

What is the Sophia Project?

These aspects are covered by the SOPHIA project. A 3 kWe-size pressurized HTE system, coupled to a concentrated solar energy source will be designed, fabricated and operated on-sun for proof of principle. Second, it will prove the concept of co-electrolysis at the stack level while operated also pressurized.

What is Sophia's Horizon Europe project?

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.

Can a solar hydrogen production plant co-generation a kilowatt-scale pilot plant?

Solar hydrogen production devices have demonstrated promising performance at the lab scale, but there are few large-scale on-sun demonstrations. Here the authors present a thermally integrated kilowatt-scale pilot plant, tested under real-world conditions, for the co-generation of hydrogen and heat.

Are solar-to-fuel efficiencies based on Gibbs free energy?

While solar-to-fuel efficiencies are typically based on the Gibbs free energy under standard conditions³⁷, it is common in the water electrolysis field for voltage efficiencies to be reported on an enthalpy basis (HHV)³⁴, and therefore both definitions (discussed further in Supplementary Note 4) will be used here for completeness.

Here we present a scaled prototype of a solar hydrogen and heat co-generation system utilizing concentrated sunlight operating at substantial hydrogen production rates.

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