

HORIZON-CL5-2026-04-Two-Stage-D3-02

THERMOGEN

Next Gen High-Temperature Thermal Power Generation & Storage System

Advancing renewable energy technologies for a 100% green grid through innovative Thermophotovoltaic (TPV) conversion.

Lead: Hydrogen Valley DK

Contact: reh@hydrogenvalley.dk

Status: Consortium Forming

Project Concept & Objectives

The Challenge

Europe requires **sovereign power balancing** to eliminate fossil fuel reliance. Current storage solutions suffer from low efficiency and high mechanical complexity.

The Breakthrough

THERMOGEN validates a novel **TPV-based HT thermal power generator and storage system**. By using selective crystal emitters, we convert heat directly to electricity, bypassing mechanical losses.

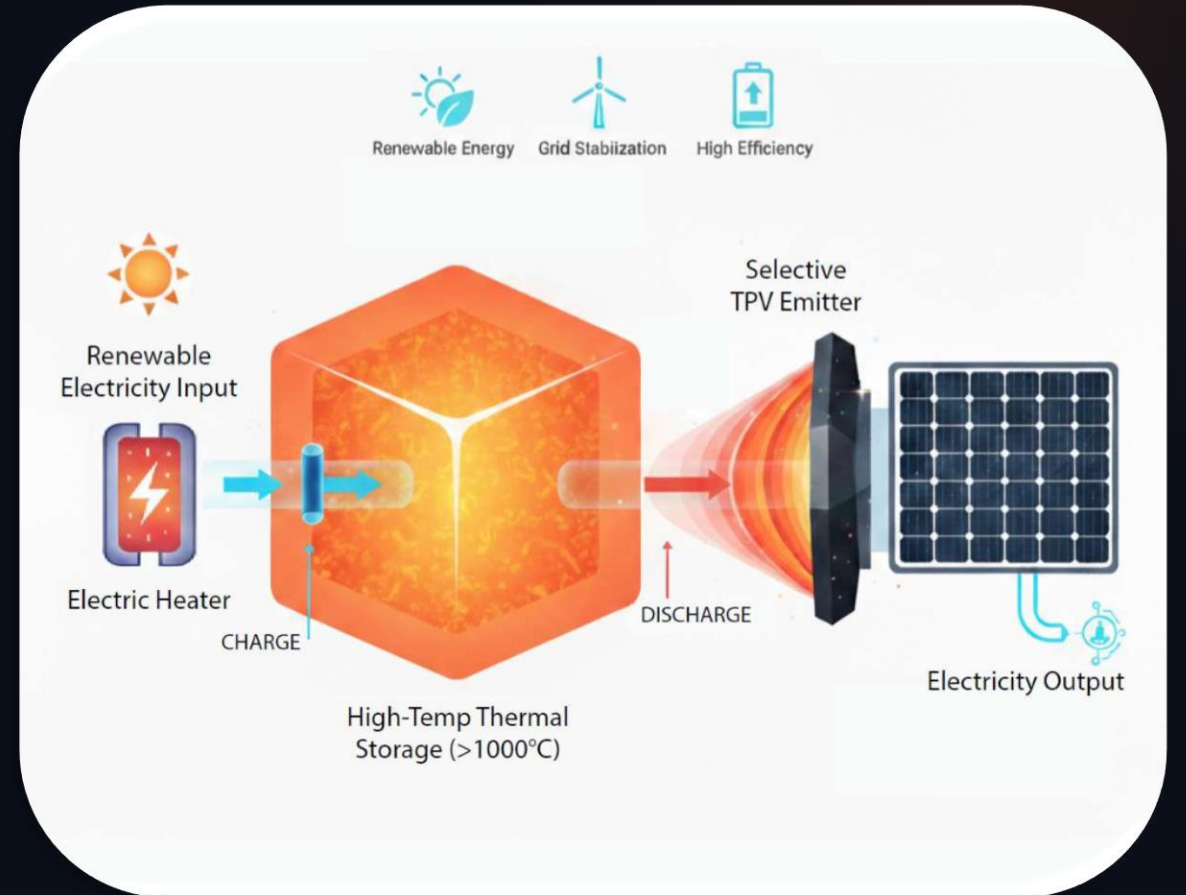
Specific Targets

- **Efficiency:** Validate 40% Round-Trip Efficiency (RTE).
- **Maturity:** Advance from TRL 2 to TRL 4/5 validation.
- **LCOE:** Significant cost reduction vs existing Thermal-based PtP systems.
- **Materials:** Utilize low-cost, non-critical raw materials.

Technological Scope

Exploiting the thermodynamic advantages of temperatures $>1000^{\circ}\text{C}$.

