Risk control

Solar Panel Installations

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Introduction

This guidance document has been developed in response to the growing number of solar panels that are being installed across the UK. Provisionally, as of the end of May 2025 there is a total of 18.9 GW of solar capacity in the UK across 1,803,000 installations, marking an increase of 8.1% (1.4 GW) since May 2024[1]. The same UK Government report also highlights that during May 2025, there were 23,098 installations, accounting for 89 MW of capacity, the second most new installations in a month, behind March 2025. These volumes remain higher than average figures seen between 2016 and 2021.

The continuing increase in micro energy generation has likely been prompted by the high energy costs and pressure on organisations to meet deadlines for net zero carbon emissions.

Harnessing the freely available power of the sun is an appealing idea to most property owners, as is being more resilient to potential issues with the supply from the national grid. However, there are some significant risks that come with solar panel arrays that need to be carefully considered and these include:

Financial Risk – Although the level of investment required for installing solar panels might be coming down as production volumes ramp up, the capital outlay involved can be significant and depending upon a solar panel systems efficiency there remains a long payback period before breakeven is reached. As costly assets, solar panel systems can also be a target for theft, and so owners are advised to ensure adequate security arrangements are in place and that insurers are aware of the value such arrays add to the property.

Installation and Operational Risks – The selection of a suitable location for installing a solar array needs careful thought to ensure system efficiency is maximised whilst minimising risks associated with safety, accessibility, and aesthetics etc. It is essential that competent and responsible people / organisations are employed to design, install and maintain these potentially dangerous electrical systems to avoid personal injury and damage to property.

Deterioration and Maintenance Risk – All materials exposed to the demands of our climate will decay over time. Despite this, manufacturers and installers often offer extensive warranties on their products and workmanship, but these are subject to certain conditions being met. Contrary to popular belief, the components that make up solar panel systems require regular inspection, testing, and maintenance (beyond just cleaning the glass surface) to ensure their continued safety and reliability.

We will explore some of these risks and controls in more detail over the coming pages.

Energy Conversion

Solar power works by converting energy from the sun into power. There are two forms of energy we can usually generate from sunlight – electricity and heat.

Solar PV panels are usually made from silicon, or another semiconductor material installed in a metal and plastic panel frame with a glass casing. When this material is exposed to photons (the basic unit of light) from the sun, it releases electrons and produces an electrical charge.

This charge creates an electric current (specifically, direct current or DC), which is captured by the wiring in solar panels. The DC electricity is then converted to alternating current (AC) by an inverter. AC is the type of electrical current used when you plug appliances into normal wall sockets.

Solar Thermal Panels are less sophisticated. They have a flow of water (or other fluids) passing through them which is simply heated by sunlight. The resultant heated water can then be directed through a hot water storage vessel to provide a supply for heating systems and taps. Solar thermal panels are usually installed on a roof facing the sun and can be used in combination with PV panels.

Suitable Locations

Solar panels are manufactured in various sizes and can be roof or ground mounted via a mounting framework.

In the UK the positioning of a solar panel array is normally to have them facing south at an angle between 20^0 – 50^0 from the horizontal. However, maintaining an optimum panel direction and angle is difficult due to seasonal changes in the height of the sun in the sky and geographic latitude.

Modern PV panels do not need to be in direct sunlight all the time to generate electricity, and it's not unusual to find solar panels situated on east or west facing roof elevations of buildings, although they will always perform better when they are unobstructed from shadows cast by trees or neighbouring buildings.

In some parts of the UK planning permission may be required from a local authority, particularly if the installation is for a listed building, or the building is located within a conservation area or historically sensitive area. The main issue from a planning perspective is the aesthetics of any system and how it affects the amenity and character of the area. However, continued relaxation of planning rules has seen most solar panel installations being regarded as 'permitted development' although there are a few

exceptions, so gaining confirmation of any restrictions is always advisable prior to purchase and installation.

The weight of a solar panel can be significant. Multiple panels can place a heavy loading on the roof structure, and so a competent installation company will need to survey and assess the condition of the roof and its ability to withstand the additional loading. The roof design, its age, and the nature of covering materials should also be considered.

Whilst rooftop systems can be a good option, some organisations may find ground-based systems are easier, quicker, and less costly to install and maintain if suitable land is available.

If a ground based solar panel system is being considered, then one of the key issues to evaluate is the accessibility people might have to the system when it is 'live' and generating energy. These installations produce electricity at significant voltages and can also become a heat source.

A prudent control would be to restrict access to only competent and authorised personnel who are equipped with the appropriate tools and have been adequately trained in applying a Permit to Work system (PTW) as part of a suitably designed Safe System of Work (SSoW) that includes the ability to isolate and test the system.

