



Climate change is making the problem worse - but operators can take steps to minimize the threat.

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Climate+



The solar energy sector in the U.S. has been expanding rapidly. It's projected that 2024 was a record year for the market, with over 32 gigawatts (GW) of project additions; furthermore, this market is likely to grow at a compound annual growth rate of 6.6 percent over the next five years. Meanwhile, the [International Energy Association](#) predicts that solar energy will surpass other energy sources to become the largest source of electricity globally within the next decade.

As solar's share in the energy portfolio grows, it is increasingly important to address risks to solar infrastructure – such as those posed by severe convective storms and hail, which are becoming more frequent and more severe due to climate change. A recent [study](#) shows that there are, on average, 158 days of damaging hail per year in the U.S. Meanwhile, [nearly 50 percent](#) of installed solar capacity currently falls within a long swath down the middle of the country that has been dubbed “[Hail Alley](#)” for its intense hail activity.

Property insurance is a crucial element of a multifaceted risk mitigation program. It can help offset a solar company's financial burden when their property is damaged during severe hailstorm events. It should not, however, be viewed as the predominant line of defense: Insured parties still carry part of the financial

burden as a result of applicable deductibles, waiting periods and other potential terms and conditions that can impact the amount a carrier will pay following a loss.

“While insurance can be an important part of an overall asset protection strategy, it’s critical for companies to invest in the resilience and hardening of their assets rather than relying solely on insurance for protection,” says Matt McMullin, North America Leader for Chubb’s Climate+ Practice. “Even

in cases where the loss is otherwise covered by a property insurance policy, sublimits and location values may not align, leaving companies’ balance sheets exposed to an uninsured or underinsured loss.”

With this in mind, operators and other stakeholders must take extra care to identify and adopt effective hail mitigation plans built on three principles: maximum panel resilience, optimal stowing protocols and a dedication to industry best practices.

