

Introducing

COMHP**T**ES

Flexible **C**ompact Modular **H**eat **P**ump and PCM based **T**hermal **E**nergy **S**torage System for Heat and Cold Industrial Applications

Dear Reader,

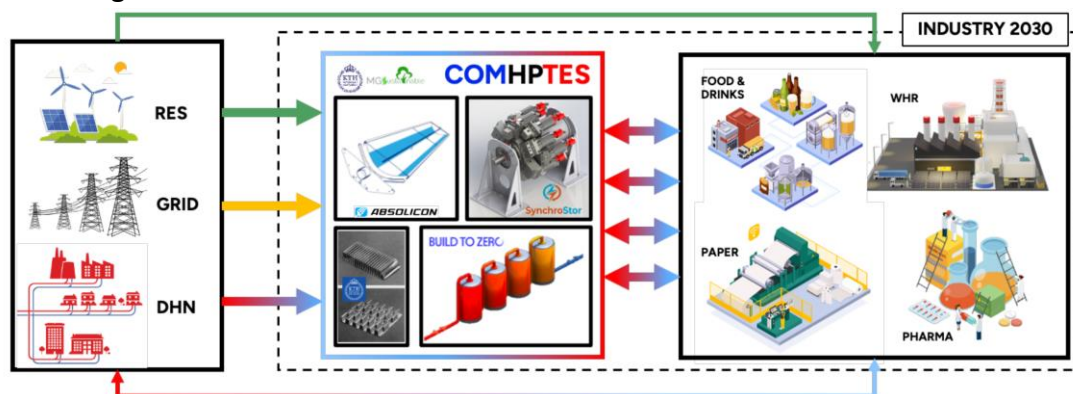
We are happy to introduce you to our project **COMHP**T**ES**, which aims to develop innovative, cost-effective, and compact CO₂-based high-temperature heat pump (HP) and thermal energy storage (TES) technologies to promote decarbonization of industrial heating and cooling.

The Challenge

Industry continues to rely on fossil fuels for thermal energy. Barriers to adoption of new, sustainable technologies include limited space, risk aversity and low investment capacity, and a lack of awareness. COMHP**T**ES aims to address these challenges.

The Solution

COMHP**T**ES will serve as a cornerstone project that demonstrates and promotes new thermal systems and technologies (i.e. HP, TES, PTC, and integrated systems) for decarbonization of the industrial sector. The project specifically targets end-users with heat loads ranging from 0.5 to 10 MW_t, supplying heating and cooling at 225°C and 5 °C, respectively. The project will achieve TRL 5 through an experimental campaign to validate the system and its constituent technologies.



Visual representation of COMHP**T**ES system, which supplies industrial heating and cooling and allows for connections to renewable energy systems, the grid, and the DHN.



Swedish
Energy Agency



Scottish Enterprise



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Who are the project partners?

The project is a joint effort between 5 partners across Europe:

1. **KTH Royal Institute of Technology** is Sweden's largest technical university, with expertise in management of EU projects, industrial decarbonization process modeling, and design and testing of HPs and TES.
2. **SynchroStor** is a UK-registered SME with a patented reciprocating compressor-expander machine and experience in developing tailored solutions for industry.
3. **Absolicon** is a Swedish SME and parabolic trough collector (PTC) supplier with their own proprietary technology for automated manufacturing.
4. **MG Sustainable** is a Swedish SME specializing in industrial sustainability, with experience in environmental impact assessment and solar energy integration.
5. **Build to Zero** is a Spanish SME with expertise in development and deployment of commercial TES systems and a patented phase change material (PCM) TES concept.

Project Timeline and Milestones

The project will take place over the course of three years, and will include HP and TES development and prototyping, an integrated validation campaign at TRL 5, and system performance impact assessment towards replicability and upscaling. Additionally, technoeconomic analysis and social and environmental impact assessment will give insight into the potential and relevance of the integrated system.

Some key milestones from this year include:

1. Definition of the heat pump cycles and boundary conditions, as well as the industrial replication case studies
2. Preliminary design of the compressor/expander, the high temperature heat exchanger, and the TES (with optimization ongoing)
3. Development of preliminary process and instrumentation diagrams for the experimental rig at KTH
4. Development of an optimized design of PTCs for integration on industry rooftops

Further optimization is underway of the different components, with 2026 being dedicated to the lab adaptation to prepare for the experimental campaign in 2027.

We are excited to bring this work to fruition and support a decarbonized future!

For more information, please visit our [website](#) or [LinkedIn](#). You can also read about recent events, including a [project meeting](#) with KTH and SynchroStor, Zamil Narsing's [presentation](#) at the ASME Energy Sustainability Conference, and KTH's [HPT Symposium](#), which highlighted various projects, including COMHP TES.

Best wishes,
The COMHP TES Team