SOPHIA: New EU project to implement Advanced Digital Solutions to increase the circularity of PV panels throughout the full value chain

Photo Caption: SOPHIA project partners at the kick-off-meeting in Valencia (Spain). June 2025.

With the rapid rollout of solar energy, which is at the forefront of efforts to reduce carbon emissions, there is a growing need for solutions to increase the circularity of PV panels, bridging the gap between the manufacturing and end-of-life processes, and keeping critical and valuable materials in use for as long as possible.

The **SOPHIA** project - Implementation of Advanced Digital Solutions to increase the circularity of PV panels throughout the full value chain – is an EU-funded Horizon Europe project that aims to implement Advanced Digital Solutions in **end-of-life solar panels**, involving the full value chain in order to **increase their current reuse, repair and recycling rates**. For the evaluation of their **State-of-Health (SoH)**, a prototype will be developed for a fast evaluation of its efficiency, black areas and main damages. Solar panels with remaining efficiency >80% will be **repaired** using a robot-assisted equipment and high-performance dielectric varnish. The non-reparable ones will be **recycled** using innovative technologies to maximize the separation of their main components (glass, silicon & metals and plastics). For the case of the glass fraction an in-line antimony quantification system will be implemented to maximize their fraction and valorization.

Furthermore, to achieve the goals and the high circularity of the panels in the long term, a new **eco-designed and easy dismantling** solar panel using tailor-made debonding on-demand adhesives will be developed. To achieve full panels traceability, a digital platform will be developed to implement **Digital Product Passport (DPP)** in new and repaired solar panels, as well as the collection of information to trace current panels without DPP. Thanks to the traceability and information available in the DPP, the panels and components will be more easily identifiable, hence they will be repaired or recycled, **increasing the quality of the obtained** secondary raw materials thought to obtain high purity fractions, thus reducing waste generation. The repaired and eco-designed panels and upcycled fractions from EoL PV panels will be put up for sale on a **specific marketplace**, supported each product by a DPP system.

The project, that officially started on 1 June 2025, has a duration of 36 months and is coordinated by AIMPLAS (ES) and managed along with other 14 partners across Europe: CIDETEC (ES), Fraunhofer (DE), WILOCK (ES), LHV (ES), SADAKO (ES), BIOSOLAR (NL), AKUMPT (BG), SISECAM (TR), FERROG (ES), IS (LT), Recyclia (ES), EuRIC (BE), CEPS (BE), ENCO (IT). The project partners of SOPHIA gathered on 26 June 2025 in Valencia (Spain) to kick-off this Horizon Europe project.

Through the development of innovative solutions to boost PV panels circularity, SOPHIA will contribute to fostering a more circular, innovative and competitive Europe.

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