# SPIRIT

## Implementation of sustainable heat upgrade technologies for Industry


This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No. 101069672 (SPIRIT).

# SPIRIT: Introduction

**Framework**
Programme:
Horizon Europe

**Topic**:
HORIZON-CL5-2021-D4-01-04 – Full-scale demonstration of heat upgrade technologies with supply temperature in the range 90 - 160°C

**Duration**:
42 months
September 2022 – February 2026

**Total budget**:
€ 11 157 709,78

EU contribution:
€ 8 901 668,75

**Partners**:
17 from 8 countries

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# SPIRIT Consortium

| Knowledge Providers | Technology Suppliers | End-users | Communcation & Dissemination | Business Support |
|---|---|---|---|---|
| TNO innovation for life<br>DLR<br>DTU<br>TLK ENERGY<br>DANISH TECHNOLOGICAL INSTITUTE | GEA Engineering for a better world.<br>SPILLING Technologies<br>MAYEKAWA<br>TVP SOLAR | Smurfit Kappa<br>STELLA POLARIS<br>Tiwen Titanium | ehpa european heat pump association<br>EUROHEAT & POWER | eurac research<br>SINLOC Sistema Iniziative Locali |

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# The SPIRIT Advisory Board

It will act as “ambassador” of the SPIRIT project.

Members will disseminate the project results via their networks and provide input to the project to steer for maximum impact.

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# SPIRIT Objectives

1. **Demonstrate 3 full-scale HPs** in the food and paper industrial sectors, with 3 different technologies
2. Improve **technical and economic performance** of HTHPs to enable an increase in their market uptake
3. Develop **HP repeatable concepts and modular design** to ensure that HP manufacturers can replicate the construction of HP units after Project completion
4. **Draft agreements and business models for delivery of upgraded heat** addressing possible regulatory barrier
5. **Create awareness of the challenges and benefits of heat upgrading technology** in the industry for reducing energy costs and GHG emission

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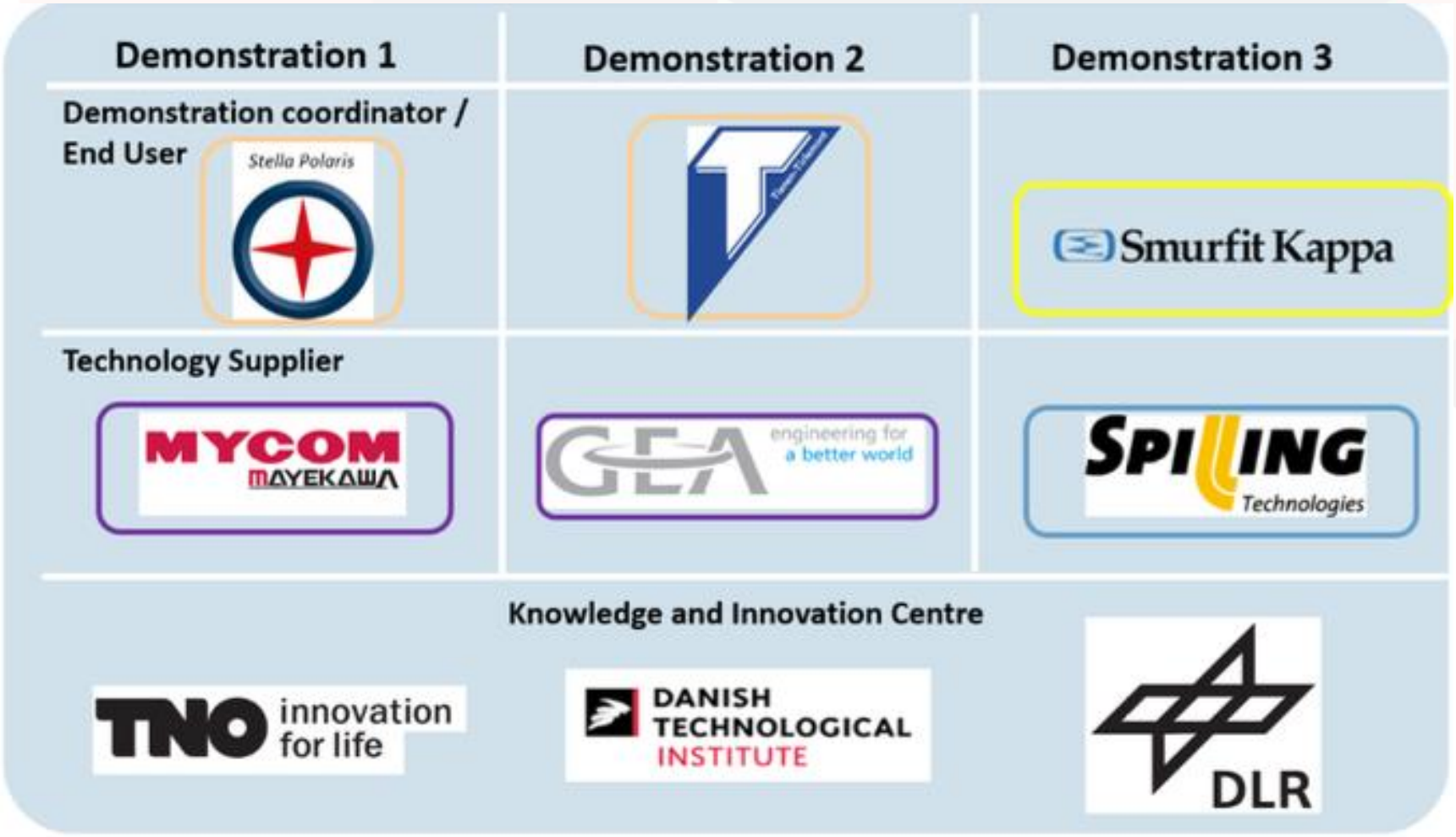
# SPIRIT Demonstration sites

