Credit: Jocelyn Augustino/FEMA

Earth, wind and fire: mitigating natural catastrophe impacts on PV plants

Insurance | A spate of extreme natural disasters in 2017 have highlighted the vulnerability of PV power plants to damage. Becky Nace-Grover looks at how the PV and insurance industries should ready themselves for a future where such events are likely to become more frequent

Recent months have seen the US and the Caribbean experience devastating Natural Catastrophe (Nat Cat) events, ranging from hurricanes such as Maria and Irma to widespread flooding, the Mexican earthquakes and the most costly Californian wildfires in history with insured damages reaching US$8 billion. Aside from the terrible human losses sustained, the consequences have been keenly felt by developers and owners of solar PV plants.

Between 2011 and 2015, on average 49.8% of North American PV losses were caused by extreme weather, but these figures are predicted to be considerably higher for 2017. This, in turn, has inevitably affected the wider renewables market, as well as the logistical and financial sectors which intersect with it.

Many of the losses to GCube-insured PV assets are due to Hurricane Maria, which caused the majority of its damage through high wind speeds. This is in contrast to past hurricanes, such as Superstorm Sandy in 2012 and Hurricane Matthew in 2016, which wreaked havoc primarily through storm surge and the inundation of water from heavy rain over a short period of time.

A PV array in the US Virgin Islands destroyed by Hurricane Maria last October. The growing frequency of 'Nat Cat' events presents a challenge for the solar industry

PV panels and other equipment on site are typically designed to withstand wind speeds of up to 120-140mph but Hurricane Maria, at its strongest point in the Caribbean, sustained speeds of up to 175mph.

The wider sector

Aside from the immediate, practical concerns relating to repairing damage and processing insurance claims, these recent catastrophic events are set to significantly affect the wider sector in the coming years. Over the past decade, new insurance providers have entered the market

and caused an imbalance in supply and demand, leading to what we call a 'soft' market where premiums may be underpriced, leaving both insurers and insureds vulnerable. The extreme weather events of the summer and autumn have forced the industry to acknowledge that these low prices are not sustainable in the long term, and we are therefore likely to see a redressing of the balance.

Appropriate and sensible premium pricing is necessary to ensure that insurers have capacity margin not only for expected losses, but also for extreme events like those seen this past year. Risks located in areas more susceptible to catastrophic losses from extreme weather events will be particularly scrutinised, with rates set to rise for projects in these locations. As GCube has always done, we will be reviewing risks on an account-by-account basis with our underwriting decisions being informed by historical performance and relationship with the Insured. There will not be a simple, 'one-size-fits-all' solution; the goal will be to make sure we are achieving the premium volume necessary to sustain in the long run.

The sector should now be looking to benefit from lessons learned. Of GCube's exposure base in Puerto Rico, some projects performed well while others sustained near-total losses. We are working to establish the factors which led to these different outcomes, and this knowledge will be put to use in advising clients on future projects.

Nat Cat events worldwide

Learning from these losses is particularly crucial given the changing risk profile of projects, as Nat Cat events pose an increasingly potent threat to PV assets. This is partially due to the expansion of developers into emerging markets, often located in more Nat Cat-prone and remote regions, which also carry the risk of an increased impact, should damage occur, due to unestablished supply chains and inadequate infrastructure.

However, the events of recent months will force the market to acknowledge that established markets, such as the US, are far from immune from such damages.

In addition to repairing damages incurred from recent Nat Cat events, developers will now be looking to protect their assets – both existing and those in the development pipeline – from future extreme weather. Fortunately, the risks to projects can be considerably lowered through a mixture of practical considerations, varying by weather event, and financial risk transfer mechanisms.

For developers working in the US, these considerations are complicated by the country's size and geographic spread. With the American market exposed to so many different extreme weather events, insuring against Nat Cat poses particular challenges. US assets, depending on location, can be exposed to windstorms, earthquakes, flooding, tornados, hail, and hostile and rapidly spreading wildfires, unlike most foreign markets which do not experience such a wide range of exposure.

Practical risk mitigation

As such, US developers are under even greater pressure to develop a range of protections for their assets, ranging from the practical to the financial. In terms of practical risk mitigation, there is a lot that developers and asset owners can do to minimise the threat that future Nat Cat events pose to their assets and, ultimately, to their bottom-line.

Floods

Pre-emptive action against flood damage is a good example of the improvement in project security that can be achieved through comprehensive planning and increased risk aversion. Developers, while avoiding flood zones, often take advantage of the cheaper land prices adjacent to these zones, sometimes building projects so that they hug the flood zone boundary. This inevitably adds risk to the project. Insureds should understand that while there are cost benefits to this approach, it also introduces implications from an insurance standpoint, such as the need for higher deductibles or increased premiums.

