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ABSTRACT

Project Title:

Circular Production in Photovoltaic Supply Chains: A Lifecycle-Based Approach to Economic and Environmental Sustainability

Acronym: **CIRCMAN5.0**

The photovoltaic (PV) manufacturing sector is undergoing a transformative shift as it embraces circular production models to address pressing environmental challenges and enhance economic sustainability. This research investigates the adoption of circular economy principles within the PV supply chain, emphasizing a lifecycle-based approach that moves beyond the traditional "take-make-dispose" model toward strategies that prioritize reuse, repair, and recycling. Through an extensive literature review and analysis of industry case studies, the study critically examines how established policy guidelines and sustainability frameworks are influencing production practices in the PV industry.

The research synthesizes insights from academic texts, specialist publications, and industry reports to construct a comprehensive overview of current circular design practices. It explores the economic and environmental impacts of adopting circular strategies, outlining the benefits of reduced material consumption, improved waste management, and enhanced resource optimization. By evaluating best practices and benchmarking industry standards, the study provides a clear framework for understanding the potential of circular production to reshape the PV supply chain.

Ultimately, the findings highlight that a transition to circular production not only bolsters environmental sustainability but also offers significant economic advantages for the PV sector. This research contributes to a broader discourse on sustainable industrial practices, offering valuable insights for policymakers, industry stakeholders, and researchers dedicated to advancing the economics of photovoltaic supply chains and promoting a more resilient, sustainable energy future.