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Higher power *Driven by ambitious climate targets, solar capacity in the UK is seeing growing momentum, fuelling massive growth in renewable energy worldwide. But, as CIR discovers, adoption is not without its challenges, and risk control and insurance are part of the solution*

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Fire risk in the modern roof

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Higher power

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The global shift towards renewable energy sources is well underway, with governments increasingly talking up renewable adoption in pursuit of energy security and cleaner power systems, and the private sector making arguably even greater strides in promoting and adopting renewables.

Solar's role as an established element of the global energy transition was cemented in 2023. That year, the world grid connected 447 GW of new solar capacity – some 78 per cent of the total 576 GW in new renewable capacity, according to solar PV association, SolarPower Europe. It was an "extraordinary" year for the UK in particular, the association noted in its *Global Market Outlook for Solar Power 2024-2028*. According to official figures, 15.7 GW of cumulative solar capacity was in place at the end of 2023, and the real figure may be even higher due to an underestimation of the "burgeoning commercial-scale rooftop market, which is hardly accounted for" in official statistics.

The search for energy security and refuge from high gas prices led to the connection of 190,000 smaller-scale installations to the grid in 2023 – the largest number since 2011. Further, data from the Microgeneration Certification Scheme suggests that around 13,000 sub-50 kW installations are being made each month. And at utility scale, EDF's 500 MW Longfield project got the green light from the Government; once built, it will be the largest solar farm in the country.

Separate data reflects a similarly optimistic outlook. The latest (July 2024) Renewable Energy Planning Database from The Department for Energy Security and Net Zero suggests that the UK now has over 11,000 renewable electricity projects of over 150kW progressing through the planning system or in construction, with solar representing the majority.

PV panels are an increasingly frequent sight on commercial and industrial premises, with many businesses opting for solar due to it scalability, reduced operational costs, and the improved sustainability credentials it can bring about.

Together, the world's solar PV installations will make up a distributed, micro-grid energy generation network that will modernise the electric grid by creating bidirectional smart grids.

While simple in its ethos, the mechanics and risks of solar power are less straightforward, however, with a high degree of project and operational risks for owners and operators to consider.

According to European fire safety organisation for the built environment, FRISSBE, fire is amongst the most significant operational risks for renewable installations – a risk that is exacerbated as the co-location of renewable energy assets is fast becoming one of the preferred approaches. A report published in 2023 by the *Independent* revealed that the number of solar panel fires rose sharply in 2023. The data, acquired by the newspaper under Freedom of Information rules, showed that 66 fires related to solar panels occurred between January and July 2023 – almost double that of the whole of

2019. It was also found that there were six times the number of fires involving solar panels in 2022 compared with 10 years prior.

To address the fire and other risks associated with solar, a number of design, installation, maintenance and operational guidelines have been developed to help eliminate or mitigate potential losses. Amongst these are the UK Microgeneration Certification Scheme, and the UK Risk Authority Guidelines RC62 (Recommendations for Fire Safety with Photovoltaic Panel Installations), developed through RISCAuthority and published by the Fire Protection Association. RISCAuthority membership comprises a group of UK insurers that actively support a number of expert working groups developing best practice for the protection of people and property from loss due to fire and other risks.

Role of insurance

Given the pivotal role of the insurance market in improving outcomes in the solar space, it is no surprise that individual insurance companies have their own requirements when it comes to risk control of individual installations or projects.

A report published in September 2024 by Howden Re shows that the renewable energy insurance market is experiencing major expansion, with notable premium potential in solar as well as onshore wind, offshore wind, and battery energy storage systems.

Howden forecasts that renewables will account for 74 per cent of the growth in global primary energy consumption by 2030 – representing a growth market for re/insurers with appetite and capacity.

Recent years have seen the renewable energy insurance segment adapting to the specific needs of the space, while being buffeted by climate

"Solar PV panels are an increasingly frequent sight on commercial and industrial premises"

issues, supply chain disruption, casualty deterioration, social inflation and geopolitical conflicts – creating a complex landscape for the class. Overall profitability is challenging for carriers due to variable results within energy classes, according to the 2024 *WTW Renewable Energy Market Review*. Innovation in the arena is testing the market's resilience in the face of technological change, with the development of floating solar installations, perovskite solar cells and bifacial solar power amongst the myriad novel risks for underwriters to consider.

With these new technologies comes a high degree of uncertainty in risk assessment; a lack of long-term operational track records makes risk modelling challenging. The specialist knowledge required to accurately assess risks related to system failures, environmental impact and safety demand that insurers build the internal know-how to correctly assess liabilities – direct or indirect.

Solar farms face other risks related to climate change itself. An increase in the number of hailstorms, for instance, is causing increased damage to solar energy installations across Europe. In 2023, hailstorm surges 104 per cent to 11,808 storms, according to figures from the European Severe Weather Database, prompting specialty re/insurance group Chaucer to label hailstorms the largest natural hazard to solar farms. The storms can damage solar panels by cracking their protective glass, which is costly to repair and pushes up costs for solar farm owners. Hailstorms in Europe have increased 267 per cent in the past five years, potentially due to climate change, up from 3,217 hailstorms in 2019/20. This rise in the number of hailstorms is expected to continue as extreme weather events become more frequent.

