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A landscape of change *The landscape for construction is changing, with sustainability and resilience the key drivers. Against this backdrop, how can the insurance industry assess the new materials, methods and technologies that are coming into play? Alan Macklin writes*

Property insurance and risk

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Building resilience

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As Europe accelerates its transition to renewable energy, commercial warehouses are emerging as pivotal assets in the solar energy landscape. Insurance providers are increasingly recognising the dual role of these structures: mitigating climate risks and facilitating the integration of solar energy systems. This synergy not only enhances energy resilience but also offers financial incentives for warehouse operators.

Insurance companies are adapting their policies to support the adoption of solar energy in commercial properties, with some offering premium reductions for properties that implement energy-efficient technologies, including solar installations. This approach not only reduces the carbon footprint of warehouses but also aligns with broader environmental, social and governance objectives, enhancing the sustainability profile of businesses.

European warehouses possess significant untapped solar energy potential. In the UK alone, commercial rooftops could accommodate up to 25 gigawatts peak of solar capacity, equivalent to powering approximately 7 million homes annually. Currently, less than 10 per cent of these rooftops are utilised for solar installations. This underutilisation presents a substantial opportunity for energy generation and cost savings. According to the International Energy Agency, by 2030, the commercial sector is expected to contribute significantly to the EU's renewable energy goals, with solar power playing a major role.

The financial incentives for integrating solar energy into warehouse operations are compelling. In the UK, if commercial buildings fully utilised their rooftop solar potential, they could collectively save up to £35 billion annually in energy costs. This significant reduction in energy expenditure underscores the economic viability of solar investments. Environmentally, the widespread adoption of solar energy in warehouses contributes to the EU's renewable energy targets. In 2023, the EU installed a record 56 gigawatts of solar capacity, marking a 40 per cent increase from the previous year. This growth is vital for achieving the EU's goal of carbon neutrality by 2050.

Despite the clear benefits, several challenges hinder the widespread adoption of solar energy in commercial warehousing. These include high initial capital costs, regulatory complexities and concerns over the long-term performance of solar installations. Insurance providers play a crucial role in addressing these challenges by offering products that mitigate financial risks and provide guidance on regulatory compliance. For instance, policies that cover both the installation of solar panels and any damages caused by extreme weather events offer warehouse owners greater peace of mind.

A brighter future

Moreover, the integration of solar power into commercial properties helps mitigate other climate-related risks. The energy independence provided by solar systems reduces vulnerability to fluctuations in energy prices and external supply chain disruptions. In 2021, the European Commission reported energy supply challenges caused by geopolitical instability, which led to volatile prices for fossil fuels. By adopting solar, warehouse operators can shield themselves from these external risks, with insurance policies helping to offset initial costs and manage risks associated with energy systems.

The insurance industry also faces evolving risks as renewable energy technologies gain traction. Extreme weather events such as hailstorms and lightning strikes have led to increased claims related to solar panel damage. According to a 2023 report from EIOPA, the increase in such events has heightened awareness of the need for specialised insurance solutions that address renewable energy assets. Insurers are adapting to this by introducing coverage for solar panels and related infrastructure.

The integration of solar energy into European commercial warehouses represents a strategic alignment of environmental sustainability and economic efficiency. Insurance providers are instrumental in facilitating this transition by offering tailored products that address the unique risks and opportunities associated with solar installations. As the industry continues to evolve, the collaboration between warehouse operators and insurers will be pivotal in achieving a resilient and sustainable energy future.

A landscape of change

The landscape for construction is changing, with sustainability and resilience the key drivers. Against this backdrop, how can the insurance industry assess the new materials, methods and technologies that are coming into play? Alan Macklin writes

The global property insurance market is projected to reach US$744.69 billion this year according to Statista, and is expected to grow 4.12 per cent year-on-year to 2029, making it one of the highest spending segments in insurance.

The latest *Global Construction Rate Trend Report* from Willis further highlights a number of trends, issues and opportunities facing this important sector, and the key challenges insurers must consider in weighing up associated risks.

