ITALIAN NATIONAL AGENCY FOR NEW TECHNOLOGIES, ENERGY AND SUSTAINABLE ECONOMIC DEVELOPMENT

National Italian Workshop on Heat Pumping Technologies
Pisa - November 17th 2026

Italian TCP Participation overview & HP Competence Center

Pisa, 17 november 2026

M. PIEVE, R.TRINCHIERI

ExCo Delegates for Italy in the HPT TCP

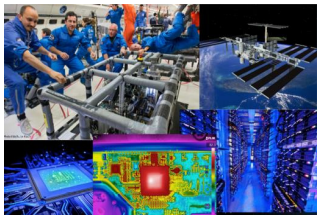
OUTLINE

- THE ENEA IN BRIEF
- THE ITALIAN TCP HPT PARTICIPATION
- ENEA TECHNICAL ACTIVITIES REGARDING HPS
- THE HP COMPETENCE CENTER IDEA

THE ENEA IN BRIEF

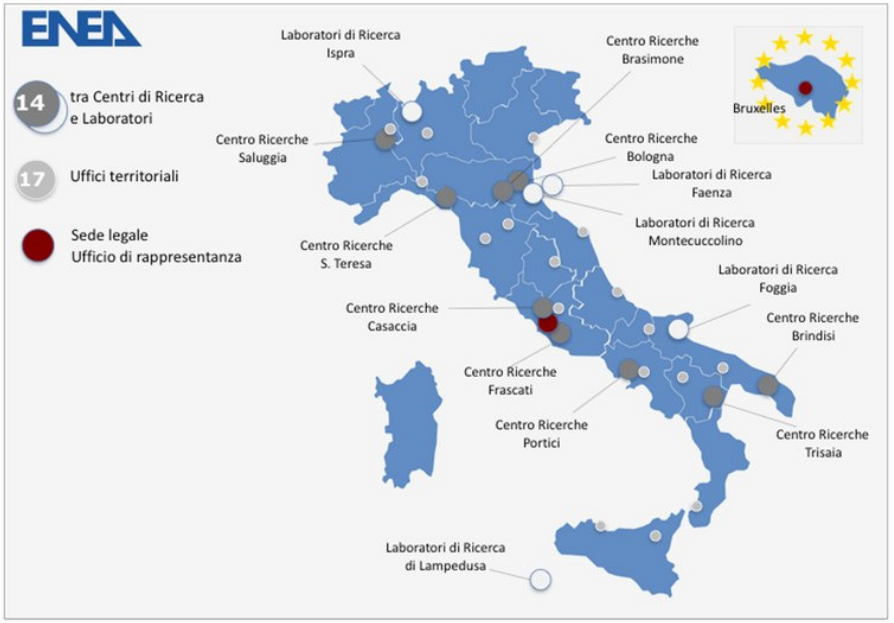
A national public research body operating in the fields of energy, the environment, and new technologies, which supports national competitiveness and sustainable development.

Mission: Developing technologies to promote the transition toward a low-emission economy and to disseminate and transfer knowledge, innovation, and technology to industries, institutions, and society.







Research Structures

- **9 Research Centers**
- **5 Research Laboratories**
- **17 Territorial Offices**
- **Brussels Liaison Office**
- **Central Headquarter in Rome**

People

2250 Permanent Staff

- **41% women**
- **68% graduates**

ITALY & HPT TCP PROJECTS

TCP HPT
Ongoing Projects
& Italian participation

ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

POLITECNICO
MILANO 1863

ASSOCLIMA
COSTRUTTORI SISTEMI DI CLIMATIZZAZIONE

More info at
www.heatpumpingtechnologies.org

ExCo Delegates for Italy:
Maurizio Pieve & Raniero Trinchieri

ENEA

59	Heat pumps for drying *	AT, CH, CN, DE, NO, SE, US
61	Heat pumps in positive energy districts *	AT, CH, DE, IT, JP, US
63	Placement impact on heat pump acoustics *	AT, CH, DE, FR, IT, NL, SE, UK
64	Safety measures for flammable refrigerants	AT, DE, FR, KR, SE, US
65	Heat pumps in a circular economy	BE, CH, DE, DK, FR, IT
66	Optimal heat pump design and operation	CH, DE, ES, NL, SE, US
67	Digital services for heat pumps	AT, BE, DK, SE
68	Industrial high-temperature heat pumps	AT, BE, CH, DE, DK, ES, FI, FR, JP, KR, NL, NO, NZ, SE
69	Enhanced Miniaturized Components	AT, CN, DE, KR, SE, UK
70	Flexibility from Large-Scale and Aggregated Heat Pump Systems	CA, DK, ES, NO, SE

