

SIXTH EDITION

# 2020 PV Module Reliability Scorecard



In partnership with



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## About PV Evolution Labs

PV Evolution Labs (PVEL) is the leading reliability and performance testing lab for downstream solar project developers, financiers, and asset owners and operators around the world. With over ten years of experience and accumulated data, PVEL conducts testing that demonstrates solar technology bankability. Its trusted, independent reports replace assumptions about solar equipment performance with data-driven, quantifiable metrics that enable efficient solar project development and financing.

The PVEL network connects all major PV and storage manufacturers with 400+ global Downstream Partners representing 30+ gigawatts of annual buying power. PVEL's mission is to support the worldwide PV downstream buyer community by generating data that accelerates adoption of solar technology. Learn more online at [pvel.com](http://pvel.com).



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# Introduction





## Foreword: A Note From Our CEO

This year's PV Module Reliability Scorecard is personal. When I established PV Evolution Labs (PVEL) ten years ago, I was preparing to become a father. I used to say that the systems installed back then would last until my unborn child graduated from university.

Unfortunately, not every system installed in 2010 was built to last. That very year, potential-induced degradation (PID) emerged as a failure mode that could reduce a power plant's energy yield by as much as 30%. This year, the median PID degradation from our PQP testing was the highest it has ever been in our lab's history. PID is a problem that many in our industry regarded as solved. Its resurgence is troubling, as are many of the other failures recorded in this report.

Over the past few years we've also observed tremendous innovation in PV technology. The list is impressive: bifacial, larger wafers, half-cut and shingled cells, novel cell-to-cell interconnect methods, PERC, HJT and a parade of other high-efficiency cell technologies. We've also tested thinner frames and glass, light-reflecting ribbon, novel encapsulants and backsheets, and many more. In this rush to innovate, some manufacturers have overlooked basic quality control.

Yet there is no question that advances in solar PV technology are critical. DNV GL, our Scorecard partner, notes in their Energy Transition Outlook that the planet is on track to warm by more than 2°C by 2050 – an outcome that will have devastating consequences around the world. Rapid expansion of renewable energy capacity is critical in the fight against climate change, and higher efficiency, lower cost PV cell and module technologies bring us closer to that goal.

Where does this leave the global solar industry? The pressure is on every player along the PV value chain to meet our energy transition needs while delivering profitable investment opportunities. At PVEL, we're creating data that matters for building the reliable, financeable solar power plants we need.

This sixth edition of PVEL's Scorecard highlights data from one of our most important test programs, the PV Module Product Qualification Program (PQP). It covers the exciting technologies we have tested, recognizes the excellence of top performing manufacturers and includes mission-critical risk mitigation strategies. These strategies are designed to help the global solar industry ensure quality and reliability as PV modules evolve and as the pressure to deploy exponentially more solar increases each passing year.

We hope that this year's Scorecard focuses the industry on deploying solar power systems that are built to last, for the sake of my ten-year-old son and for all of our children.

**JENYA MEYDBRAY**

CEO

PV Evolution Labs