National Workshop on Heat Pumping Technologies

Lu-ve's perspective

Massimiliano De Girardi
Global Product Manager Components

November 17th, 2026 – Pisa, Italy

LU·VE





Agenda

- Who we are
- Our challenges, our drivers
- How do we turn challenges into opportunities?
- The challenge of credibility and reliability
- But is only the right product enough?
- Conclusions

Who we are

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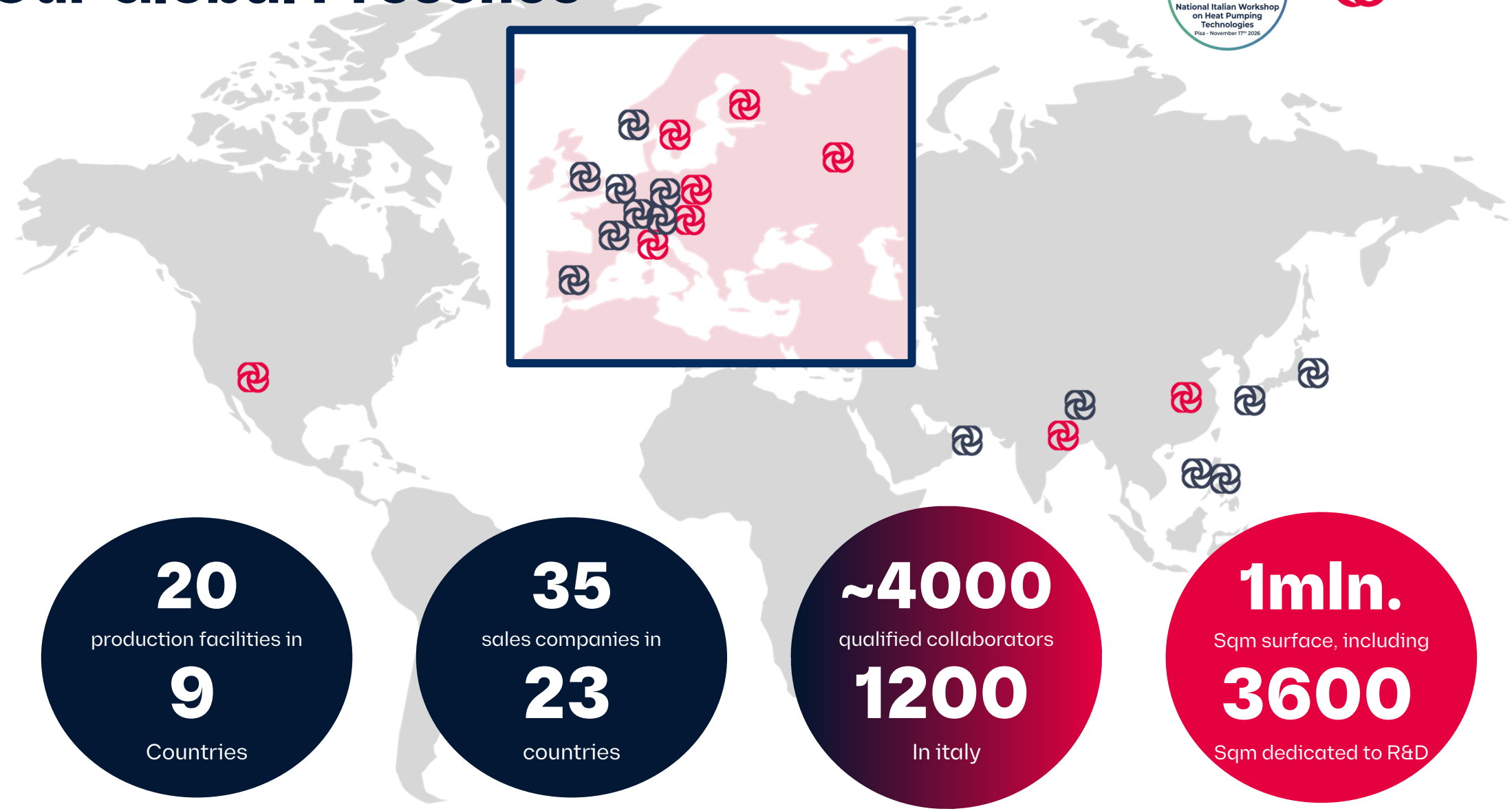
LU·VE: a Lucky Venture

We are LUVE, the HVAC&R company that changed the cooling industry through our innovations.

