure the risk of a loss occurring is reduced to as low a level as possible.

Solar photovoltaic (PV) systems, often known as solar panels, directly convert the sun's light into electricity using solar cells. PV systems only require daylight, rather than direct sunlight to generate electricity so they can work even on a cloudy day.

Please note: Photovoltaic should not be confused with Solar Thermal which is indirect energy generation where the modules (panels) collect the heat from the sun, capture it and transfer it, for example for heating water. Solar Thermal does not present the same issues as there is no Direct Current (DC) electricity involved.

### How does a photovoltaic system work?

In simple terms, when light shines on a solar panel it creates an electric field across layers of silicone in the cell. The stronger the light, the greater the flow of electricity. PV cells produce electricity in the form of Direct Current (DC), which is in contrast to the power used by conventional mains electrical equipment where the power is Alternating Current (AC). A device called an inverter is therefore needed to covert this electricity to AC which can then be used immediately in the building or stored in batteries for future use. Alternatively, the electricity can be exported to the National Grid.



## What you need to know

PV systems now come in various forms to suit all applications, from grey 'solar tiles' that look like roof tiles, to panels and transparent cells. Solar panels are heavy and the roof must be strong enough to take their weight, especially if the panel is mounted on top of existing tiles. Remember to take into account the possibility that the panels may be covered with snow, imposing an additional load.

While a PV system can lead to lower energy bills and reduce your carbon emissions, it does carry some potential risks and issues which you need to consider before installing:

- Poorly designed and installed PV systems can lead to roof leaks as well as the obvious risks with electricity. The cause of fires involving PV systems are often related to poor installation or design. Always use Microgeneration Certification Scheme (MCS) certified installers. This should cover all stages of the operation - design, installation and maintenance. The quality of installer and equipment is critical.
- PV systems are not in themselves a fire risk however they can cause problems if the building on which they are installed catches fire. High Direct Current levels in the panels can pose problems with fire-fighting because the modules cannot easily be switched off and can continue to operate even when damaged. This means that it can take longer to make the premises safe for fire-fighters, causing more fire damage and increasing the extent of the loss. Always ensure a DC (and if possible an AC) isolating switch is installed. Isolation switches should be clearly labelled.
- Roof anchors must be strong enough to withstand a fire, and to minimise the risks posed by large arrays of panels, these should be subdivided into smaller sections. If severe enough, a fire can melt the roof anchors that secure PV system modules. They in turn can cause damage to the roof as they fall and a burning PV system can release significant amounts of toxic gas.
- Cables and power lines to the AC side must be protected by over current devices such as circuit breakers.
- Ensure installed panels do not obstruct or restrict use of roof windows as a means of escape.
- Where roof spaces have fire compartmentation installed it is important that any system installed does not breach this compartmentation.
- PV installations must be separated from any existing lightning protection system, and also from likely future positions of any such system, such as main roof ridges where conductors may need to be placed in the event of an upgrade of the lightning protection system. Surge protection may be required where bonding to the lightning protection system is necessary. Specialist lightning protection advice should be sought regarding separation and installation of surge protection.
- If your building is not connected to the National Grid, PV systems can provide alternative energy that may be far more flexible, as excess electricity can be stored in special batteries. You will need to consider where you can safely and securely store this extra equipment and specialist advice should be sought.
- If the unfortunate happens and a fire occurs, please inform the Fire and Rescue Service of the location of the panels and the isolator switch, as it may not be obvious to them especially at night. This will influence their tactics on how they will fight the fire and attempt to minimise overall damage.
- Install a warning sign adjacent to the distribution board advising there are PV panels on the roof. n Ensure your emergency contact list includes details of the Distribution Network and PV installer.

- Ensure the PV system is maintained as recommended by the installer. A scheduled maintenance visit should include checking the inverter fans and ventilation, panel cleaning and cleaning of irradiance sensors.
- Your periodic check of the electrical installation needs to include the electrical components of the PV system.
- The room where the inverter is located needs to be kept clear of all combustible materials and secured against unauthorised entry.
- If you would like a photovoltaic system to be covered as part of your insurance policy, please talk to us or your broker before you are due to have it installed.

### Helpful information

- British Photovoltaic Association (BPVA). [www.bpva.org.uk](http://www.bpva.org.uk)
- Microgeneration Certification Scheme (MCS). [www.microgenerationcertification.org](http://www.microgenerationcertification.org).

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