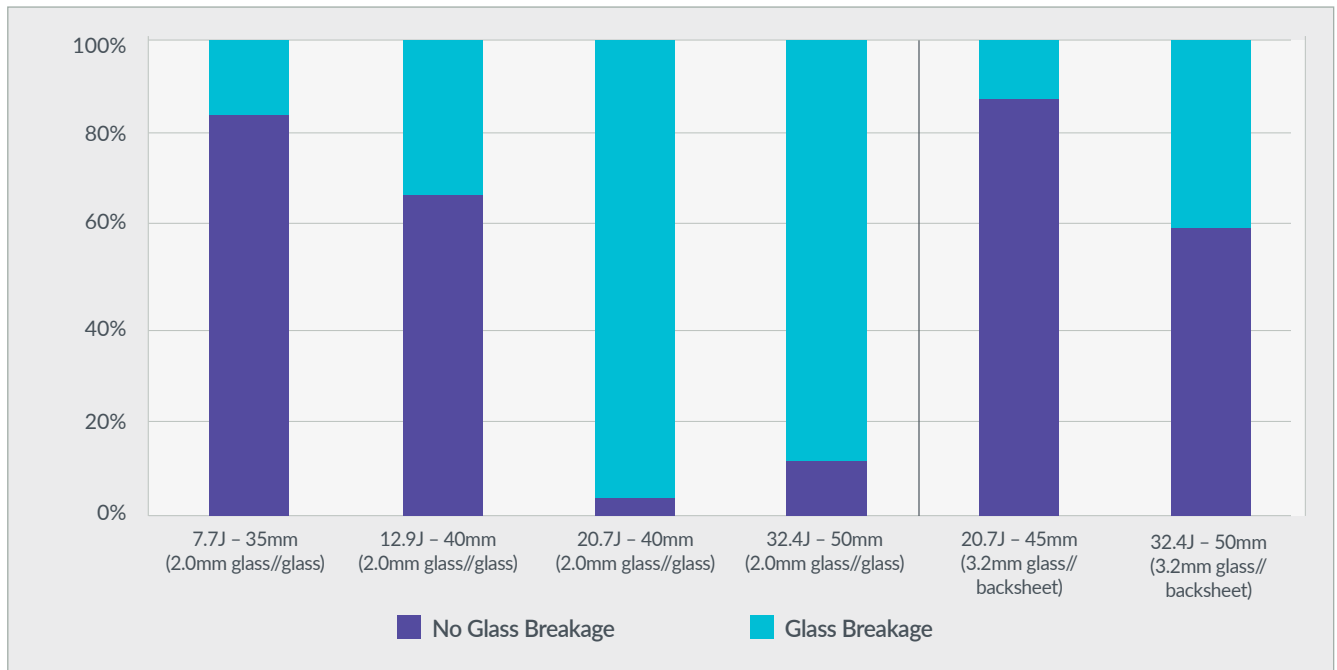


HAIL AND PANEL RESILIENCY

There are numerous factors to consider when selecting the right photovoltaic (PV) panels for your solar project, [from power efficiency](#) and [temperature coefficient](#) to [compatibility](#) and [power tolerance](#). But what about resiliency – specifically, resiliency against hail?

To help them answer that question, many companies rely on hail certification standards such as the International Electrotechnical Commission’s [IEC 61215](#) or those issued by other independent third parties. One of these third parties is [Kiwa PVEL](#), a company that specializes in performance testing for PV infrastructure. Each year it exposes nearly 300 modules to its rigorous [Hail Stress Sequence](#) (HSS) test. This test of commercially available modules – one of nearly a dozen that Kiwa PVEL conducts as part of its [Product Qualification Program](#) – was designed to address concerns over the suitability of current hail resistance standards, and also to acknowledge the fact that climate change is leading to increases in both average hailstone size and velocity.

In its 2024 HSS test, Kiwa PVEL compared the hail resiliency of two different types of solar modules that an operator might consider purchasing and installing. According to test results, 3.2mm glass/backsheet modules far outperformed their 2.0mm glass/glass counterparts. When tested under conditions simulating a hailstorm marked by 40mm- to 45mm-sized hail, the former saw roughly a 15% breakage rate – as compared to nearly a 95% breakage rate by the 2.0mm glass/glass modules. (Kiwa PVEL’s test results, along with the other parameters that help to define the company’s Product Qualification Program, can be viewed in its annual [Top Performer](#) scorecard.)