Published in March 2025, Willis' research highlights two major themes: the drive for more sustainable solutions, and the increase in nat cat events. The first clearly offers an opportunity to help mitigate the second, but it must deliver more than action against climate change – it must also be resilient in the face of it.

Cutting carbon

In order to tackle the climate emergency effectively, we must cut carbon emissions, and buildings provide one of the best opportunities to do this. The latest report from the International Panel on Climate Change posits that buildings alone could contribute around 28 per cent of what is needed to achieve net zero targets by 2050. This includes both new and existing buildings and involves first improving the thermal efficiency of the building envelope to reduce heating and cooling energy demand; and then meeting remaining operational energy demand through renewable technologies such as photovoltaics and heat pumps.

Cutting carbon is not simply an environmental issue. In its latest report, *Costing Energy Efficiency Improvements in Existing Commercial Properties,* the Investment Property Forum highlights the potential for assets to become stranded if they are not upgraded to meet upcoming energy efficiency requirements. Meanwhile, since January 2024, the European Corporate Sustainability Reporting Directive has required larger companies to report on a range of factors, including energy efficiency and carbon emissions, in accordance with the European Sustainability Reporting Standard.

These twin drivers of regulatory requirements and the climate crisis are leading asset owners to seek effective ways of upgrading existing buildings and constructing new ones that will be future-proofed against the risk of both increased climate-related regulation and the impacts of increasing extreme weather events.

Designed for durability

Commercial buildings today need to be adaptable, efficient and resilient. As well as the building envelope itself being thermally efficient, the inclusion of renewable and low-carbon technologies is increasingly being mandated. Both developments demand additional consideration at design, construction and lifetime maintenance stages.

Take warehouse roofs, for instance. In the UK, research from the UK Warehousing Association found that the top 20 per cent of the UK's largest warehouses represents 75 million square metres of roof space, with the potential to support rooftop solar capacity. This potential will form an important aspect of the UK Government's drive to achieve 70GW solar capacity by 2030, with a Solar Roadmap expected to be published imminently.

Incorporating solar into new build projects is a relatively straightforward process, as the building can be designed to accommodate the additional loading. However, care needs to be taken with the installation of PV as a secondary aspect of the construction, as any damage done to the roof may invalidate the warranty.

When it comes to retrofitting, simply adding PV to existing roofs carries a much greater degree of risk and complexity. The possibility of invalidating an existing warranty still remains. There are also potential issues around structural loading and design considerations such as allowing safe access for maintenance, orientation and shading from parapets and other rooftop equipment which could impact the effectiveness of the array, even aspects such as the placement of cabling and containment routes.

Finally, there are a number of additional factors, such as the potential risk of fire that arises from additional electrical equipment, and the need for anything fixed to the roof to be able to withstand wind load, snow load, hail impact, the normal movement of buildings due to temperature changes and possibly seismic activity.

Building for resilience

Commercial buildings clearly represent an important investment for the building owner and end user, but they could also play a key role in helping to create a more sustainable future. To do that, it is crucial that they are constructed to be thermally efficient, durable and resilient in the face of major challenges such as fire, flood and severe weather events.

