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Sustainable Photovoltaics Integration in buildings and Infrastructure for multiple applications

SPHINX - Deliverable report

D3.3 – Techno-economic analysis (lightweight PV modules specifications)

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Public Summary

Deliverable D3.3 aims to present the specifications of the lightweight PV modules developed by HELIUP with shingle matrix, focusing on the BOM and electrical design.

Lightweight panels for large rooftops

Solar panels are evolving with an ever-higher levels of power and reliability. However, their considerable weight, combined with the mechanical structures (~ 15 Kg/m²), is not compatible with a large proportion of existing buildings rooftops. To achieve a reduced weight together with an increased resistance to ageing, mechanical shocks (such as hail) and installation, a significant evolution in the design of the solar panel is thus necessary.

To provide an effective response to these challenges, HELIUP develops and produces photovoltaic solutions 60% lighter than conventional panels while maintaining the same level of performance and durability. HELIUP is located in France, in the Auvergne-Rhône-Alpes region and its first pilot line is operational since the end of 2023 (**Figure 1**).

***Figure 1**. Location (left) and facilities (right) of HELIUP in France.*

The STYKON® panel is one of the solutions offered by HELIUP dedicated to flat roofs, with an innovative, simple and quick installation system based on gluing the panel directly onto the roof's waterproofing membrane. It is IEC 61215/61730 certified and building certified for French market (CSTB ATEx 3308_V1 and 3309_V1). In line with its commitment to develop products with a low environmental impact, the STYKON® panel has low-carbon footprint (ECS certification in accordance with French regulations).

A first installation of 22kWc was fitted in a SOPREMA rooftop in September 2023 (**Figure 3**), validating the STYKON® panel design and integration system. The proposed reduction of 60% of raw material (in mass) compared to a conventional solar rooftop system with the same installed capacity was indeed obtained.

Figure 2. *First demonstrator of 22kWc in a Soprema building with STYKON® panels.*

STYKON® in SPHINX project

The current design of STYKON® panels is based on half-cell technology and will be replaced by shingle matrix in the SPHINX project. The shingle matrix technology will result in a higher active module area, higher shading resilience and lower copper/lead consumption.

In **Figure 3** the STYKON® panel with half-cell and matrix shingle design are presented based on the same final module dimension. It is possible to see a qualitative increase of active area on the shingle matrix design: in the next section, a quantitative estimation of the I-V parameters will be reported.

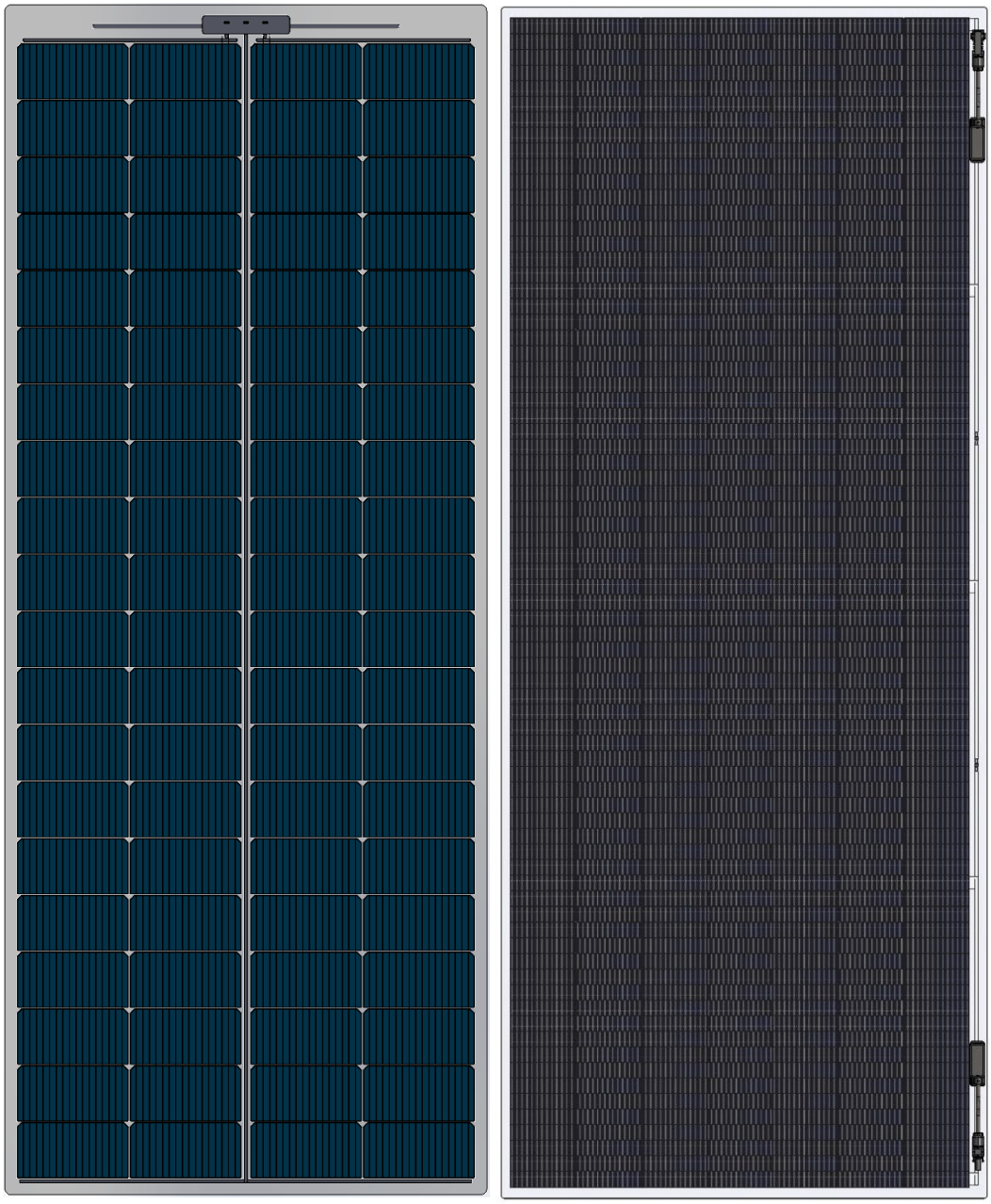

***Figure 3**. Design of the STYKON® panel with the 4x20 M10 cells (left) and shingle matrix (right).*

During the SPHINX project, the compatibility of matrix shingle technology with HELIUP bill of materials will be evaluated and CSEM antifouling coating as well as its UV downshifting layer will be tested. The final goal is to successfully complete the qualification tests (Task 3.3) which will allow to install a 100 kWc installation for commercial and industrial rooftops (Task 5.1).

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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
7	ICARES	ICARES CONSULTING
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8	CEA	COMMISSARIAT A L ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES
9	FSUNS	Freesuns SA
10	CSEM	CSEM CENTRE SUISSE D'ELECTRONIQUE ET DE MICROTECHNIQUE SA - RECHERCHE ET DEVELOPPEMENT
11	EPFL	ECOLE POLYTECHNIQUE FEDERALE DE LAUSANNE
12	SOP	SOPREMA

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