

## **Impact of cyclones on India's solar rooftop photovoltaic systems**

*By Jaymin Gajjar.*

*India, a country highly vulnerable to the effects of climate change, has witnessed the devastating impact of cyclones in recent years. The increasing frequency and intensity of cyclones have raised concerns about the resilience of India's solar rooftop photovoltaic (RTPV) systems. As the nation strives to transition to renewable energy (RE) sources, the RTPV industry has gained significant momentum. This article examines the lessons learnt from the impact of these cyclones on the nation's solar infrastructure and some of the measures needed to build a more robust and sustainable RE sector.*

### **Impact of Cyclones on RTPV Systems**

In recent years, cyclones such as [Biparjoy](#) (2023), [Tauktae](#) (2021), and [Fani](#) (2019) have hit the Indian coast, catching many RTPV system owners off guard. Characterised by strong winds of around 150–200 kmph of speed, heavy rainfall, and destructive forces, these cyclones have left a lasting impact on India's RTPV systems, especially in the coastal regions of Gujarat and Odisha. Because of the cyclone's violent gusts, RTPV installations faced challenges such as dislodged solar panels, panel breakages, bent frames, and weakened mounting structures. The torrential rains and flooding have also further worsened the situation, with electrical component failures and compromised system safety. In some cases, entire solar panel arrays have been destroyed, leaving solar system owners facing significant financial losses.

The damage inflicted on India's RTPV systems by cyclones led to disrupted clean energy generation and power supply. Many households, businesses, and public institutions heavily reliant on RTPV installations experienced prolonged power outages, creating inconvenience and disrupting normal life. This underscores the vulnerability of RE systems and highlights the importance of investing in their resilience to safeguard against extreme weather events in the future.

### **Rebuilding Towards Resilience**

One of the key reasons behind the damage to RTPV systems during cyclones could be the compromises made in the quality and durability of installations, especially because of the falling costs of RTPV installations. It is essential to keep a balance between both the quality and cost-effectiveness of RTPV installations.

To enhance the resilience of RTPV infrastructure, several key measures should be considered. The government, in collaboration with solar equipment manufacturers and installers, should conduct thorough assessments to identify vulnerabilities and develop appropriate guidelines and standards for cyclone-resistant solar installations.

*First, the government should initiate comprehensive assessments of existing RTPV installations to identify their vulnerabilities to cyclones. This process should involve evaluating the structural integrity of solar panels, mounting structures, and associated electrical components.*

*Second, the government should collaborate closely with solar equipment manufacturers to develop cyclone-resistant solar panels, mounting structures, and related components. Manufacturers can invest more in research and development to improve the durability and resilience of solar panels, with a focus on features such as reinforced frames, impact-resistant glass, and enhanced sealing techniques to prevent water ingress. Also, the manufacturers can work on innovative designs that minimise wind resistance and ensure secure installation.*

*Third, the government should strictly enforce regulations so that RTPV installers use certified and cyclone-resistant components in RTPV installations. It is crucial to have adequate design and certification as certified solar components undergo rigorous testing and meet standards to ensure durability and performance. The solar installations equipped with certified and robust mounting structures withstand the cyclone's impact relatively well.*

The formation of a task force dedicated to frequent inspections of RTPV installations would be another valuable initiative by the government. The task force would ensure the quality, safety, and compliance of RTPV systems, enhancing their performance and resilience. Implementing penalties and fines for non-compliance acts as a deterrent and encourages RTPV installers to strictly adhere to regulations. These measures will safeguard existing RTPV systems and pave the way for more reliable and resilient RE installations in the future.

Furthermore, financial support and incentives should be provided to encourage solar system owners to upgrade and reinforce their existing installations. This could include measures such as subsidising the replacement of damaged panels and providing low-interest loans for system repairs and improvements. Additionally, public awareness campaigns should be launched to educate solar system owners on cyclone preparedness, regular maintenance practices (such as trimming trees near panels and securing loose components), and the importance of backup storage solutions, such as batteries, to ensure uninterrupted power supply during extreme weather events.

The impact of recent cyclones on India's RTPV systems serves as a wake-up call to prioritise resilience and preparedness in the face of extreme weather events. As India continues to lead the RE transition, it must invest in cyclone-resistant solar technologies, strengthen installation guidelines, and support solar system owners in rebuilding and reinforcing their installations. By taking these proactive steps, the nation can emerge stronger, ensuring that RTPV systems continue to play a crucial role in the state's sustainable development and climate change mitigation efforts.

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