The requirement for projects to obtain adequate natural catastrophe cover limits sufficient to protect against probable maximum loss has put pressure on insurers to manage their exposure by restricting coverage for these perils with sub-limits and higher deductibles.

Sky's the limit

Insurance aside, the UK's volatile energy market, driven by fluctuating fossil fuel prices and geopolitical events, affects the long-term financial planning of solar projects. Solar projects, especially large-scale solar farms, can face lengthy approval processes due to local opposition, environmental concerns, and grid capacity issues.

The UK's aging electricity grid is not fully equipped to handle intermittent renewable sources like solar, which creates bottlenecks for new projects. The need for investment in energy storage systems and grid upgrades remains significant. Against this backdrop, the new Labour Government's promise to triple solar power by 2030, in its bid to make Britain a "clean energy superpower", is an ambitious goal.

While large corporations are leading the charge in solar investment, smaller businesses still face challenges including high upfront costs and complex regulatory frameworks.

Improved risk control and tailored insurance products have begun to help address some of the uncertainties involved in the adoption of solar projects, but there is some way to go before the bidirectional smart grid vision can manifest at scale.

Mitigating fire risk in the modern roof

The role of the roof has advanced exponentially in modern years, extending far beyond its primary function of making a building watertight. Yet, with this expanded role, what is the impact on fire risk? Lisa Stephens examines the role of the modern roof

Whether for an education building, industrial unit or high-rise apartment, flat roofs provide a versatile design solution and a valuable and practical commodity. Flat roofs have long been used to house building services equipment. However, they are also now frequently designed to create green and blue roofs, provide social spaces and, in particular, enable energy efficiency infrastructure.

Using the roof for renewable energy generation is a great way to use the space efficiently and practically. Factors like the cost of living crisis, increasing energy prices globally and the drive towards net zero contribute to the growing number of solar installations.

A European Commission' communication on EU solar energy strategy reported in May 2022 that the cost of solar power had decreased by 82 per cent over the prior decade, making it the most competitive source of electricity in many parts of the EU. What's more, the EU Solar Energy Strategy adopted in 2024 included the Europ ean Solar Rooftops Initiative, which makes rooftop solar energy compulsory for all new public and commercial buildings with useful floor area larger than 250m^2 by 2026, all existing public and commercial buildings with useful floor area larger than 250m^2 by 2027 and all new residential buildings by 2029.

Ignited risk

However, as the use of flat roofs further evolves, potential sources of ignition increase. A fault tree analysis by the University of Edinburgh (*Fault Tree Analysis of Fires on Rooftops with Photovoltaic Systems*, Nur Aliah Fatin Mohd Nizam Ong *et al*, April 2022) concluded that "Rooftop PV systems are promising electrical power sources and a potential fire risk at the same time. In the qualitative fault tree analysis, seven major events were defined as the potential ignition sources leading to the major event, a PV-related fire. Herein, it was found that arcing is the major contributor of fire events, which arise from poor-quality products, planning and installation errors, component damages during transportation, operation errors, lack of regular inspection and maintenance, as well as weathering effects."

Likewise, the Building Research Establishment stated in a May 2018 report, *Fire and Solar PV Systems: Investigations and Evidence*, that arcing can create temperatures that are "easily hot enough to melt glass, copper and aluminium and to initiate the combustion of surrounding materials".

Solar panels can also complicate fire and rescue operations. The Institute of Fire Engineers noted in a July 2022 report, *Solar Power Fire Risk,* that as long as a panel is exposed to light (even artificial light), "parts of the system are always live", even if the building's electricity has been otherwise isolated. Therefore, electrical considerations are critical during fire control and suppression. Moreover, burning solar cells can emit toxic and dangerous fumes.

More broadly, roof fires can also heighten the risk of building collapse compared to fires in other building areas. In situations where building collapse is avoided, fire in the roof usually leads to significant financial costs not limited to re-construction, service disruption, loss of stock and impact on employment. Additionally, if the damaged building supports a public service such as schooling or hospital care, the effects on the surrounding community can be even more significant.

Recent roof fires highlight why minimising its spread is so important. The Ocado warehouse in Andover is one example of this. The fire broke out on the factory floor due to a robotics fault and eventually spread to the roof, resulting in total building collapse. Fortunately, there was no loss of life, but there was considerable damage to the facility and stock – amounting to a financial cost of £110 million to Ocado, according to the retailer's financial report.

Compliance and liability

With these factors in mind, flat roofs should be built following recognised best practices and regulations to ensure safety and full compliance.

