

**TECH OFFER**

## Magnetic Cooling And Wasted Heat-To-Electricity Conversion



### KEY INFORMATION

TECHNOLOGY CATEGORY:

Materials - Metals & Alloys

Energy - Thermal Power System

Green Building - Heating, Ventilation & Air-conditioning

TECHNOLOGY READINESS LEVEL (TRL): **TRL8**

COUNTRY: **FRANCE**

ID NUMBER: **TO174097**

### OVERVIEW

Global warming is accelerating and credible solutions in refrigeration are struggling to emerge. Aware of the enormous energy and environmental footprint of thermal production in the world, the technology owner is developing magnetic cooling modules from 20 to 100 kW with low environmental impact and high energy efficiency as well as machines for conversion into electrical energy from sources of solar or lost heat (below 100°C).

The refrigeration solutions widely used today are high pressure refrigerant gas compressors. This technology, dating from the 1920s, is mature and well mastered. Its performance is modest and the refrigerants used have a negative environmental impact. Many sectors are therefore seeking new refrigeration solution that is both sustainable and environmentally friendly.

The proposed technology relates to a magnetic refrigeration device that operate without refrigerant gas. The electricity consumption is at least 50% lower than traditional refrigeration systems. It is a green technology with great potential for the

environment. The technology owner also developed a device to efficiently convert low sources of wasted heat into electricity. The two technologies are very similar and rely on the same magnetic core expertise.

The technology owner is seeking partners to collaborate through various models including custom-made prototypes, co-development projects, technology licensing and strategic partnership.

## TECHNOLOGY FEATURES & SPECIFICATIONS

### Magnetic cooling technology:

Environmental and energy innovations

- No refrigerant gas
- Elimination of hydrofluorocarbon emissions
- Energy saving (reversible thermodynamic cycle with little irreversibility)
- High energy efficiency allowing twice the yield on average

Technical innovations

- Safer system (low pressure)
- Less noise and less vibrations
- Lower heat dissipation on the hot side
- Low mechanical stresses resulting in a longer service life
- Reduced maintenance costs and increased equipment life

### Wasted heat-to-electricity technology:

Environmental and energy innovations

- No negative impact on the environment and the landscape
- The use of multiple renewable energy sources, flexible, uninterrupted and constant for the most important, previously unused and widely available ( $T < 100^{\circ}\text{C}$ ): e.g.: data centers, waste heat from cold groups or industrial processes, incineration plant
- Global power generation, location independent and decentralized
- Flexibility during the conversion process and low energy transport costs (already existing networks, addressable smart grid, local production, etc.)

Technical innovations

- A modular construction which allows to increase the power by using several units
- Waste heat energy recovery and generation technology produced for low temperatures ( $-50^{\circ}$  to  $+100^{\circ}\text{C}$ )
- A safe system (low pressure)
- Low noise and vibration level
- Low mechanical stresses resulting in a long service life

## POTENTIAL APPLICATIONS

#### Magnetic cooling technology

- Refrigeration, e.g., supermarkets
- Air-conditioning for buildings
- Datacenters

#### Waste heat-to-electricity technology

- Datacenters
- Industrial processes
- Energy - Waste-to-Energy

## BENEFITS

#### Economic benefits

- Reduction of the electrical consumption of the cooling device
- Reduction of maintenance Cost
- Improvement of the OPEX

#### Technical benefits

- Low noise and vibrations
- High durability of the systems
- Safe technology

#### Environmental benefits

- Free from regulations on refrigerant gas
- Eco-friendly image of the technology (marketing)
- Reduced carbon emissions