We continue to shape the future of the cooling industry with performing and customer-oriented solutions.

Our areas of expertise range from refrigeration, industrial cooling, air conditioning, data center & power gen cooling, OEM components and thermo-glass doors.

Our Global Presence



20 production facilities in **9** Countries

35 sales companies in **23** countries

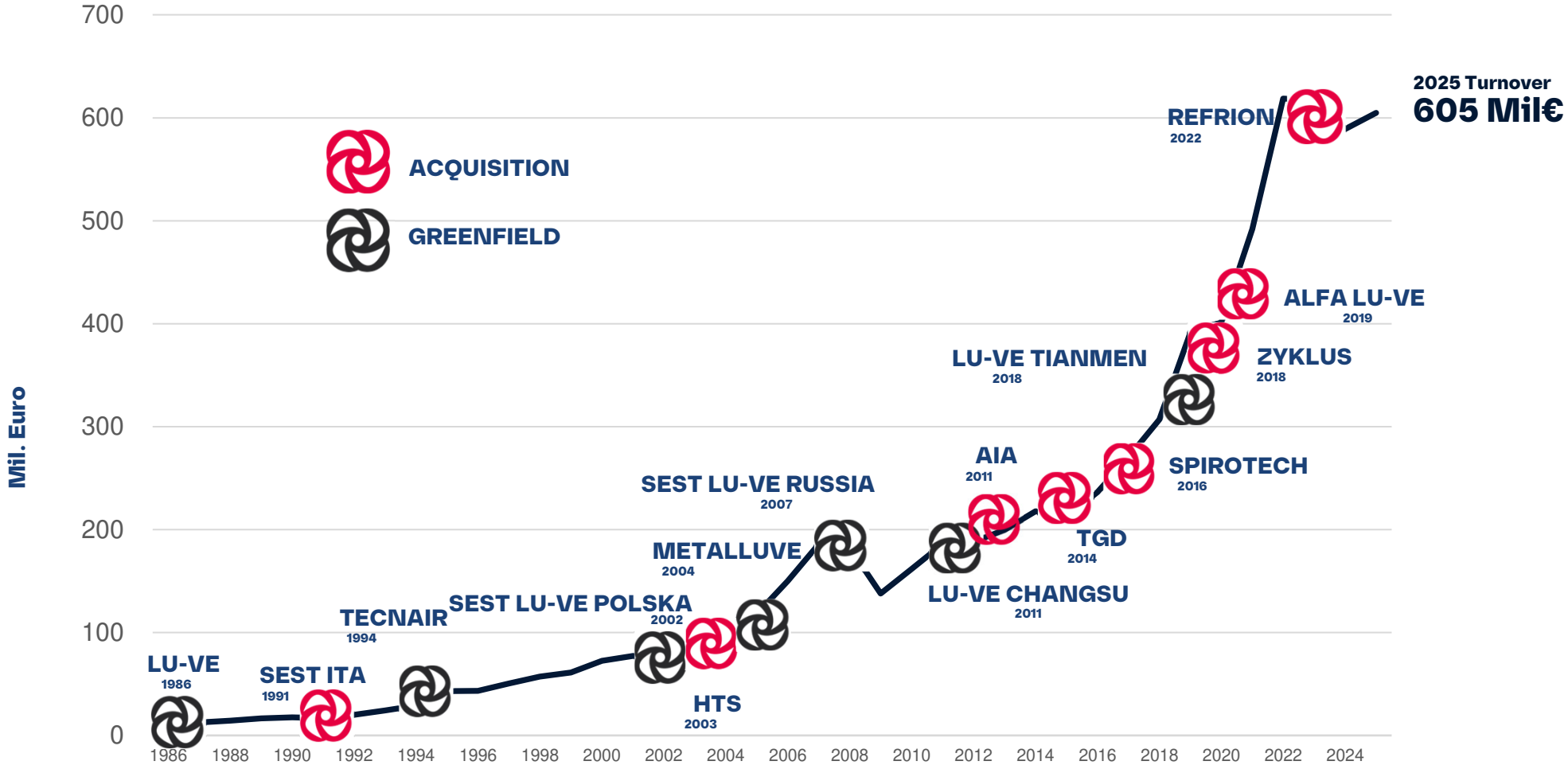
~4000 qualified collaborators **1200** In italy