Other Italian participations in previous Projects

enerbrain

TEON
ENERGIA DALLA TERRA

Politecnico di Torino
Dipartimento Energia "G.Ferraris"

UNIVERSITÀ DI PADOVA
Dipartimento di Ingegneria Industriale - DII

CLIVET

ENEA

DIISM
DIPARTIMENTO DI INGEGNERIA INDUSTRIALE E SCIENZE MATEMATICHE

eurac research

National Italian Workshop on Heat Pumping Technologies

ITALY & RECENT PAST HP CONFERENCES

ROTTERDAM 2017 — 12th IEA HEAT PUMP CONFERENCE 2017 | ROTTERDAM — 8 papers over ~ 260

JEJU 2021 — 13th IEA HEAT PUMP CONFERENCE 2020 | JEJU KOREA — 6 papers over ~ 200

CHICAGO 2023 — 14th IEA HEAT PUMP CONFERENCE RENAISSANCE CHICAGO DOWNTOWN HOTEL MAY 15—18, 2023 | CHICAGO, IL — 10 papers over ~ 170

VIENNA 2026 — 15TH IEA HEAT PUMP CONFERENCE VIENNA 2026 MAY 26–29, 2026 | HOFBURG — 48 papers over ~ 365

 # papers authored or co-authored by Italian authors

National Italian Workshop on Heat Pumping Technologies

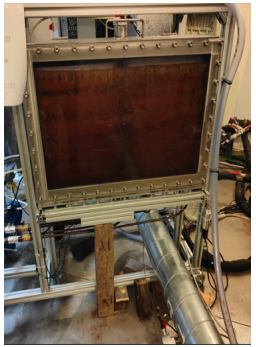
ACTIVITIES AT ENEA ON HPs

ENEA coordinates National research activities on Sustainable Air Conditioning and Heat Pumps in the “Three-year Research Implementation Plan” (**PTR**) funded by MASE (Ministry of the Environment and Energy Security)

PTR 2019 - 2021:
- Studies on integrated systems (HP + solar)
- Sizing of PCM thermal storage tank for defrost
- Innovative components development (i.e. ejectors for CO_2 HP)

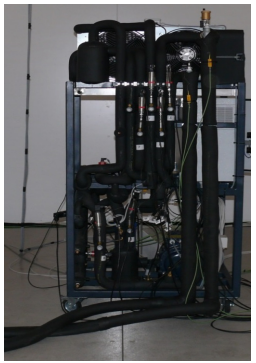
PTR 2022 - 2024:
- Studies on Dual-source air-ground HPs
- Realization of apparatus with PCM tank for defrost

PTR 2025 - 2027:
- Optimization on PCM tank solution
- Optimization on solar evaporator for CO_2 HP