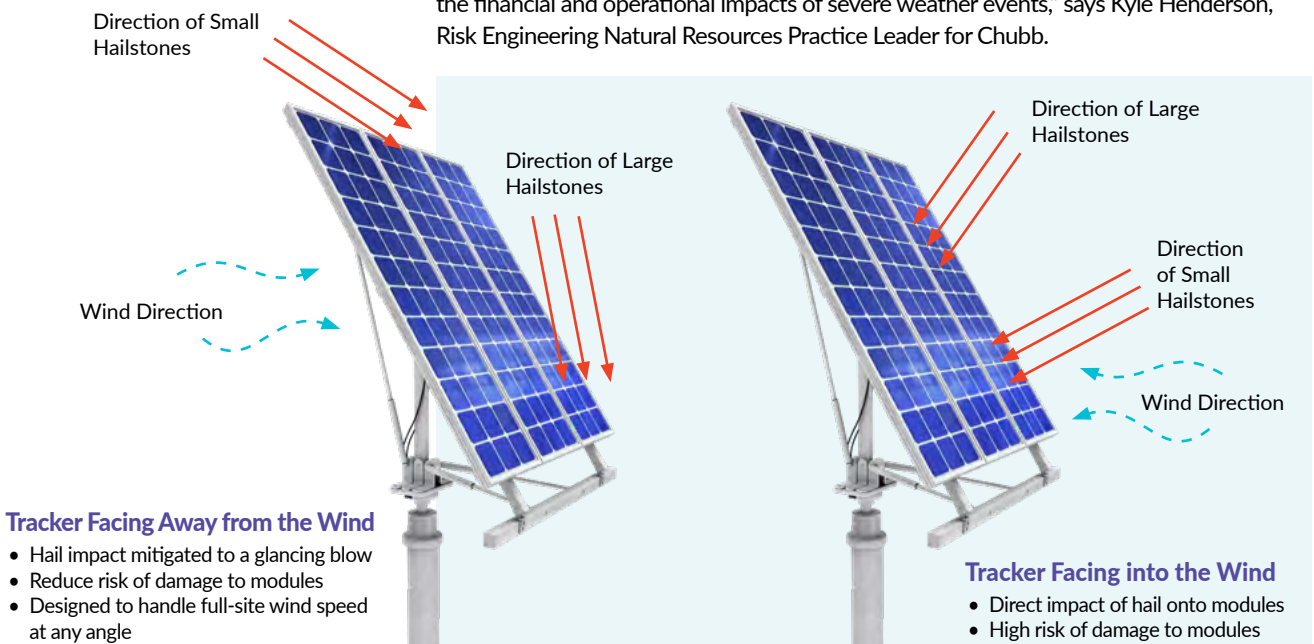


OPTIMIZED STOWING

Because [hailstorms are getting more severe](#) – producing stones that are far larger than 45mm and that travel at greater velocities – relying solely on the module’s glass thickness and configuration is simply not enough to mitigate against hail damage. The size and velocity of hailstones aren’t the only factors that determine their impact on solar PV modules. The angle of the panels themselves, relative to the angle of the falling hail, also plays a substantial role.

“[Stowing](#)” refers to the act of tilting PV modules on their trackers to minimize their wind profile or reduce the energy impact of hailstones. Trackers come in different configurations that are marked by different capacities. By stowing PV modules at a maximum tilt angle (50–75°) away from the wind during hailstorms, operators can significantly reduce the damage potential of hailstones by reducing the effective surface area of exposed glass. Doing so [has been shown](#) to result in indirect or glancing blows from hailstones rather than direct ones, weakening the normal element of kinetic energy associated with the falling hail.

“By stowing early and often, operators and developers can proactively safeguard against the financial and operational impacts of severe weather events,” says Kyle Henderson, Risk Engineering Natural Resources Practice Leader for Chubb.





OPERATIONAL CONSIDERATIONS

The third key element of any effective hail mitigation strategy for solar infrastructure is vigilance. Beyond selecting panels with care and optimizing stowing, operators should also factor in the following to address the growing threat of severe hailstorms posed by climate change.

- **Proactively monitor weather:** By paying close attention to weather forecasts or subscribing to a weather alert service (e.g., [AccuWeather](#) or DTN Weather Sentry), operators can identify the likelihood of severe weather in advance. Given the speed at which storms can travel and the time it takes for trackers to activate, operators should establish a weather alert radius (e.g., 30 miles) by measuring the local meteorological conditions and overall risk of hail occurrence against the response time of the tracking system.
- **Incorporate stow procedures into O&M programs:** Establish comprehensive Operations & Maintenance (O&M) strategies that include specific hail mitigation responsibilities, such as placing panels in hail stow position in advance of severe weather events. Ensure that these procedures have buy-in from all levels of company leadership and are actively monitored and reviewed annually.
- **Establish a plan, post-storm:** Develop post-storm assessment protocols, including immediate site inspections and damage assessments that use methods such as [aerial infrared imaging](#) or drone-assisted video. Because hail damage can result in damage invisible to the naked eye (i.e., [microcracks](#)), additional testing, such as [electroluminescence crack detection](#) (ELCD), may be warranted. If available, gather information from hail sensors, which can help record data on real time storm events, such as size of hailstones and distribution and intensity of impact. This information can play a key role in warranty or insurance claims.





HOW CHUBB CAN HELP

With Chubb as their partner, operators can feel more confident about their ability to ride out the storm.

Chubb is committed to [hastening and protecting the transition](#) to clean energy. Our provision of insurance products and risk management services to companies in the renewable energy sector plays a critical role in this transition.

Solar energy companies wishing to strengthen the resilience of their modules can [contact Chubb](#) to explore partnerships that will help them protect their operations from extreme weather events, including severe hail. With Chubb as their partner, operators can feel more confident about their ability to ride out the storm.

“As the frequency and severity of hailstorms increase, it’s crucial for solar companies to proactively address the escalating risk of hail damage,” says Holly Moore, Chubb Commercial Insurance Natural Resources Practice Leader. “By prioritizing panel resilience, optimized stowing protocols and adherence to industry best practices, we can help safeguard this vital industry.”