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Circular Economy Strategies for End-of-Life Solar Panels

The rapid expansion of the solar photovoltaic (PV) sector has brought increasing attention to the sustainable management of decommissioned solar panels. This study investigates circular economy strategies for addressing the environmental and material recovery challenges associated with end-of-life (EoL) PV modules. Drawing on a review of current practices and policy frameworks, the paper examines the potential of reuse, refurbishment, and advanced recycling technologies to minimize waste and enhance resource efficiency. The analysis highlights the critical need for regulatory harmonization, design-for-disassembly principles, and investment in recycling infrastructure to close material loops within the solar industry. Findings contribute to the ongoing discourse on circularity in renewable energy systems and offer actionable insights for policymakers, manufacturers, and sustainability practitioners.

Keywords: circular economy, solar panel recycling, end-of-life photovoltaics, resource recovery, sustainable materials management

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