

CROSS Safety Report

Fire in roofs containing photovoltaic panels

This month we present a report concerning the monitoring of photovoltaic panels and lessons learned from current experience.

Report

A reporter is concerned about the monitoring of photovoltaic (PV) panels and whether all the possible lessons are learned from current experience.

One of the triggers for this report was a fire in a building under construction which was circulated in local media. The reporter is alarmed by the fact that building integrated photovoltaic (BIPV) panels were present in the building, rather than building attached photovoltaics (BAPV). The main distinction is that BAPVs are fitted on existing surfaces that comprise the structure (like flat or tiled roofs), whereas BIPVs essentially replace construction elements and the panel becomes part of the building (potentially facade or roof element). It is still uncertain whether the PVs were the initiating cause of the fire.

The reporter considers that experience with BAPVs is more extensive, so they are 'tried and tested', but is alarmed by the drive for more 'beautiful buildings' through the avoidance of intrusive elements, which leads to the preference of BIPVs in new projects. Some building control bodies may require details for the PV installation through the submission process, but it is the reporter's view that their interest is focused on the appearance of the building, potentially leaving safety implication concerns on new technologies unaddressed. It is alarming to them, citing a fire officer's report on an educational occupancy project which appears to incorporate BIPVs, that '...matters of combustibility of materials is not a planning consideration and would be dealt with via Building Regulations'.

Part B of Schedule 1 of the Building

Regulations 2010 outlines the functional requirements for buildings. It is up to the designers to prove that the functional requirements have been satisfied with appropriate arrangements for the project's nature and constraints.

When PV panels were increasing in practice, a government study was issued and was conducted by the Building Research Establishment (BRE), producing several reports. The reporter is wondering whether the updating of the databases on PV fires is still ongoing and if potential issues with this 'new' construction practice are addressed through the mechanisms that arose through that study.

Expert Panel comments

The issue of PV panel installations is one of the ongoing issues relating to new developments in construction and building technology, potentially presenting different fire risks to more conventional methods. Fire engineers should try to not prevent the use of new technology, but should be cautious about it and treat it with care.

In this case, the location of the PV units would significantly affect the fire risk. Conventionally, PV units tend to be on roofs, which means that even if a fire does occur it is unlikely to present a risk to occupants. However, if the new types of PV are in different locations or incorporated into the building fabric in a novel way, then those risks should be carefully assessed. For example, PVs on top of a tiled roof will at least offer some level of protection to the roof structure, whereas when they are integrated there may be a greater risk (e.g. the risk of concealed fire spread) if there is a fire and the issue

is left unaddressed. The interactions of these systems with other traditional or innovative construction methods and products should be explored by designers in order to ensure that they are understood and addressed.

Conventional design standards, by definition, will only address conventional building technology and so it cannot be assumed that compliance with those conventional design standards is sufficient to meet the functional requirements of the Building Regulations when dealing with new technology or materials. Those responsible (designers and/or regulators) need to demonstrate how they meet the functional requirements of the Building Regulations (as amended), and how those responsible under the Regulatory Reform (Fire Safety) Order 2005 assess the risks posed by these new technologies, given these evolving technologies are not considered in statutory guidance in support of the above law.

Regarding the reporter's comment



tse@istructe.org



@IStructE
#TheStructuralEngineer



#TheStructuralEngineer

Key learning outcomes

For building designers, persons procuring solar panels and fire safety engineers:

- | Novel technological solutions can introduce new risks to buildings and these have to be properly accounted for in the fire strategy of the building
- | Those responsible need to demonstrate, with supporting evidence, how they meet the functional requirements of the Building Regulations

For site engineers:

- | Ensure that the electrical components and connections are properly installed and inspected

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on the focus on aesthetics instead of safety, the panel would like to clarify that building control is focused on and interested in the safety aspects of designs, and it could be the local authority planning agency that addresses the appearance of the building, to avoid any misinterpretation of the reporter's view.

The panel acknowledges and supports the need for sustainable growth and greener energy solutions, and this report is another good example of how their introduction to the built environment can require additional considerations by the designers. However, pursuing the green agenda cannot be at the expense of safety for all, and the potential for creating a future legacy issue must be acknowledged at an early stage.

The fire and rescue service is updating its procedures as these new risks emerge. This process takes time, with lessons learned from incidents being used to inform future practice. Despite that, it needs to be acknowledged that

fire and rescue service intervention has some limitations, and if after having carried out appropriate risk assessments the fire and rescue service decides to tackle the fire defensively, this may mean the fire is allowed to burn (under control) while adjacent risks are protected.

The BRE research did include some recommendations for helping assist the fire brigade, e.g. ensuring good locations for isolation switches, and engineers should take that into account. An academic publication that reviews the latest guidance and safety practices for firefighters can also be read¹.

In 2016 CROSS published an Alert: *PV installations: structural aspects*² which provides advice about the installation of panels on roof structures.

The full CROSS Safety Report, including links to guidance mentioned, is available on the CROSS website (report ID: 1032) at www.cross-safety.org/uk/safety-information/cross-safety-report/fire-roofs-containing-pv-panels-1032.

REFERENCES

1) Ramali M.R., Ong N.A.F.M.N, Said M.S.M. et al. (2022) 'A review on safety practices for firefighters during photovoltaic (PV) fire', *Fire Technol.*, 59, pp. 247–270; <https://doi.org/10.1007/s10694-022-01269-4>

2) Collaborative Reporting for Safer Structures (2016) SCOSS Alert: *PV installations: structural aspects* [Online] Available at: www.cross-safety.org/sites/default/files/2016-11/photovoltaic-installations-structural-aspects.pdf (Accessed: May 2024)

What is CROSS?

Collaborative Reporting for Safer Structures (CROSS) helps professionals to make structures safer by publishing safety information based on the reports it receives and information in the public domain.

CROSS operates internationally in the UK, US, and Australasia. All regions cover structural safety, while CROSS-UK also covers fire safety.



How reporting to CROSS works

The secure and confidential safety reporting system allows professionals to share their experiences to help others.

Professionals can submit reports on safety issues related to buildings and other structures in the built environment. Reports typically relate to concerns, near misses or incidents. Find out more, including how to submit a safety report, at <https://bit.ly/cross-safety>. Your report will make a difference.



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