

SILICON PHOTOVOLTAICS

Solar power plants age well

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The durability of photovoltaic modules is a critical factor for industry. Manufacturers guarantee retention of 80% of nameplate power after 25 years, but they are currently targeting longer service lifetimes. However, very few studies analyse systems older than 30 years, while datasets are typically inconsistent or may rely on outdoor monitoring rather than indoor laboratory performance testing. As a result, the feasibility of this target is not clear yet. Now, Alessandro Virtuani and colleagues across Switzerland and Italy present an analysis of the performance of a 35-year-old 10 kW solar power plant installed in Lugano, Switzerland, revealing that the photovoltaic modules are still delivering considerable power output.

The Ticino Solare photovoltaic plant comprises 288 modules, 18 of which have been regularly tested indoors, whereas the full set has been characterized three times over the years. The researchers report that while the average annual degradation rate is fairly low over the first 18 years (-0.1% per year) and mainly affected by a reduction of the fill factor, a more severe degradation occurs afterwards and especially after 28 years of service (-1.2% per year). In particular, the researchers identify a subset of modules ($\sim 72\%$ of the total) that experience higher performance losses that are correlated to a reduction of the short-circuit current. These losses are associated with degradation of the encapsulant layer, presence of hotspots and cracked cells. Nevertheless, Virtuani and team note that, even after 35 years, approximately 60% of the modules still satisfy the 80% performance threshold.

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