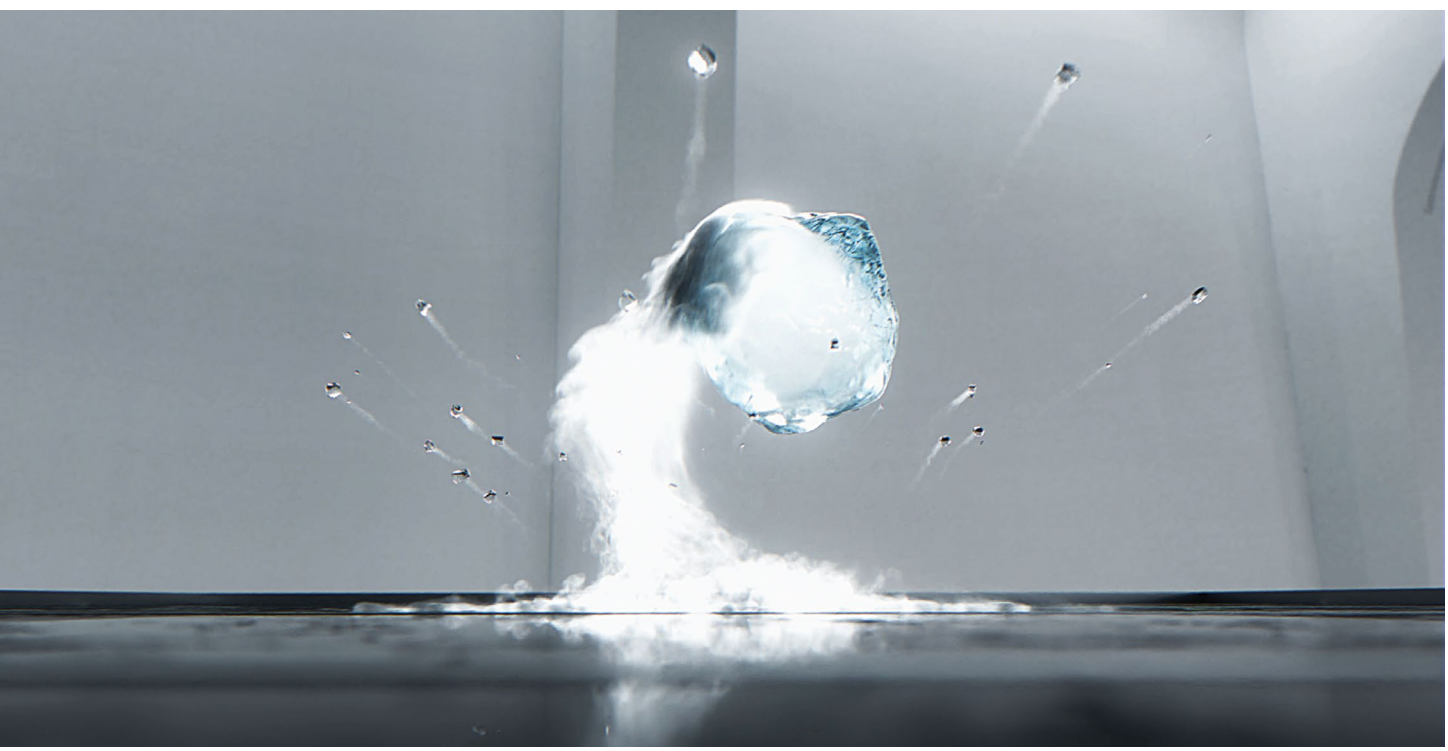
Insurer approved third party certification is an effective way of assessing how construction products will perform in practice. FM Approvals is a globally recognised body that provides a range of rigorous standards to assess different aspects of construction product performance in application from a loss prevention perspective, including tests that have been developed in recent years specifically for roof mounted or integral PV systems.

FM4478: FM Approval standards for roof mounted PV systems

The FM Approvals certification mark verifies that products and services meet their stated conditions of performance, safety and quality. The FM4478 standard states the approval requirements for rigid PV modules that are installed with a roof assembly. Typically constructed with glass or tempered glass that provides structural support and protection to the solar cells, this type of PV module is commonly used in traditional solar panel installations where the modules are mounted onto fixed frames or structures.

Manufacturing of products to be tested must be independently witnessed by an FM engineer to ensure they are representative of product supplied to market. The product is subjected to fire from above the structural deck, simulated wind uplift, hail damage and gravity load resistance. These tests examine the suitability, performance and durability of the product and, crucially, the entire system is assessed, including the roof, fixings and PV module – not just one element in isolation. The roof system itself must already be FM Approved to the relevant standard in order to feature in the test.

After the approval of a product, FM Approvals' follow-up programme ensures continued, independent bi-annual surveillance auditing of production, quality control and manufacturing procedure. This means that no changes from what was originally tested are made whilst continuing to use the certification. It is the responsibility of the manufacturer to notify the certification agency of any changes in product construction, components, raw materials, physical characteristics, coatings and component formulation post-approval.



