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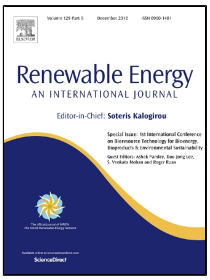

Assessment of early degradation and performance loss in five solar photovoltaic module technologies installed in Ghana using performance ratio time-series regression

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Assessment of early degradation and performance loss in five solar photovoltaic module technologies installed in Ghana using performance ratio time-series regression

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ABSTRACT

Long-term performance degradation in solar photovoltaic modules is generally understood to be linear. Nevertheless, there is increasing acknowledgement of sharper performance decline within the early periods of exposure. Emerging industry trend is geared toward providing multi-staged warranties that provide assurances of both early-period module output and longer-term performance. While studies on performance degradation are increasing in the open literature, there remains significant geographical imbalance. Moreover, many of the studies available are based on discrete measurements, with few resulting from continuous monitoring. This paper presents the outcome of analysis conducted to explore performance degradation of five solar photovoltaic module technologies within the first 14 months of installation in Kumasi Ghana. Based on time-series regression of the performance ratios, early degradation ranged from 8% - 13.8% of initial performance. Technologies studied were amorphous silicon, mono-crystalline silicon, polycrystalline silicon, Copper Indium Sulfide and hybrid Heterojunction with intrinsic Thin-layer (HIT).

Keywords: Early degradation; performance ratio; crystalline Silicon module; thin-film module; Ghana

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