



Procuring a PV panel system

Introduction

The use of photovoltaic (PV) panels has become increasingly common over the past decade, but the awareness of additional risks associated with these panels is less common. This brief guidance note has been produced to highlight some of these issues, and to provide guidance on how to prevent fires in these systems.

The issues

Even minor malfunctions can lead to catastrophic electrical fires in PV panels. These incidents pose significant challenges for firefighters, who may struggle to manage the situation due to the presence of hazardous exposed electronics and the absence of a comprehensive emergency response plan related to these PV systems.

It is imperative to disconnect the electricity and other utilities of the building when a fire occurs. Each photovoltaic (PV) system is typically equipped with an inverter that can retain charge and transmit current back to the PV panels. As long as there is a light source, the PV panels will continue to generate electricity, causing the wiring connecting the panel to the inverter to remain energised with direct current, even after the main service panel has been deactivated. This ongoing current poses a risk of electric shocks to firefighters if the wiring is not properly isolated.

The fire can be tackled if the remains of the system is live, but this causes a delay while a dynamic risk assessment takes place. Once the fire is extinguished there is a concern that DC cables will remain live.

Fire Performance

In the event of an electrical fault, a fire can spread quickly throughout a PV system where combustible components are used. This may include the frames, mounting systems, cables and boxes associated with the panels, many of which are constructed from plastic which will fuel any fire.

Solar PV systems are subject to electrical faults in the same way as household electronics. These faults can include arc faults, short circuits and reverse currents. Faulty connections or cable installation breakdowns can also cause problems. If these faults occur, then they cause hot spots that can ignite flammable/ combustible material nearby. Fires can also be caused by incorrectly installed or defective DC/AC inverters.

Identification

Poor maintenance and poor installation practice are the main causes of fires within these systems. To reduce the risk of fires occurring, we suggest regular inspections and maintenance, including thermal imaging and removal of debris from the vicinity around the panels. The installation and maintenance should be performed by a competent person.

Risk Management advice

Protector should be consulted by their property clients during the design phase and before PV panels are installed. This way bespoke risk management support will be available to help find cost effective mitigation solutions during procurement and installation. Below are some general points to consider.

General Installation

- Do not install PV systems on industrial and commercial buildings with combustible roofs or over roof-lights.
- Avoid installing on buildings of high risk (such as heritage buildings), or those presenting a high-risk occupancy or where there is significant financial dependency on the building.
- Do not install where accumulations of dirt, dust and deposits can occur.
- All electrical control panels should be located within minimum 60-minute fire rated enclosures and suitably fire stopped around all cable penetrations. The enclosure should be provided with smoke detection linked to the main fire alarm system, which is in turn remotely monitored at an Alarm Receiving Centre.
- Ensure that a structural engineer has confirmed the roof can withstand the additional mechanical loading, or additional wind-loading caused by the panels.
- Consider the risks from storm damage and falling snow and ice from the panels and if necessary, install a protective mesh barrier at the eaves.
- It is preferable for PV panels to be mounted parallel to the angle of the roof.
- Consider the need for fire suppression of the PV panels and associated electrical components.

Chose a reputable installer

The competency of an installer can be determined by training and certification that the specific installer has undertaken. Common PV installation certificates include MCS (Microgeneration Certification Scheme), NOCN Level 3 Certificate for Solar PV Installer and Operator and G98 and 99. Other certificates to demonstrate competency of PV installation are available – if in doubt, obtain the details and share these with Protector.

Select high quality components

Well known panels and inverters are recommended to be certified by:

- **UL 1703** or **IEC 61730** for solar panels.
- **UL 1741** or **IEC 62109** for inverters.

Evaluate system design for safety:

The panels and inverters should be installed in areas that minimises the risk of fire. This means being installed onto a non-combustible material or roof material that matches or exceeds the fire resistance of this, having no combustible materials within 10 meters and away from chimneys or dry vegetation (such as green roofs and walls).

Other aspects to look out for when selecting components are product warranty and fire performance.

Battery Storage Safety (if applicable)

If a battery is stored as part of the system, it should be stored in a detached, well-ventilated building, ideally with automatic fire suppression system installed, especially if the batteries are Lithium-ion.



Checklist

<input type="checkbox"/>	Property insurer notified during the design phase
<input type="checkbox"/>	Competent person identified to install
<input type="checkbox"/>	Local regulations for the installation of PV panels verified
<input type="checkbox"/>	Installation surface is non combustible
<input type="checkbox"/>	PVs installed away from combustible materials
<input type="checkbox"/>	Isolator switch in a 1-hour fire compartment box located on an escape route
<input type="checkbox"/>	Has your PV system been checked by a competent person to be installed as designed?

Further information and guidance on this subject is available from:

- The Fire Protection Association - <https://www.thefpa.co.uk/>



For clarification or further information please contact –

Protector Insurance UK Risk Management Team

Risk@protectorinsurance.co.uk

Disclaimer:

Please note that the Information contained herein has been provided to you for general information purposes only and is considered confidential and/or privileged information, which you must not distribute to any third party, in whole or part, without Protector’s express written permission. Whilst all reasonable care has been taken to ensure that the information in this document is comprehensive and accurate, Protector makes no representation, warranty or undertaking, express or implied, as to the accuracy, reliability, completeness or reasonableness of the Information. Any assumptions, opinions and estimates expressed in this document constitute Protector’s judgment as of the date thereof and are subject to change without notice. Any projections and/or proposed risk mitigating solutions contained in this document are based on a number of assumptions as to existing risk conditions and there can be no guarantee that any projected outcomes will be achieved, nor that no other risks exist. Protector does not accept any liability for any direct, consequential or other loss arising from reliance on the contents of this document, and provides no guarantee that recommended remediation measures supersede, or replaces any statutory obligations.

