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Sustainable Photovoltaics Integration in buildings and Infrastructure for multiple applications

SPHINX - Deliverable report

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Techno-economic analysis for semi-transparent modules

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Public Summary

The techno-economic analysis presented in this deliverable focuses on semi-transparent modules with the half-cell and shingle technologies developed within the SPHINX project, emphasizing their crucial role in advancing building-integrated photovoltaic (BIPV) technology. The project, linked to Task 3.1, involves the deployment of modules with and without matrix shingle technology under identical conditions on carport structures, facilitating a comprehensive comparison between the two technologies.

A key feature of the semi-transparent modules is the incorporation of advanced coatings and encapsulant layers developed by CSEM, aimed at enhancing module performance by amplifying incident light conversion, bifacial power and mitigating temperature buildup behind the photovoltaic module. Additionally, aesthetic requirements tailored for carport structures, such as seamless integration, tunable transparency, and color customization, are addressed to ensure optimal functionality and visual appeal.

Performance evaluation demonstrates high efficiency and increased bifaciality, showcasing the modules' suitability for practical applications. A thorough cost analysis considers variations in raw material prices and production yields, providing insights into economic viability amidst fluctuating solar cell prices. Furthermore, the assessment of the carbon footprint highlights mitigation measures aimed at reducing overall emissions.

This deliverable contributes to the SPHINX project objectives by supporting the integration and validation of semi-transparent photovoltaic modules in the construction value chain, particularly in carport settings. It also aligns with major project exploitable results by promoting the development of innovative photovoltaic products for integration into various building structures.

Moving forward, recommendations include continued collaboration among project partners, long-term monitoring of module performance, development of market deployment strategies, further R&D to enhance module efficiency and durability, and stakeholder engagement to foster widespread adoption of semi-transparent modules.

To conclude, the insights gained from this deliverable underscore the significance of semi-transparent modules in advancing sustainable building practices and renewable energy solutions, positioning the SPHINX project at the forefront of BIPV technology innovation.

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