

## **SolarTech Power Solutions**

# **Degradation rate of solar monocrystalline silicon modules**



## Overview

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Currently, the general consensus in the industry for high-quality monocrystalline silicon panels is an annual degradation rate between 0.5% and 0.8%. Do mono-crystalline silicon PV modules degrade after 25 years of outdoor operation?

This paper investigates the degradation of 24 mono-crystalline silicon PV modules mounted on the rooftop of Egypt's electronics research institute (ERI) after 25 years of outdoor operation. Degradation rates were determined using the module's performance ratio, temperature losses, and energy yield.

What is the degradation rate of mono-crystalline silicon modules?

Mono-crystalline module degradation rates revealed a drastic power reduction (more than 4% per year). The annual degradation rates of multi-crystalline silicon modules were 0.85% and 1.05% respectively. Meanwhile, the annual degradation rates of CIS modules were approximately 4.5% and 1.57%.

What is the degradation rate of monocrystalline PV panels?

Table 9 presents the calculated degradation rates of the monocrystalline PV panels over the 5-year period. The results indicate that the annual degradation rate ranges from 0.282% to 0.354%, with an overall average degradation rate of 0.861% to 0.886% per year. Table 8. The EL results of two monocrystalline PV panels after 5 years of operation.

Why do mono-crystalline PV modules deteriorate?

Rajput et al. 31 performed a degradation analysis of mono-crystalline PV modules after 22 years of outdoor exposure to the Indian climate. The analysis revealed a 1.9% power degradation rate per year. The authors identified the degradation in short circuit currents as the primary cause of degradation.

What is the degradation rate of multi-crystalline PV modules after long-term exposure?

While the average degradation rate of multi-crystalline PV modules is 1.28%/year after 12 years of outdoor exposure. The other study is to assess the behavior of PV modules of different technologies after long-term exposure in the Saharan region of Algeria.

What is the average degradation rate of silicon panels?

The research by Som found that monocrystalline and polycrystalline silicon panels have an average degradation rate of about 0.5% per year in temperate climates.

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