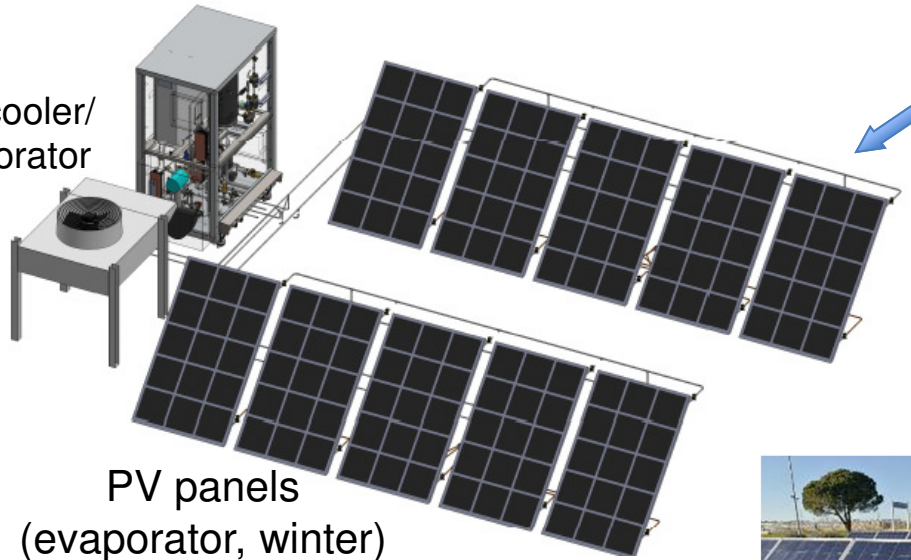




RECENT ACTIVITIES AT ENEA ON HPs

SOLAIRHP – CO_2 HP with solar integration

Reversible HP



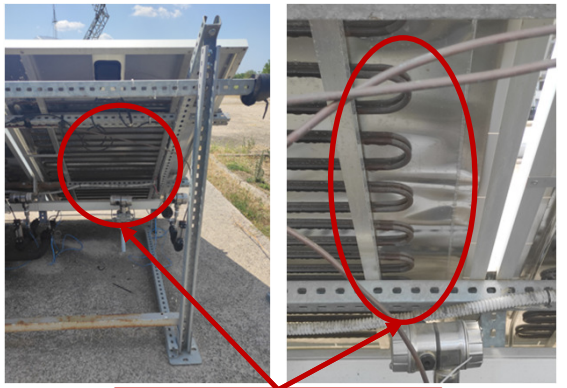
PV panels act as evaporator

CO_2 as refrigerant

Size Heating/Cooling: 7÷10 kW

Six operating modes





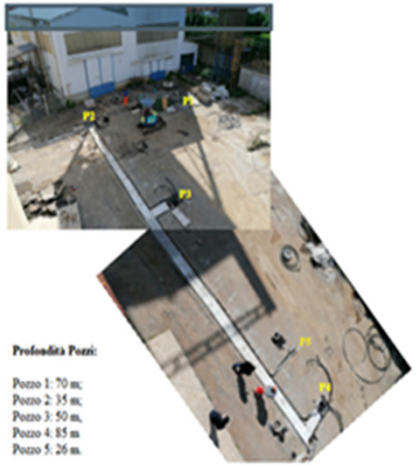
Evaporator details

RECENT ACTIVITIES AT ENEA ON HPs

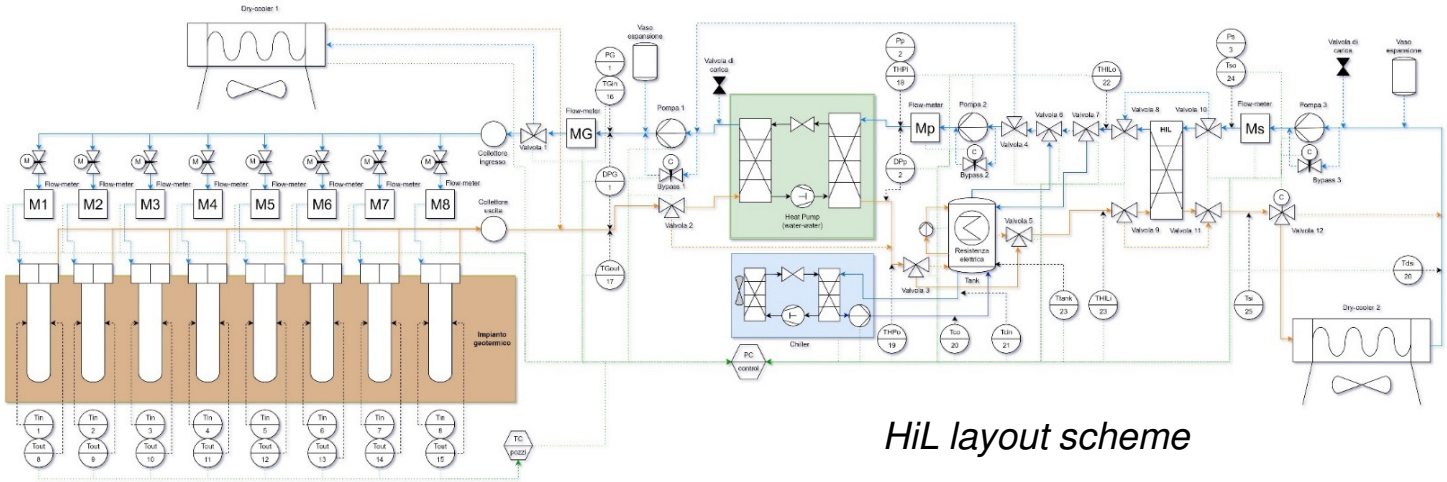
HPs and integration

Dual-source air-ground HP with daily or seasonal storage