Aside from these considerations, additional steps which can be taken to prevent losses due to flooding include land grading and trenching, enabling water diversion. It is essential to ensure that project sites are able to drain effectively and swiftly following heavy rains, particularly in dry, desert locations. Critical equipment should also be raised off the ground; GCube has seen a number of avoidable losses, primarily during construction, caused by equipment being left on the ground and in the path of moving water while being staged.

Wildfires

Practical measures to protect against Nat Cats vary by event, and wildfires carry their own unique risks. First, developers must remember to consider that assets do not have to be in the direct path of a wildfire to feel the effects of it. With PV plants, an issue is the tremendous amounts of smoke and ash which is created from wildfires and can travel a long way in the wind, ultimately settling on PV panels and blocking the sun from penetrating through to create power. Cleaning panels can be a costly endeavour, but it should be factored into budgeting from the very start.

As another example, for carport installations, an effective preventative action is moving all other items – such as cars – from underneath the systems. Carport assets are often elevated enough to escape unscathed, but the advantage of height can be compromised if the car or vegetation growth below catches fire and it is spread up to the PV system.

On utility-scale sites, a consideration often overlooked is the maintenance and length of grass on the site. This is of particular importance in hot regions and during the dry season. A small error, like the use of insubstantial zip ties to secure wiring on site, can lead to wires becoming loose and, ultimately, can lead to a fire breaking out. In these cases, overgrown, dry grass provides perfect fuel for the fire to spread.

Earthquakes

GCube has less experience dealing with claims from earthquakes than with other Nat Cat events. The expectation is that ground-mount installations should perform relatively well, unless located directly near the epicenter of an earthquake. Owners will still have to contend with damage to utility poles and T&D lines, which can threaten project economics through loss of revenue.

Rooftop installations are an entirely different matter, and are a greater cause of concern for insurers. The large variance in strength of the structures on which the panels are mounted presents challenges. For example, the elevated nature of the mounting structure and position of panels on carports leaves them more susceptible to damage. If the building or carport collapses due to an earthquake, rooftop installed PV assets face a high likelihood of a total loss.

Financial risk mitigation

As is clear from the many different practical considerations, outlined above, which are required to protect against various differ-

ent natural disasters, insuring against Nat Cat events, in comparison to other project risks, introduces many complications.

This is no less the case for underwriters' own business; for insurers, one of the most important considerations regarding Nat Cat exposure is the aggregation of risk in specific locations. For example, for an insurance company which only underwrote assets in Puerto Rico, 2017 would prove a financially devastating year.

To minimize exposure, insurers tend to diversify their asset insurance portfolios geographically. However, in the recent spate of Nat Cat events, regions as diverse as Puerto Rico, Texas, Florida, Northern California and Mexico were affected by various events – and so a geographically diverse portfolio is no guarantee of security. This goes to prove the uncertain and unpredictable nature of Nat Cat events; Nat Cat events are called 'catastrophic' for a reason. Such events tend to strike less often than damage due to other risks, but when a Nat Cat event does occur, the consequences can often be devastating. Insurers can offer mechanisms to protect developers, but for the security of their own business, must often rely on reinsurance risk transfer mechanisms.

For developers, this highlights the importance of choosing an Insurer with a strong track record of supporting clients through Nat Cat losses, and with sufficient underwriting capacity to weather these losses with equanimity. With Nat Cat events only set to increase both in regularity and severity, developers are increasingly reliant on financial cover products to supplement the practical mechanisms they are implementing to minimise risk.

Insureds therefore need to work with their lenders' consultants and brokers, to determine the risk they are willing to take, and the minimum coverage they need to feel secure. Risk modelling companies often offer modelling based on past events, which can help insureds to settle on their 'probable maximum loss'. The insured and stakeholders must then determine the coverage required, balancing considerations of risk with budgeting for insurance premiums.

Moving forward

As developers and asset owners in the US and Caribbean recover from the devastating effects of recent Nat Cat events, the industry must look to the future and collaborate in order to minimise future risks from extreme weather events. This will require transparency and openness; developers, owners, investors and insurers alike have suffered from these events, but there is plenty that can be done to mitigate against future losses, from practical implementations to improved financial coverage mechanisms. With effective collaboration, the losses incurred need not have been meaningless; they can provide knowledge and inform decision making in the future, for the ultimate benefit of the industry as a whole.

Author

Becky Nace-Grover is an underwriter at GCube Insurance, having joined the New York office in 2012. Since then, she has helped to grow a large diversified book of wind and solar business on both the property and the liability side. She has worked on all size accounts ranging from small IPPs to large multinational energy and utility scale clients who operate renewable energy assets.