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SPHINX - Deliverable report

D5.7 – Performance of demonstrators

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Public Summary

SPHINX develops and demonstrates integrated photovoltaic (IPV) products based on the matrix-shingle (MSC) interconnection technology for different construction typologies. In work package 5, these products were installed on demonstration sites in Switzerland, France and Germany. This report presents the performance of the demonstrators, assessed with a common monitoring procedure based on IEC 61724-1:2021 and a shared monitoring platform developed by EPFL.

Five solar roof tile demonstrators are monitored in Switzerland: three roofs and one façade of individual houses, and the roof of a heritage house. On the roofs where they replaced earlier solar tiles, the SPHINX tiles produced, per kWp installed, 14 % to 54 % more energy from January to mid-October 2026 than the 2019–2024 average of the previous installations, except at Rossinière (+5 %), where the tiles now cover the entire roof, including less favourable orientations. The decrease in performance over the first year is acceptable and lower than that of the previous tile generations. A UV downshifter foil applied on one row of tiles increased its production by about 14 % in summer, while matching the standard tiles in winter. The analysis also showed that simple 2D simulation methods are not suited to complex roofs with windows, chimneys and safety elements.

On the PV noise barrier in Merdingen (Germany), the mounting system has a decisive influence. Vertical bifacial elements benefit from rear-side irradiance in summer, and on this structure the TOPCon MST bifacial modules produce about 14 % more than the TOPCon H-pattern monofacial modules. The inclined-row structure is primarily designed to meet the acoustic and construction requirements of a high-performance sound-absorbing noise barrier. During the January–mid-September 2026 monitoring period, the lower rows showed lower cumulative specific yields than the top row. Summer self-shading was anticipated during design, and soiling was also documented; their respective contributions to the yield difference have not been quantified separately. On this structure, the PERC and TOPCon H-pattern modules perform well and are much less affected than the TOPCon MST modules. The acoustic measurements, to be reported in an update, will allow the trade-off between energy yield and noise reduction to be assessed. On the free-standing SalvaTerra elements, preliminary results show that south-facing TOPCon MST modules perform slightly better than TOPCon H-pattern modules (about 2–3 %).

An analysis of edge obstructions shows that TOPCon MST modules tolerate partial shading well, but that a band of soiling or shading along the lower edge of a module in landscape orientation can reduce its power drastically, while the same band has almost no effect in portrait orientation. Each installation should therefore be analysed carefully before using this technology.

The industrial building demonstrator was cancelled in December 2025, and the car-port demonstrator is awaiting its grid connection. Its performance will be reported once data are available. The measured energy yields feed the cost and LCOE assessment of the project

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Project partners:

#	Partner short name	Partner Full Name
1	VOL	VOLTEC SOLAR
2	ETW	ETWAY S.R.L.
3	HLP	HELIUP
4	M10	M10 INDUSTRIES AG
5	UNR	UNIRESEARCH BV
6	Fraunhofer	FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV
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