1mln. Sqm surface, including **3600** Sqm dedicated to R&D

Production facility

Sales company

Our History


700
600
500
400
300
200
100
0
Mil. Euro
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
ACQUISITION
GREENFIELD
LU-VE
1986
SEST ITA
1991
TECNAIR
1994
SEST LU-VE POLSKA
2002
HTS
2003
METALLUVE
2004
SEST LU-VE RUSSIA
2007
LU-VE CHANGSU
2011
AIA
2011
TGD
2014
LU-VE TIANMEN
2018
SPIROTECH
2016
ZYKLUS
2018
ALFA LU-VE
2019
REFRION
2022
2025 Turnover
605 Mil€

Over 600 years of experience

In heat exchange technology



Market applications



Commercial & Industrial Refrigeration



Heating Ventilation & Air Conditioning



Datacenter & Big Data Cooling



Industrial Process Cooling



Energy & Power Cooling

Our engineering expertise serves critical heating and cooling needs across multiple sectors

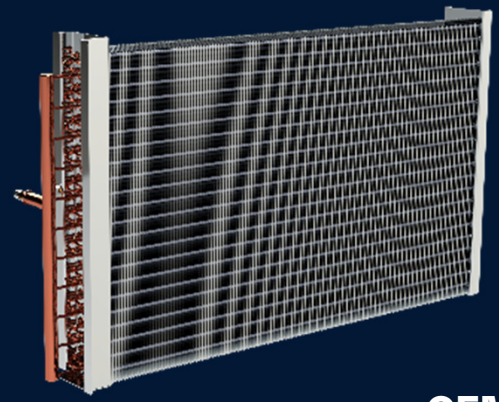
Our products



Ventilated Heat Exchangers

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OEM Coils



Thermo-Glass Doors

HVAC&Heat Pump OEM coils

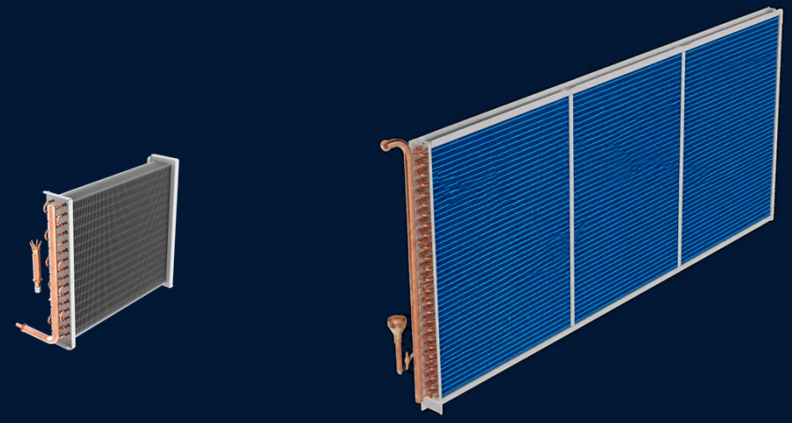
One market segment, several applications requirements, unique solutions.