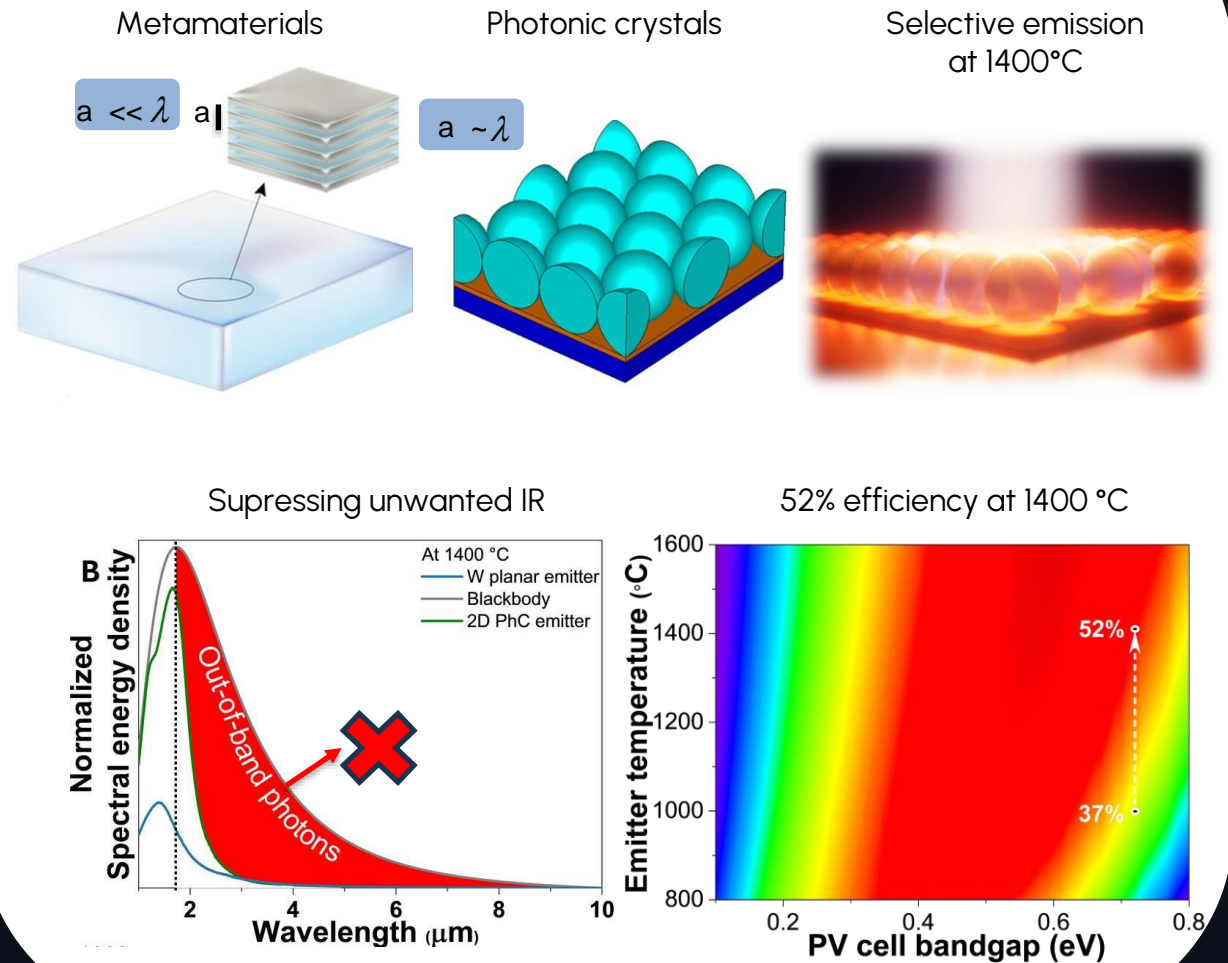
- **Charging:** RES-powered heating of HT storage media.
- **Energy Conversion:** Selective TPV crystal emitter converts heat to IR radiation.
- **Power Generation:** Specialized PV cells convert IR to electricity, **avoiding mechanical losses**.
- **Integration:** Optimized HT interfaces to minimize energy leakage.



Novel TPV Emitter

TPV systems can realistically deliver ultra-high power density of 1-20 kW/m², orders of magnitude higher than solar PV.

- **Multi-compatibility:** Waste-heat, combustion, renewable heat, nuclear, and CSP.
- **Enables** compact, efficient, dispatchable power for remote and off-grid applications.
- **Spectral control** minimizes thermal losses, maximizing electrical conversion efficiency.
- **High-Temperature Operation** delivers higher radiative power and improved conversion efficiency



Partner Profiles Sought

We are seeking European experts to complete a consortium currently including **Hydrogen Valley, AAU M&P, and Aalborg CSP**.



Control Systems

Developing Energy Management Systems (EMS), predictive maintenance, and interface software.



Materials & PV

Specialists in HT storage media design, encapsulation, and HT IR-to-electric PV optimization.



LCA & Impact

LCA modelers for techno-economic pathways and LCOS validation against RIA targets.

Consortium Expertise

ORGANIZATION

SPECIFIC TECHNOLOGICAL EXPERTISE

AAU Materials & Production

Advanced materials science, HT component testing, and selective emitter crystal development.

Hydrogen Valley DK

Project management, green hydrogen integration, and large-scale renewable energy project facilitation.

Aalborg CSP

Specialists in high-temperature thermal energy storage, solar thermal systems, and industrial heat integration.

Combined track record in progressing TRLs from laboratory concept to pilot-scale industrial validation.

Join the **Consortium**

RIA ACTION TYPE | TARGET BUDGET: EUR 4.00M

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Hydrogen Valley DK