It would also be reasonable to establish robust security measures around the solar panel array to prevent the access of any uninvited visitors and set any fencing at a distance to limit the chances of malicious damage to equipment from thrown items.

Many solar panel systems generate more energy than is needed or used during the day, so most systems are configured in a way that any excess energy is fed back into the national grid. By utilising a feed-in tariff this action can create a revenue for the property owner.

It is also becoming increasingly common for PV systems to incorporate a battery storage facility to hold any excess charge that the panels generate (for use overnight or when there is higher electrical demand), thus minimising the need to draw electricity from the grid. These batteries are often Lead Acid batteries or Lithium-ion (Li-ion) with the latter becoming a more popular technology as they take up less space and accept electrical charge more efficiently.

However, there has been significant adverse publicity about Li-ion batteries in other electrically powered apparatus (cars, E-bikes, vaping devices etc.) as they can cause significant fires if they are damaged or misused.

Therefore, a properly designed solar panel system must incorporate a suitable automatic control mechanism that monitors and regulates the flow of electricity from the panels via the inverter to the battery storage and back to the grid if the battery becomes fully charged.

Many of these components can become heated when in use and particularly in fault conditions, so it is essential that a safe and secure location is found for this equipment to be located. The location should be free of combustible materials, and maintain adequate ventilation and appropriate fire detection systems etc.

Electrical Risks

Each PV panel has between 60 – 72 cells that are collectively capable of generating 350w – 450w of power. Each panel is connected in series. However, it is a peculiarity that each PV panel will generate a DC charge whenever it is exposed to light, and they are not generally fitted with an individual off switch, so the glass surface should be covered to reduce the risk of electric shock when handling these panels.

It is a phenomenon of DC electricity that it has a greater propensity to cause and sustain an electrical ark if there is a break / fault in the electrical circuit in which it flows. Therefore, the DC side of a solar panel system, if allowed to deteriorate or become damaged, may pose a greater risk of fire and electric shock.

Solar PV systems are subject to the Electricity at Work Regulations 1989[2] which amongst other things stipulate that employers, as far as is within their control, should:

- Ensure electrical systems are constructed and maintained to prevent danger (risk of injury) so far as is reasonably practicable
- Ensure any work activity, including operation, use and maintenance of a system and work near a system, shall be conducted in such a manner as not to give rise, so far as is reasonably practicable, to danger
- Any equipment provided under these regulations for the purpose of protecting persons at work on or near electrical equipment shall be suitable for the use for which it is provided, be maintained in a condition suitable for that use, and be properly used

Electrical installations in the UK should be designed, installed, inspected, and tested in compliance with British Standard 7671 IET Wiring Regulations[3] and BS EN IEC 62446-2 Photovoltaic (PV) Systems – Requirements for testing, documentation, and maintenance – Part 2: Grid connected systems – Maintenance of PV systems[4]. These standards detail the scope of work required to evidence compliance with The Electricity at Work Regulations 1989.

The electrical circuitry of a well-designed PV system should include an accessible and clearly marked DC isolation switch / fireman's switch to enable the shutting down of the inverter in an emergency.

The installation of, or significant alteration to a PV system should be undertaken in line with the component manufacturers instructions (often referred to as an Operational and Maintenance (O&M) manual) and undergo a commissioning inspection and test by an electrical engineer competent in the type of system being worked upon.

On completion of such works an appropriate electrical installations certificate should be produced containing the details of the site, description and extent of the electrical system, items inspected and tested etc. along with confirmation of the test results and the engineers' signed declaration.

These records should be retained by the property owner and any recommendations made within the certificate by the electrical engineer about the safety of the system should be carefully assessed and form the basis of a corrective action plan.

Depending upon the nature of the electrical system, its condition, and the type of premises where it is installed will usually dictate the frequency of future inspections and tests.

As well as the above periodic inspections of electrical installations and in the absence of any clear regulation being developed by the industry, Solar Energy UK (a Trade Association with over 400+ member companies operating within the UK energy sector) have produced a best practice guide for owners and competent persons. 'Guidelines for the operation and maintenance of rooftop solar photovoltaic systems'[5] contains some inspection and maintenance checklists covering the various components that make up a rooftop solar panel system.

Mechanical Risks

There are a limited number of ways that solar panel systems can fail mechanically unless they are subject to the effects of rough handling and impacts during manufacture, transportation, or installation, or because of extreme adverse weather.

Poor manufacturing processes have occasionally resulted in panels delaminating prematurely causing overheating as the layers separate and allow moisture and other contaminants to penetrate. Close inspection by competent installers at the fitting stage and subsequent periodic visual examinations should help to identify the early signs of damage or deterioration.