- 10+ dedicated plants around the world
- 28+ patterns from the **smallest 4mm** tube to the **16mm**
- From 200mm to 12 m coil length manufacturing capability
- Co-design and optimization for each coil
- Dedicated innovative and sustainable solutions

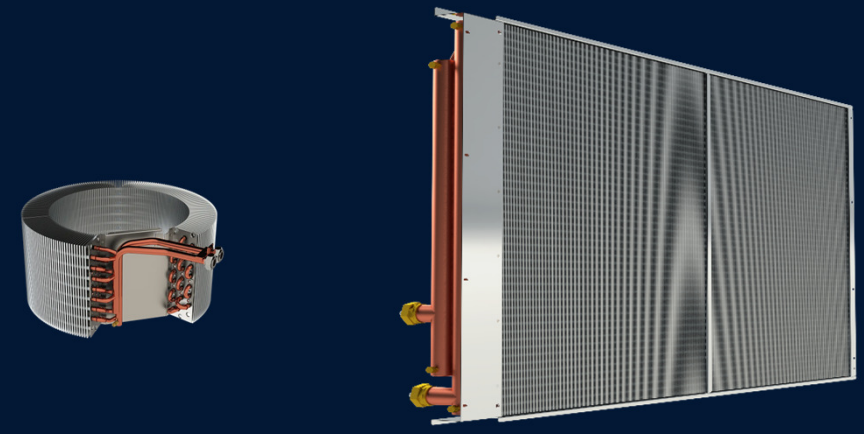
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From DHW HP to commercial HP



From fan-coils and cassettes to fan-walls



Our challenges, our drivers

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Our challenges, our drivers

NATURAL REFRIGERANTS



REFRIGERANT VOLUME

ENERGY EFFICIENCY

- INCREASED CAPACITY
- ENERGY SAVING
- MINIMIZED REFRIGERANT CHARGE
- REDUCED NOISE LEVEL
- MANAGE AND CONTROL
- CO2 EQUATOR REDRAWING
- REDUCED WATER CONSUMPTION
- FLEXIBILITY
- REDUCED FOOTPRINT AND WEIGHT
- CORROSION RESISTANCE
- REDUCED MAINTENANCE COSTS
- INCREASED RELIABILITY

How do we turn challenges into opportunities?



INNOVATION
is in our DNA

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An innovative and visionary founding father



"Grey matter is our raw material"

Iginio Liberali, founder of the LU-VE Group.

LU-VE's philosophy is built on the belief that innovation, ideas, and people create more value than raw materials alone.

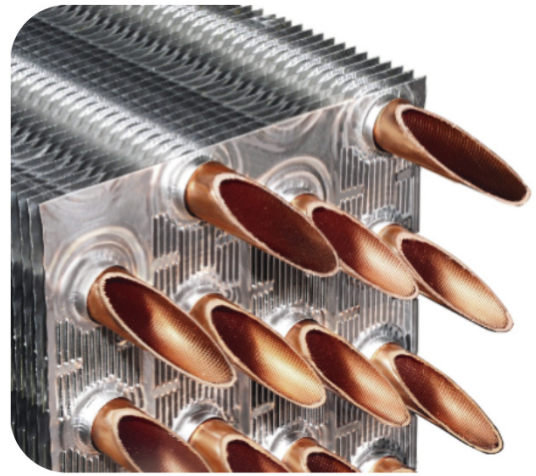
- More thinking, less waste
- Young people & training
- Research & Development

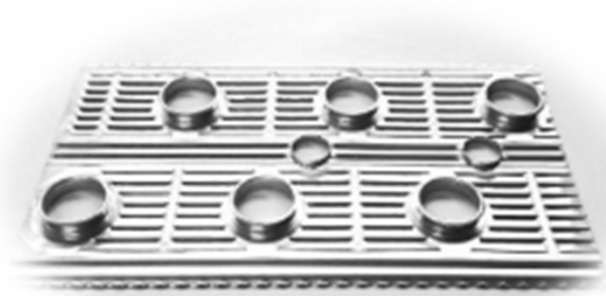
Innovation on OEM coils, our focus

MINIATURIZATION

Evolution of the LU-VE coil technology

1967	First company in the world introducing the internal turbulator*
1988	First company in the world introducing the fin turbulator.
1988	HITEC® AIR COOLERS
1991	HITEC® CONDENSERS
1997	SUPERHITEC® AIR COOLERS
2012	MINICHANNEL® ⌀ 5 mm
2019	MINICHANNEL® ⌀ 5 mm for CO2 applications
2022	MINIMIZER ® ⌀ 4 mm for propane applications





** introduced by Contardo*

Innovation on OEM coils, our focus

MINIATURIZATION: WHICH BENEFITS?