Just like any other area of a building, flat roofs are susceptible to fire damage. In the event of a fire, whether deliberate or otherwise, liability can fall on stakeholders

throughout the construction process. In England, the recently introduced Building Safety Act 2022 outlines new, clearly defined Dutyholder roles, specifically focusing on fire safety, which should be reviewed by insurers to understand supply chain liabilities in construction projects.

However, according to the 2024 Building Safety Act White Paper by NBS, only 29 per cent of building professionals state they are 'very clear' on the types of projects that fall within the scope of the Act. Moreover, only 52 per cent of architects are said to understand the responsibilities of the duty holders for Higher Risk Buildings.

Summarising what it means in terms of liability, the Act outlines Dutyholder roles across the construction supply chain, including the client, designer, principal designer and contractors working on the project. While each role has specific responsibilities outlined within the Act, this new legislation states that Dutyholders will have legal obligations connected to their job roles and failure to meet these obligations will be deemed a criminal offence under Section 35 of the Building Act 1984.

For HRBs – broadly, any building in England at least 18 metres or seven storeys high with two or more dwellings – the Act also brings in a new 'Accountable Person' role. This is an individual or corporate entity, an external client, landlord, freeholder, a management/right-to-manage company or commonhold association with obligations for higher-risk buildings when occupied.

Accountable Persons either own or have legal obligations to ensure the safety and good repair of common areas of the building. Furthermore, it is not a valid defence for a defendant to claim they have followed acceptable practices at the time of construction.

Approved Document B provides guidance to contractors, architects and specifiers about fire safety in construction. Critically, this document should not be mistaken with the contents of The Building Safety Act 2022 or the Building Regulations, with the latter setting minimum standards for building design, construction and alteration to ensure they are safe and perform suitably.

ABD states that "complying with the guidance in the approved documents does not guarantee that building work complies with the requirements of the regulations" and that "the approved documents cannot cover all circumstances. When considering modern methods of construction and the rapid changes to construction technologies, looking beyond regulatory guidance may be best practice." The use of solar panels is an example of rapid change in practice, as there is no specific guidance for their use on flat roofs within ADB.

To support stakeholders, ROCKWOOL has published a whitepaper 'Flat roofs: The functional fifth façade' which explores the fire safety implications of modern multifunctional roofs and discusses best practices for identifying and mitigating the risks. It also explains the role of the guidance provided in approved documents and examines potential limitations of such advice for non-standard flat roof circumstances and scenarios.

Download the whitepaper at https://rockwool.link/fff

Reducing risk

With this in mind, and as the use of solar panels on flat roof applications continues to rise, the construction industry should be examining best practices to mitigate risk. By specifying and installing a non-combustible insulation material, it is possible to reduce heat loss in the roof and deliver measurable protection against fire spread.

A simple and straightforward way to determine the combustibility of a building product is by confirming its Euroclass reaction-to-fire rating. A non-combustible material is defined by a Euroclass rating of A1 or A2-s1, d0 (within the context of Approved Document B, a substrate or deck with a minimum classification of A2-s3, d2 is required at the junction with compartment walls).

Non-combustible materials do not contribute to the spread of fire nor emit significant toxic smoke. Some non-combustible materials, such as stone wool insulation, have the ability to withstand temperatures in excess of 1000°C. Non-combustible insulation can help reduce damage to the roof and minimise the impact of fire on the overall building fabric.

With the growing trend of using roofs for renewable energy generation, including solar installations, the risk of ignition has further intensified. In light of these developments, it is more imperative than ever for stakeholders in the construction process to prioritise safety and look beyond regulations to best practice. Using non-combustible materials is not just a best-practice measure for ensuring effective risk management in today's market, it also serves to futureproof buildings and specifications against changing client demands and an evolving regulatory landscape.

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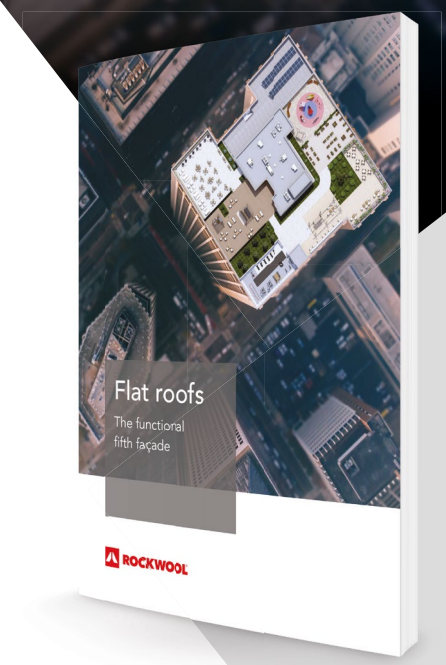
Flat roofs: The functional fifth façade

Mitigating fire risk above and below modern flat roofs.

Today's flat roofs are increasingly used as multifunctional spaces for social and practical applications, including solar energy installations.

This expanding remit, particularly in crowded urban areas, brings multifaceted challenges to specification and building design.

Learn to mitigate the risks.



Download the whitepaper:

rockwool.com/uk/functionalroofs

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