High-T HP (R600a refrigerant) for building retrofitting HiL mode simulation of many end users (new, old, renovated buildings…)



Geothermal facility

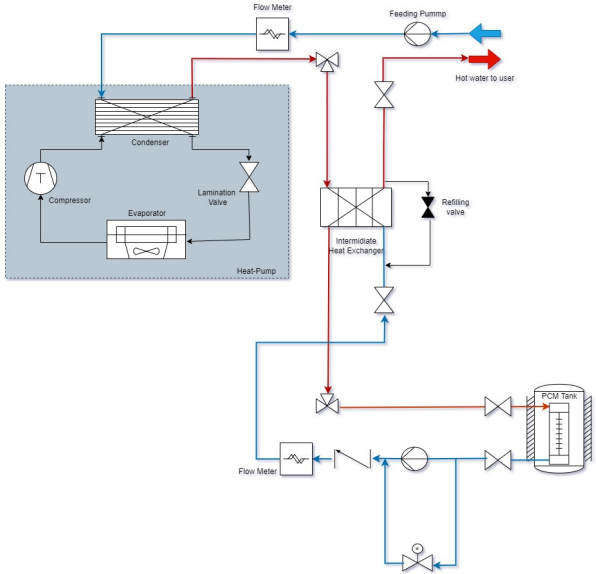


HiL layout scheme

RECENT ACTIVITIES AT ENEA ON HPs

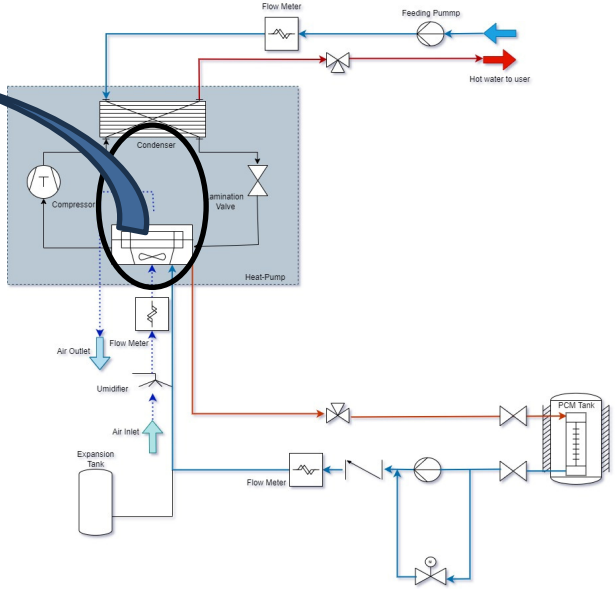
Defrosting of HP air-evaporators with PCM storage

PCM charging



PCM discharge – evaporator defrost





The heat stored in the PCM tank heats the air entering the evaporator by means of an intermediate fluid (water in this case).

The water coming from the PCM tank circulates in the first frontal row of the finned coil.