- ✓ Compact heat exchangers,
- ✓ Reduced foot print for heat pumps;
- ✓ Fewer tubes with reduced diameter;
- ✓ Reduced internal volume and thus refrigerant charge;
- ✓ Reduced needed air quantity;
- ✓ Reduction of fan energy consumption and noise level;
- ✓ Reduction of defrost needed energy.

Innovation on OEM coils, our focus

MINIATURIZATION: WHICH BENEFITS?

A real case with 4mm solution grooved tube

Comparison vs. standard patterns. In collaboration with **Politecnico di Milano**.

The results:

Considering same thermal capacity at same conditions:

- ✓ **Thermal Capacity vs. Internal Volume** ratio **increase up to 50%**
- ✓ **+3% in heat transfer** performance through CFD simulations.
- ✓ **Reduction of the charge** for the R290 heat pump real case is:
  - ➢ **-17%** compared to the 5 mm tube
  - ➢ **-36%** compared to the 7 mm tube
  - ➢ **-67%** compared to the 9,52 mm tube

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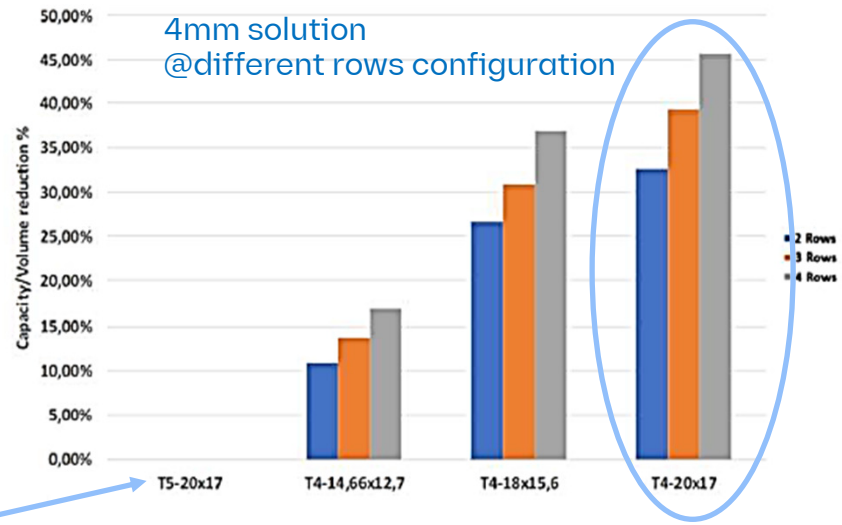
Geometry miniaturization in fin-and-tube heat exchangers for refrigerant charge reduction

Stefano FILIPPINI*[a], Umberto MERLO[a], Dario DEMURTAS[a], Federico VOLONTÉ[a], Luca MOLINAROLI[b], Ennio MACCHI[b]
[a] LU-VE Group
Uboldo, 21040, Italy, stefano.filippini@luvegroup.com
[b] Politecnico di Milano
Milan, 20156, Italy, luca.molinaroli@polimi.it
*Corresponding author: stefano.filippini@luvegroup.com

ABSTRACT

The indications given by the F-gas regulation and also the European Green Deal are contributing to the growing spread of small heat pumps that in many cases can be affected by flammability issues coupled with the use of natural refrigerants. Consequently, the market is looking for ever more efficient solutions to be achieved with very compact components, to reduce cost and refrigerant charge and to comply with safety constraints.