There have been occasional reports of hail stones breaking the glass panels or high winds pulling panels from insecure fixings. The latter obviously creates a profoundly serious safety risk from flying and falling objects. Minimisation of this risk relies upon the quality of the site survey to ensure roof structures and panel fixings have sufficient integrity to withstand foreseeable wind loadings.

More commonly, it is likely that the fixings holding panels to their brackets or to the roof structure work loose because of the wind and cycles of expansion and contraction of the materials caused by temperature variations. A regular programme of inspection and maintenance should prevent this risk materialising.

It should also be noted that the issue of movement of system components can cause strain and stretching to the systems electrical cables and connections resulting in early failure.

Fire Risk

Electrical systems are one of the most common causes of fires in buildings, with several cases of solar panel arrays being suspected of causing or exacerbating the impacts of fire.

Some of the components of PV systems are combustible and under fault or overload conditions these can become the fuel source of a fire.

As the electrical component parts of a solar panel system normally generate a level heat (and a degree of shelter) they are sometimes attractive locations for birds or animals to nest, which often then leads to an accumulation of combustible materials near these potential ignition sources.

The installation of a solar panel system on any property is likely to constitute a notable change to the fire risk profile. Therefore, those in control of premises need to review the premises fire risk assessment and evacuation plans etc. to ensure the protective and preventive control measures remain relevant and effective.

In addition to the above-mentioned issues, if it is a roof-based system the fire risk assessment will need to consider issues such as:

- Will electrical components on or in the roof space add to the ignition sources?
- Will the solar panel fixings or cable runs compromise any fire stopping between compartments in the building design that would otherwise hold back fire spread?
- Will the weight of the panels add extra loading on the roof and create a greater risk of early collapse during a fire?

And for the ground-based systems:

- Is the immediate area around the solar array free from combustible materials including litter and vegetation?
- Does the solar array interfere with any access or egress routes?

Work at Height

The installation of a solar panel array on most premises will fall within the scope of The Construction (Design and Management) Regulations 2015[6] (CDM), creating duties for the Client, Designer and Contractor(s) to ensure the safety and health of workers and others affected by the project.

The aim of CDM is to achieve this by requiring sufficient liaison between the various parties involved to make sure there is amongst other things:

- A sensible plan to follow
- Competence within all roles
- Cooperation and coordination
- Sufficient information sharing
- Effective communication

If the solar array is to be sited on the roof of a building, then one of the most obvious and most serious of risks is working at height during installation and subsequent inspection and maintenance.

Because of decades of workplace fatalities resulting from falls from height, legislation was introduced in the form of The Work at Height Regulations 2005[7](WAH).

These regulations apply to employers or those in control of work at height (for example, Facilities Managers or building owners) so clearly there is a need to ensure any staff or contractors involved in installing, maintaining or inspecting solar panel systems do so safely and in compliance with the requirements of the regulations.

If, as part of a suitable and sufficient risk assessment, it is determined that work at height cannot be avoided then employers are required under Regulation 7 of WAH to consider the nature of the work at height and select work at height equipment which:

- Is appropriate to the work being performed and foreseeable loadings
- Allows passage without risk
- Is the most suitable equipment

The Health and Safety Executive provides useful guidance to assist with assessing and controlling a variety of risks associated with working at height[8].

For a rooftop solar panel array, this is likely to mean the erecting of a suitable fixed scaffolding system by a competent person following the National Access and Scaffolding Confederation (NASC) Safety Guidance[9] or by following similar guidance provided by the manufacturers of the scaffolding system.

Conclusions

In a short guidance document such as this we cannot explore in detail all the risks that can arise with solar panel installations or ever expect to give advice on every possible control measures that could be taken, but hopefully this article has provided some insight that will assist in the effective planning, assessment, and management of solar panel energy systems.

Some may argue that best and simplest way for property owners to ensure a safe and reliable solar and / or battery installation is to contract it out to a legitimate company who are certified members of MCS, employ competent engineers, and use products manufactured and certified to relevant safety and quality standards.

However, these step on their own provides no guarantee of a risk-free installation or dependable generation of clean solar energy in perpetuity. All such investments must go through a thorough planning, procurement, and assurance process to ensure a solar panel system remains both safe and efficient.

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9. National Access & Scaffolding Federation - SG4 - Preventing falls in scaffolding operations, available here: https://nasc.org.uk/product/sg415-preventing-falls-in-scaffolding-operations/

Further information

For access to further RMP Resources you may find helpful in reducing your organisation's cost of risk, please access the RMP Resources or RMP Articles pages on our website. To join the debate follow us on our LinkedIn page.

Get in touch

For more information, please contact your broker, RMP risk control consultant or account director.

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