SPIRIT Partners will design, construct and integrate three heat pump systems at three end-user locations.
This allows the Consortium to demonstrate industrial heat pump technology up to Technology Readiness Level 8 within three different full-scale industrial processes

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# Demo-site 1: Shrimp processing Plant (TNO, Stella Polaris & Mayekawa)


The goal is to demonstrate a high-temperature heat pump based on a screw compressor with a hydrocarbon as the working fluid.
The heat pump will supply steam temperatures at around 143°C with a capacity of 1.2 MW, replacing the steam produced from the fossil fuel-based boiler.
The technology provider for this demonstration case is Mayekawa.
The heat source for the heat pump will be heat recovery from the condenser in the existing cooling system where a capacity of around 600 kW is identified.

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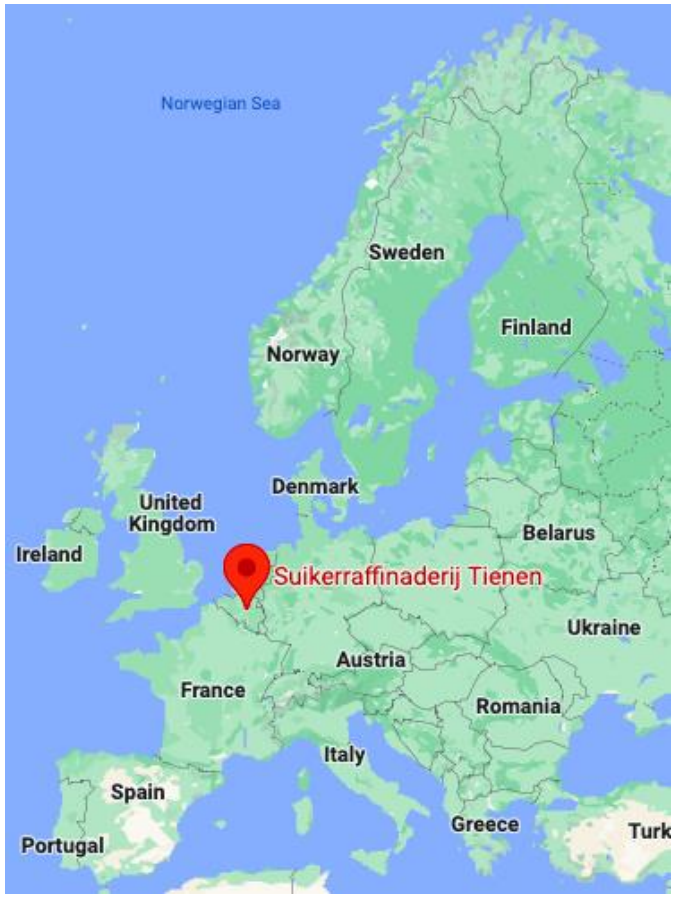
# Demo-site 2: Sugar production plant (DTI, Tiense Suiker & GEA)




The technology provider coupled with Tiense Suiker is GEA.
The goal is to demonstrate a GEA heat pump system with a screw compressor to generate steam around 139°C at a 4 MW capacity.
The heat pump will replace the steam produced from fossil fuel-based boilers and partly electrifying the sugar production processes of Tiense Suiker.

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# Demo-site 1: Corrugated packaging plant (DLR, Smurfit Kappa & Spilling)


Given the process needs of Smurfit Kappa, the technology supplier chosen for this demonstration case is Spilling. Spilling's ambition is to develop standardized steam compressor units to lower the purchased equipment cost. The compressor chosen by Spilling for Smurfit Kappa's application is a four-cylinder piston compressor.

DLR

Smurfit Kappa

SPILLING Technologies

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# Large-scale Heat Pumps standardisation

SPIRIT will focus on the standardization of the critical components of an industrial heat pump

1

Identify of a clear picture of the standard components of a HP

2

Investigate the modular design of the IHP: select a combination of components that can cover the HP market

3

Create a portfolio of HPs that can cover different heat capacities and temperature levels

Provide global guidelines for the integration of the modularized HPs to industrial processes

4

Result: standardized HPs that will be easier to integrate in existing and new industrial processes. G

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# Innovative business models

**Market analysis to estimate the potential of IHPs**

- Process of data from the food, & paper Industrial sectors
- Identification of HPs integration in these processes
- Estimation of the energy and CO2 emission reduction potential

**Market analysis to identify key factors for successful implementation of business models**

- Technological solutions
- Innovation level
- Physical and human resources
- Relations and Network
- Financial stability

**Definition of innovative business models and contractual agreements to upgrade heat at industrial plants and to think of heat as a service and not as a product**

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# Training and raising awareness

## Dissemination of Project Results

- Scientific papers
- Webinars
- Conferences and fairs
- Final Conference
- Visual identity and logo
- Project website
- Social media channels
- Flyers and Leaflets
- SPIRIT Newsletter

## Summer school on Industrial Heat pumps

- Aim: to increase the competences and knowledge of various stakeholders on the challenges and opportunities of industrial heat pumps.
- Target audience: engineers, installers, consultants, students,
- Period: M25-M30 → Sep 2024 – Jan 2025

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# Follow SPIRIT on Social Media!

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# Thank you!

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www.spirit-heat.eu