LU-VE has developed a new heat exchanger geometry specifically designed for small air-to-water heat pumps, giving significant advantages compared to the solutions currently available on the market. The adoption of a very small tube diameter, coupled with a fin shape optimized for this specific application through parametric

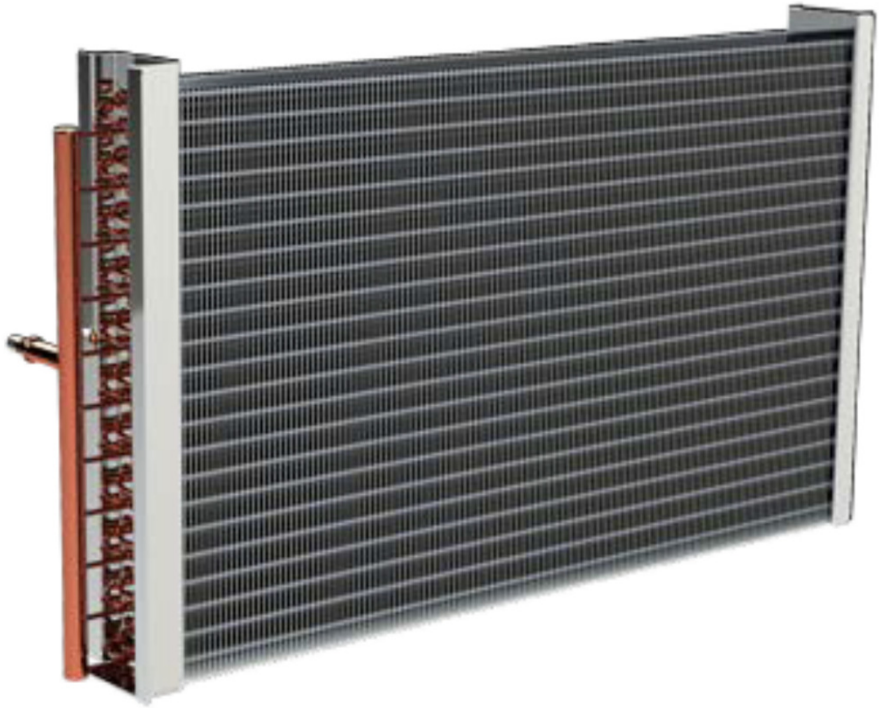


Baseline: 5mm

Figure 2: Capacity/volume reduction % - R290 Evaporator (micro-finned tubes)

Innovation on OEM coils, our focus

MINIATURIZATION: WHICH BENEFITS?



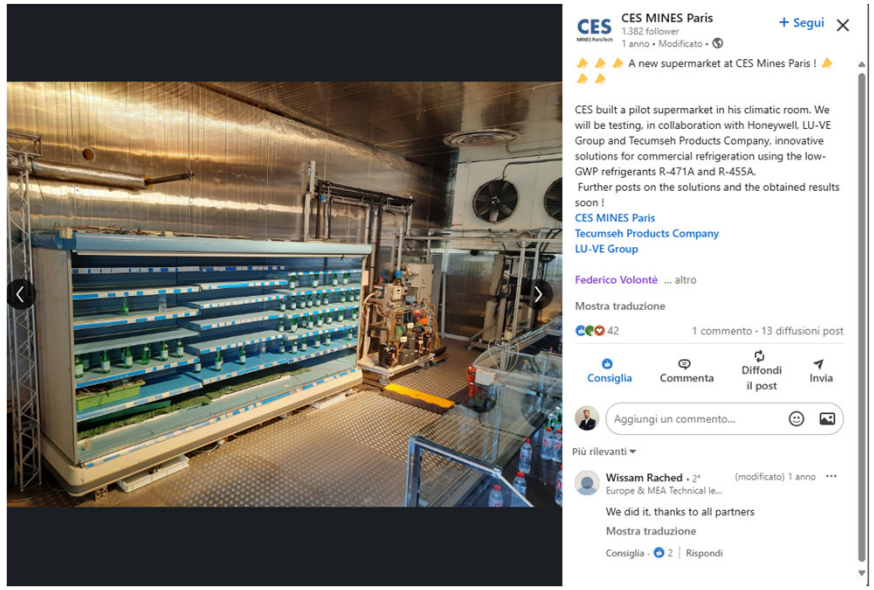
- Suitable Solution for **Multiple Product Segments**
- **Risk Reduction** for A2L and A3 Refrigerants
- Copper weight reduction → **Increased Product Sustainability**
- Product compactness for a **Carbon Footprint Reduction**
- Same **Dimensional Flexibility** of the standard patterns

