



# Backsheet degradation in solar modules

DuPont PV Consulting Services offers a field inspection and analysis program that tracks material degradation and solar module performance

## Summary

The photovoltaics (PV) market is growing quickly in higher-temperature climatic zones. Extreme environmental conditions, such as heat and humidity, can significantly increase the rate of degradation in vital solar panel components such as backsheets. It's critical to uncover backsheet defects and failures before they pose serious safety and power loss issues. DuPont PV Consulting Services provides the crucial insight and expertise that can help you detect and correct backsheet issues before they cause devastating problems at your PV plant.



**Historical trends + visual inspection**



**Backsheets provide electrical insulation while also sealing the PV module from moisture and ultraviolet (UV) light**



**Maintaining and replacing backsheets is key to preventing accelerated degradation and energy loss at PV plants**

## Backsheet degradation

A backsheet is the outermost layer at the back of the PV panel that adds the critical electrical insulation necessary for safe operation. In addition to electrical protection, the backsheet protects the solar cells from water exposure that would create dangerous arcs.

In addition to UV, temperature and humidity, everything from abrasion to atmospheric chemicals can threaten this crucial component of the PV panel. Backsheets should be designed to withstand these stresses on the PV modules. However, when the wrong material is used, backsheets sometimes fail in their mission to provide electrical insulation for the lifetime of the panel due to the combination and continual repetition of stresses. When backsheets degrade prematurely, it can lead to humidity ingress. Water may then create conductive paths that lead to shunts, arcs and/or current leakage. This poses serious safety concerns in the operation of the plant.

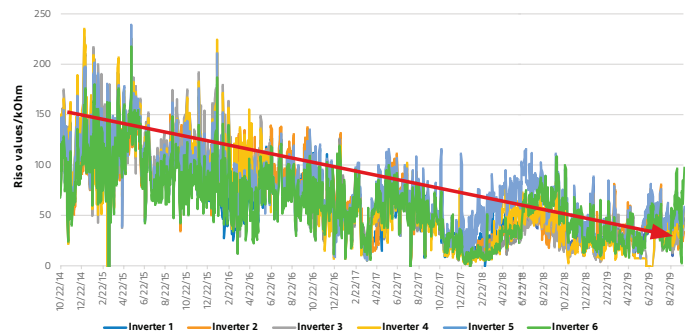
The adhesion of the backsheet to the panel, combined with its UV resistance and stable mechanical properties with regard to UV exposure, temperature and humidity, are all critical factors for the longevity of the entire panel. Therefore, it is crucially important to effectively detect and correct issues as soon as possible to prevent further damage.



Widespread backsheet cracking

## A more predictable performance

A 3MW ground-mounted system was built in France. After conducting historical analysis of the plant's insulation resistance (Riso) values, DuPont consultants determined that the solar panels' insulation resistance had significantly declined over time. DuPont consultants conducted a visual inspection and discovered extensive backsheet-level cracking that affected the polyamide (PA)-based backsheets as well as the polyvinyl difluoride (PVDF)-based backsheets. Many affected panels suffered visible water infiltration.



Insulation resistance degradation over time

The backsheet issues contributed to the degradation of the panels' insulation resistance, resulting in inverter tripping on the plant and subsequent increased operation costs. DuPont consultants recommended an immediate panel replacement of the defective modules.

DuPont consultants were also able to demonstrate to the local power off-taker that this course of action was required due to major safety concerns. The feed-in tariff was therefore maintained.

## Conclusion

Backsheets play a significant role in protecting the operators of PV plants. Backsheet degradation can significantly reduce the lifetime of the panels. Drawing on decades of experience researching, manufacturing and testing solar materials in the field and laboratory, DuPont offers best practices in component selection and long-term maintenance. DuPont consultants can help you select the right materials and can closely monitor material performance, ensuring that your PV systems are protected and performing now and in the future.



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