# Smart Integration of Waste and Renewable Energy for Sustainable Heat Upgrade in the Industry

SUSHEAT

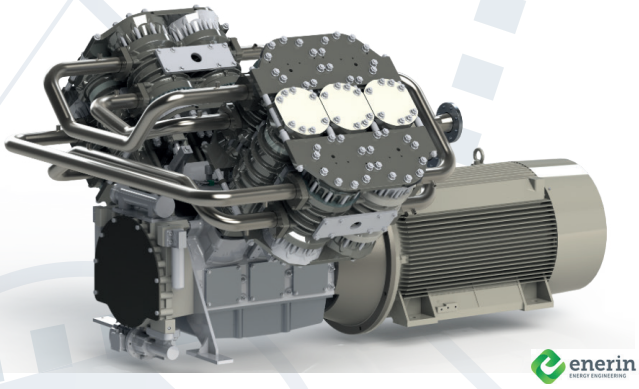
## PROJECT OVERVIEW

The SUSHEAT project aims to develop innovative technologies tailored for flexible and efficient industrial heat generation in the temperature range between 150°C to 250°C. These solutions will undergo validation in cutting-edge laboratories.

Three novel technologies will undergo validation:

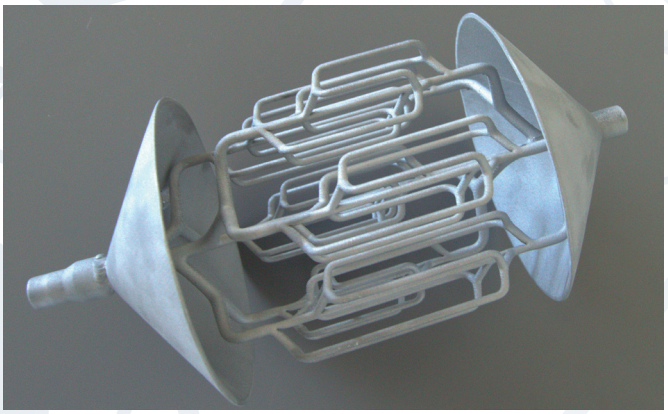
1. **High-Temperature Heat Pump (HT-HP)**

   Enerin's advanced industrial heat pump will upgrade low-temperature sources from manufacturing processes – waste heat, cooling water, or ambient heat – to the high temperatures required by industrial processes.



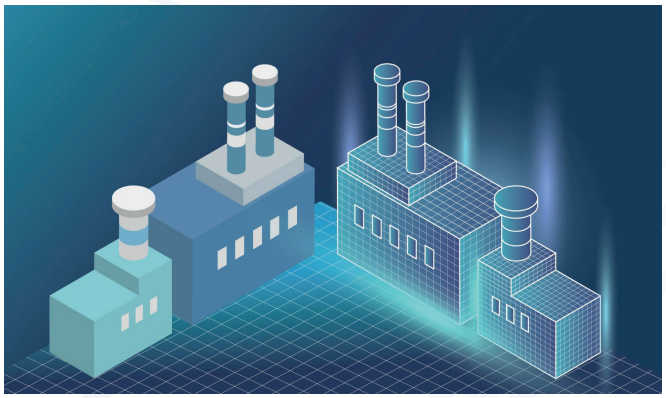

2. **Phase Change Material (PCM) bio-inspired Thermal Energy Storage (TES) system**

   This innovative system, drawing inspiration from nature, utilises phase change materials to efficiently store and release thermal energy. The incorporation of biologically inspired design, assisted by Artificial Intelligence (AI), will aid in designing the storage tank.



3. **Control & Integration Twin (CIT) system**

   The CIT system will incorporate a digital twin for experimental simulations and an AI-guided control system. This integration aims to optimise and enhance energy management for industrial processes through smart decision-making algorithms.



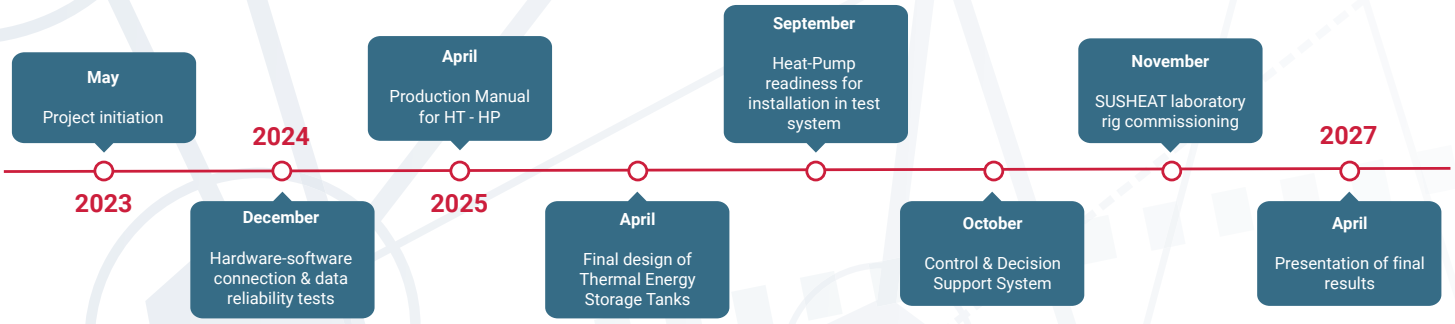
## VALIDATION AT TRL 5

The SUSHEAT project will optimise system performance and integration through case studies with Pelagia AS in Norway and Mandrekas in Greece. Pelagia will replace traditional boilers with a High-Temperature Heat Pump, while Mandrekas will incorporate waste heat recovery and solar energy. Additional relevant cases will also be investigated to ensure comprehensive validation for diverse industrial applications.