The ability to withstand hail impact is a crucial factor when it comes to installing PV on commercial rooftops

Continued approval is based on:

- Availability
- Confirmed use of acceptable quality assurance procedures
- Field experience
- Compliance with the master agreement and approval report
- Re-examination production samples
- Facility and procedure audits

Testing for fire

The potential for increased risk of fire from the inclusion of PV on roofs is naturally a concern, although there is little consistency in reporting such incidences globally, making it harder to assess the true level of risk.

FM 4478 includes a test for combustibility from above the roof deck and/or rigid photovoltaic module, which is conducted in accordance with a modified version of the ASTM E108 Class A Spread of Flame Test. The length of the test deck for the Spread of Flame test is a minimum of 2.4 m to a maximum of 4.9 m, and the width between 1 m to a maximum of 2 m. The samples tested must be long enough to accommodate two to three PV panels, depending on their combined length, which must be more than 4m, but less than the length of the rig.

A 760°C (+/- 10°C) flame is applied from a 360kW burner at a wind speed of 5.4m/s for 10 minutes. To pass the test there must be no damage to either the roof cover or the PV panel within 152mm of the end of the last PV module, no flying brands, displacement or falling away.

Testing for wind uplift

The ability to withstand wind uplift is clearly a crucial factor when it comes to installing PV on commercial rooftops. If a panel becomes dislodged it could potentially cause considerable damage to the roof and surrounding

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panels, and even pose a risk to life if it then falls from the roof.

There are two test methods to assess wind uplift resistance under FM 4478. The first of these involves applying the minimum pressure the system must be able to withstand to achieve certification, which is 45 pounds per square foot, going right up to a maximum of 990 psf. The system is tested until it fails and must maintain 50 per cent of the ultimate failure pressure for one minute without any visible cracking or creasing. The conditions for passing essentially require all fixings, components, adhesives and bonds to remain intact, and for the roof deck to maintain structural integrity throughout. The PV modules themselves must not puncture, fracture, crack, delaminate or separate from the frame.

The second test examines the pull-out resistance of the clamping system between the PV module and the roof deck, using a constant strain tensile machine to discover the maximum force that can be exerted before the clamp fails.

Testing for hail damage resistance

The aforementioned Willis *Global Construction Rate Trend Report* highlights an increased nat cat risk perception for hail, which is regarded as a secondary peril. FM 4478 uses 10, 50.8 mm diameter ice balls fired at the PV panels, including at potential weak points in corners and edges, at 33 km/h. As an indication of how severe this test is, this is the size of hailstone that would be categorised as 'destructive' by the Tornado and Storm Research Organisation, to the point of creating "wholesale destruction of glass, damage to tiled roofs, significant risk of injuries", also "bodywork of grounded aircraft dented, brick walls putted".

To meet the criteria for acceptance for hail damage resistance, the PV module must show no signs of "cracking or splitting, misaligned external surfaces, or rupture when examined under 10X magnification".

Protecting investments

FM Approved insulated panel systems offer a robust, thermally efficient and versatile method of construction for commercial buildings. As a roofing product they also present a highly suitable platform for the installation of photovoltaics – both new build and retrospectively, dependent on a suitable structural survey. There are FM 4478 Approved systems available on the market that combine the benefits of insulated panel systems with factory installed PV, further reducing the risk of poor installation.

Introducing photovoltaics on a roof is a significant investment – one that could bring rich returns but also one that could leave a building roof vulnerable to damage if the installation is not robust. Using a standard such as FM 4478 provides specifiers, building owners and insurers with a clear benchmark of performance for all the component parts and how they perform as a roof system.