THE HP COMPETENCE CENTER IDEA

- Strengthening synergies among the country's excellences regarding the dissemination of technical knowledge on HPs
  - TRAINING AND NEW PROFESSIONAL ROLES
  - NEW TOOLS FOR DISSEMINATION AND NETWORKING



- Facilitate the widespread adoption of HP technology across the country by removing technical and socio-cultural barriers
  - ANALYSIS OF TECHNICAL CHALLENGES AND OPPORTUNITIES
  - ANALYSIS OF CRITICAL ISSUES AND OPPORTUNITIES at SYSTEM LEVEL
  - ANALYSIS OF SOCIO-CULTURAL AND POLITICAL CRITICAL ISSUES



- Establish a permanent working group
  - PARTICIPANTS
  - STRUCTURE and ORGANIZATION



STRENGTHEN SYNERGIES AMONG THE COUNTRY'S EXCELLENCES REGARDING THE DISSEMINATION OF TECHNICAL KNOWLEDGE ON HEAT PUMPS

TRAINING

- Training for designers
  - Correct Sizing
- Training for installers
  - Proper operation
- Management of the Interface between designers and installers



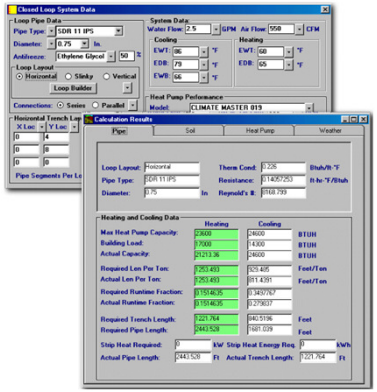


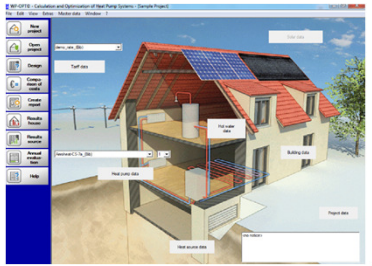
Training pathways designed and launched as part of the PTR 25–27, with two dedicated commitments

NEW TOOLS FOR DISSEMINATION & NETWORKING

- Heat pump web portal?
- Increased visibility of available technical solutions
- Free and user-friendly sizing tool

Sizing tool designed and developed as part of the PTR 25-27, with dedicated commitment





National Italian Workshop on Heat Pumping Technologies

FACILITATE THE WIDESPREAD ADOPTION OF HP TECHNOLOGY ACROSS THE COUNTRY BY REMOVING TECHNICAL AND SOCIO-CULTURAL BARRIERS

PRODUCT-RELATED CHALLENGES & OPPORTUNITIES

- Standardization and scalability
- Heat pump management and control
  - Predictive maintenance
  - Part-load operation (modulation)
- Integration of heat pumps into complex systems
- Refrigerants
- Frosting risk management
- DHW (Domestic Hot Water) and high-temperature applications
- Acoustics

SYSTEM LEVEL CHALLENGES & OPPORTUNITIES

- Integration into the Power System
- Flexibility Solutions
- Market and Sales/Distribution Network
- Digitalization, IoT & AI…

Studies on system level issues included in a dedicated commitment for the PTR 25–27

SOCIO-CULTURAL AND POLITICAL CHALLENGES

- Heat pumps and climatic conditions
- Heat pumps and user type (apartment buildings, specific types of users)
- Regulation and Standardization





ESTABLISH A PERMANENT WORKING GROUP



BEYOND THE PTR...

- 2025-2027: Launched with the patronage of ENEA
- After 2027: Financial autonomy?
- Visibility?
- Mission?
- Tools and Outputs
- Synergy with other subjects
  - Overlap risks management
  - Collaborations
  - Resource optimization





PARTICIPANTS

- Universities & other entities
- Individual companies
- Independent advisors
- Engagement procedures
- External relations with institutions



STRUCTURE & ORGANIZATION

- Forms of financing
- Legal framework
  - Secretariat
  - Logistics, Headquarters
- Working groups?



LAUNCH OF THE ITALIAN HP COMPETENCE CENTER – 1ST MEETING (SEPT. 2025)



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ENEA

CENTRO STUDI GALILEO

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Thank you!