The challenge of crediblity and reliability

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Behind our numbers







Research & Development activity

With its 4 private laboratories, LU-VE Group has one of the largest R&D facilities in Europe, and works in close cooperation with the customers and over 23 universities all over the world

Behind our numbers

Most recent R&D successful projects

TESSERE: Innovative Heat Exchangers for Heat Pump Applications

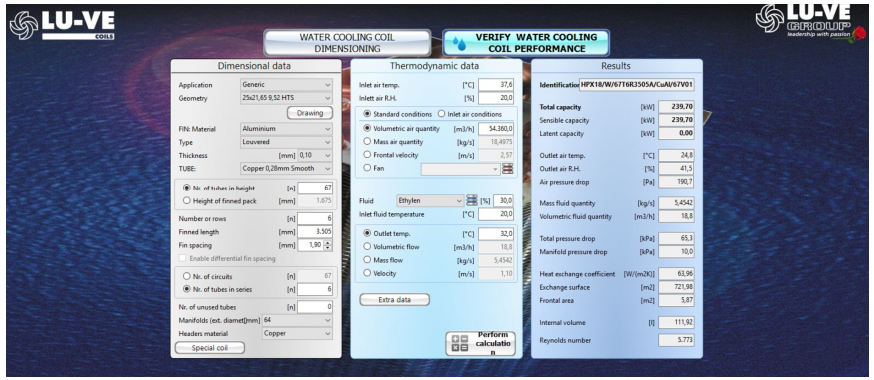
- **Funding scheme**: Piano Nazionale di Ripresa e Resilienza (**PNRR**) framework part of Network 4 Energy Sustainable Transition (**NEST**)
- **Submission date**: October 2025
- **In collaboration with**: Politecnico di Milano
- **Project scope**: to enhance the role of **heat pumps** through two key innovations: more efficient **air evaporators** for district heating, using **CFD** modelling and metal **3D printing**; the use of advanced **refrigerant blends**, such as CO_2-HC mixtures, on industrial heat pumps.

Smart CO_2 heat pumps

- **Funding scheme**: Energy Technology Development and Demonstration Programme (**EUDP**)
- **Submission date**: January 2026
- **Managing institution**: Danish Technological Institute
- **Project scope**: to develop and demonstrate **a CO_2 heat pump (20–200 kW)** for buildings and light industry. Innovative features include **new efficient components** and cloud-based control, enabling safer, greener and smarter heating solutions.

Behind our numbers





eGenius

A reliable calculation software

- Algorithms are **developed** and **validated** in Lu-VE laboratories
- **All features** available in our facilities
- **Advanced calculation** such as with **tripods**
- Possibility to simulate **special coil configurations** for pin-to-pin comparison
- **Continuously updated**
- Fully available to our partners

But is only the right product enough?

LU·VE



Our goal: to be a solution provider



Understand needs

- Deeply engage with clients to anticipate and address their evolving challenges

Tailored solutions

- Deliver comprehensive, customized offerings that integrate seamlessly into operations.

Integrated partnership

- Foster long-term relationships with ongoing support and continuous optimization.

Global expertise

- Combine worldwide knowledge with local insights to create innovative, effective solutions.

Global footprint, local solutions



Global Design

Standardized principles, processes and procedures

Local Production

Manufacturing near our partners

Reduced Logistics

Lower costs, carbon footprint and lead time

Better risk management

For our supply chain and toward our partners

Conclusions

Conclusions

Challenges are our drivers, **innovation** is the fuel that turns obstacles into opportunities

from the 1967 internal turbulator to today's 4 mm tube, we keep setting the pace in the heat exchange industry

But innovations is not just a proclamation:

Miniaturization pays off:

up to -17% refrigerant charge vs. 5 mm tube for R290 heat pumps, and **up to -67%** vs. market standard, bringing **higher safety** and **extended performance** for the same charge.

Credibility and reliability:

private laboratories, long-standing partnerships with several university and validated calculation software.

More than the right product:

we understand needs, tailor solutions and build long-term partnerships as a solution provider.

Global design, local production:

wide presence in the world means lower costs, carbon footprint and lead time for our partners.



Thank you

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