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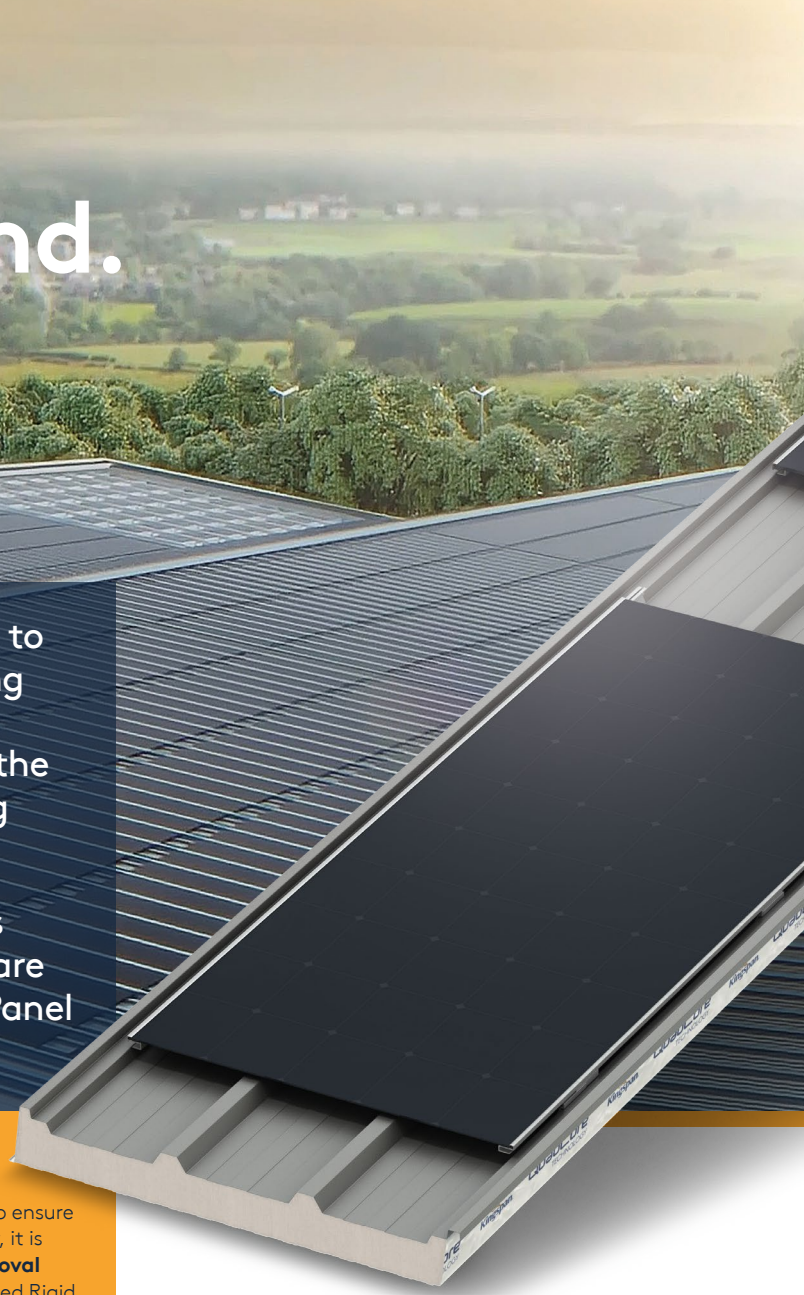
Peace of mind. Built in with PowerPanel.

QuadCore® PowerPanel can help to create thermally efficient building envelopes, whilst generating renewable solar energy to meet the operational needs of the building occupiers.

But we ask more of our buildings than energy efficiency, so what are all the core benefits that PowerPanel brings to the built environment?



Mitigating Risk

QuadCore® PowerPanel has undergone extensive testing to ensure that the whole system is robust and durable. Most notably, it is **one of the first systems to have achieved the FM Approval mark to FM 4478** – examination Standard for Roof-Mounted Rigid Photovoltaic Module Systems. This rigorous standard assesses fire performance, wind uplift, hail damage and gravity load resistance from the point of view of asset protection.

Quality Assurance

QuadCore® PowerPanel is manufactured in the UK using **state-of-the-art robotics, in a factory accredited to ISO 9001, and ISO 37301**. Because each PV module is precisely fitted under strict factory quality control systems, it reduces the risks associated with on-site installation, as well as supporting speedier construction.

Warranty

Finally, for added peace of mind, a comprehensive, **insurer-backed Kingspan PowerPanel Assured Warranty** is available, subject to project specific information, covering the thermal and structural performance of the insulated panels for up to 25 years, with up to 40-year external coating warranty, whilst the photovoltaic module is covered for up to 25 years and up to 30-year linear power warranty.

Please scan for further information on QuadCore® PowerPanel FM 4478 Approval.

kingspanpanels.co.uk

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