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SPHINX - Deliverable report

D4.2 – EDGE PASSIVATION

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Public Summary

The EU project SPHINX works to integrate solar technology more effectively and sustainably into buildings and infrastructure. A promising technique for this involves so-called matrix shingled solar modules. In this approach, standard solar cells are cut into narrow strips and arranged overlapping each other. However, the cutting process causes damages along the edges of these cell strips, leading to a loss in power generation.

In this work package (D4.2), the focus was on reducing this efficiency loss. A process named "Edge Passivation" (Passivated Edge Technology, PET) was developed and tested. This involves applying an ultra-thin protective layer (aluminum oxide) onto the cut edges after the cutting step, followed by a heat treatment.

Regarding the key results, a complete and functional workflow was established and validated, covering cell cutting, edge passivation, and quality control. Crucially, the developed PET process proved effective in increasing efficiency by significantly reducing the losses caused by cutting; it recovered approximately 70% of the initial efficiency drop. Additionally, concepts were developed to improve the sorting of these shingle strips for module assembly, using measurement images and artificial intelligence to better predict the quality of individual strips.

This work demonstrates that edge passivation is an effective method for improving the performance of shingled solar cells. It contributes to increasing the efficiency of solar modules and reducing material losses during production, marking an important step towards achieving the goals of the SPHINX project.

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Project partners:

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1	VOL	VOLTEC SOLAR
2	ETW	ETWAY S.R.L.
3	HLP	HELIUP
4	M10	M10 INDUSTRIES AG
5	UNR	UNIRESEARCH BV
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