

# Renewable and affordable energy supply systems

TRI-HP EU funded project will develop trigeneration systems based on heat pumps with natural refrigerants and multiple renewable sources



Consortium

**SPF** INSTITUT FÜR SOLARTECHNIK

COORDINATOR

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IREC Shaping Energy for a Sustainable Future

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ILAG swiss quality coatings

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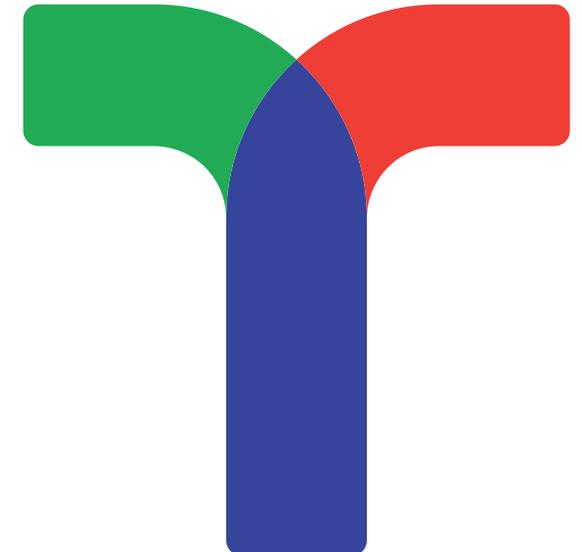
Hochschule Karlsruhe Technik und Wirtschaft UNIVERSITY OF APPLIED SCIENCES

REHVA Federation of European Heating, Ventilation and Air Conditioning Associations

# Renewable sources based on solar, ground and air

80% direct on-site renewable share, covering heating, cooling, DHW and electricity demand.

Project duration: 01.03.2019 - 28.02.2023



**TRI-HP PROJECT**

Trigeneration systems based on heat pumps with natural refrigerants and multiple renewable sources

[www.tri-hp.eu](http://www.tri-hp.eu)

E-mail: [rj-tri-hp@ost.ch](mailto:rj-tri-hp@ost.ch)

LinkedIn: TRI-HP

Twitter: @TRIHP\_EU



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## About TRI-HP

TRI-HP will develop flexible energy-efficient and affordable tri-generation systems based on electrically driven natural refrigerant heat pumps coupled with PV to provide heating, cooling and electricity to new and refurbished multi-family residential buildings with an on-site renewable share of 80%. The flexibility will be achieved by allowing the use of three heat sources: solar (with ice/water as storage medium), ground and ambient air.



## HOW?

By developing innovative trigeneration systems with high share of renewables, based on:

- ▶ Stakeholders' acceptance
- ▶ Building demand characteristics
- ▶ Local regulations
- ▶ Social barriers

## Goals

- ▶ 10-15 % lower installation costs
- ▶ 15% more energy efficient heat pumps
- ▶ 15% energy cost decrease for systems' operation
- ▶ 80% on-site direct renewable share
- ▶ Up to 75% GHG emissions reduction
- ▶ Up to 75% reduction of primary energy demand for electricity-heating-cooling (compared to gas-fueled systems)



## Technology innovations

- ▶ Evaporators with icephobic coatings
- ▶ Dual source evaporators/condensers
- ▶ Tri-partite CO2 gas cooler
- ▶ Advanced natural refrigerant heat pumps
- ▶ Smart energy management and self-detecting error controls
- ▶ Guidelines and recommendations of stakeholder's acceptance