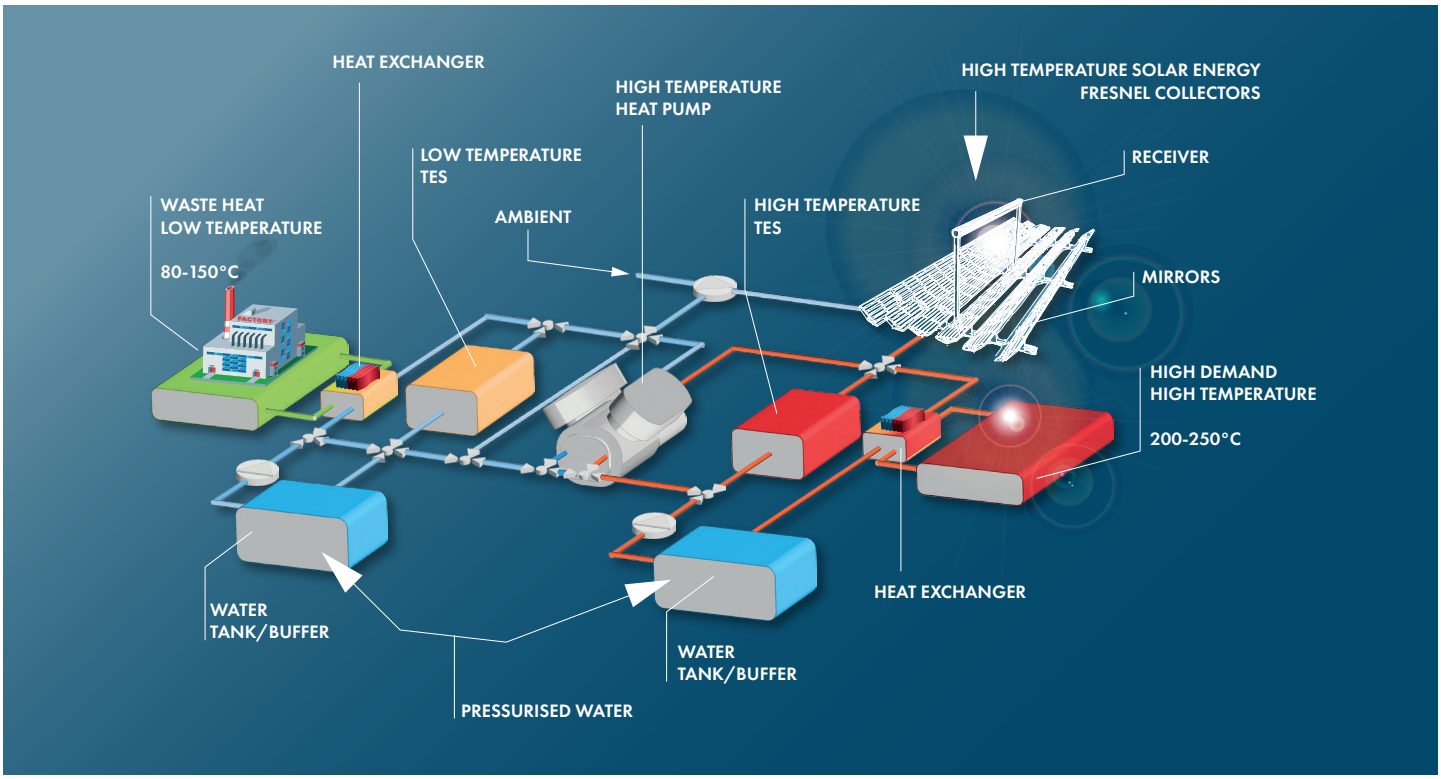
### SUSHEAT OBJECTIVES

- **Increase energy efficiency** in the industry.
- **Reduce industrial greenhouse gas (GHG) emissions** and **energy consumption** by enabling innovative waste heat upgrade solutions.
- **Enhance the flexibility** of the industrial sector, limiting the short- and long-term impact of industrial heat electrification on the local grid.
- Promote and **raise awareness** of the benefit of industrial heat recovery and upgrade within key stakeholders.

## PROJECT MILESTONES:



## ENERGY OPTIMISATION WITH SUSHEAT CONCEPT




SUSHEAT uses waste energy available in the industry to charge low-temperature thermal energy storage tanks, which are upgraded by the HT-HP and stored at high temperatures. The HT-HP can also upgrade ambient heat and solar energy, initially to low temperatures, and later to high temperatures.

Solar collectors add an advantage to the system by introducing heat directly to either high temperatures or low temperatures, which are later upgraded, enhancing the efficiency of Linear Fresnel Collectors.

This approach reduces fossil fuel consumption, greenhouse gas emissions, and waste energy release. The Control and Integration Twin optimises these benefits for each case study.

SUSHEAT will develop self-assessment tools to identify and optimise industrial processes, enhancing efficiency and supporting decarbonisation. The complete SUSHEAT system will be tested at the KTH Royal Institute of Technology laboratories, replicating conditions of the dairy and fish oil industries.

**www.susheat.eu**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