HEATERNAL

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heaternal-project

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INNOVATIVE HIGH-TEMPERATURE THERMAL STORAGE FOR INDUSTRIAL APPLICATIONS

APPROACH

The HEATERNAL concept will ensure 48-hours heat storage capacity at an industrial scale through modeling and simulation approaches. It will be optimized through a hybrid storage unit of a refractory brick containing a Phase Change Material (PCM). The PCM composition will be adjusted to comply with multiple industrial applications.

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11 Partners

+3 Million Euros

4 European Countries (French, Spain, Belgium and Portugal)

3 years and 6 month Duration

4 Energy-intensive European industries from aluminum, ceramics, and steel, an engineering/ thermal-equipment manufacturer, and leading research teams in energy storage, materials, modeling, system design, prototyping, LCA, techno-economic assessment, and technology transfer to industry.

OBJECTIVES

OPTIMIZED COST-EFFECTIVE SYSTEM

1. To maximize thermal performances of TES Unit (energy density, heat transfer capacity).
2. To simulate full TESS integration for 3 use cases.
3. To ensure the economic viability and environmental sustainability of the system.

INCREASE THE THERMAL STORAGE LIFETIME BY UP TO 10 YEARS

4. To ensure the reliability of the thermal storage Unit from 600-900°C.
5. To validate a 50 kWh-scale (TRL5) prototype via accelerated ageing tests corresponding to 2 years of the UGIT use-case and via thermos mechanical models considering heat transfer and thermal stress.

SPEED UP THE MANUFACTURABILITY FOR RAPID MARKET ENTRY

6. To minimize system footprint.
7. To ensure HEATERNAL R&D results in a system that can be rapidly manufactured and improved: compatible with high MRL7 processes for urgent decarbonization and exploring lower MRL processes for next-gen thermal performance.

TO ENSURE THE SOLUTION MARKET ENTRY BY 2030 AND PROMOTE 10% OF THE MARKET SHARE BY 2040

8. To engage stakeholders to invest in TRL7/8 demonstration and/or factory adoption.

INNOVATING IN EFFICIENCY AND RAPID INTEGRATION

The collaborative objective is to create a prototype and model for an innovative thermal energy storage concept that draws from substantial scientific and industrial expertise. This involves two key components: inventive phase-change materials and unit designs that amplify unit energy density by 350% compared to ceramic bricks, and manufacturing proficiency that guarantees swift integration of materials and units into factories by 2030. The solution proposed by HEATERNAL effectively addresses industrial requisites, including a minimal footprint, a lifespan exceeding 10 years, and a swift return on investment. The project brings four specialized public research teams focused on prototyping and modelling thermal systems, phase-change materials, and 3D printing to implement viable short-term thermal energy storage within up to 48 hours.

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