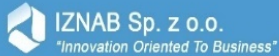




POLITECNICO
MILANO 1863



**HOCHSCHULE
LUZERN**

Project Overview

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Project Manager, Project Coordinator (Politecnico di Milano)



Heat4COOL project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 723925

H2020 funded project

EU funding: €5.4 Mio

Duration: 54 months

Period: Oct 2016-Apr 2021

13 Partners from 10 countries

4 demo sites: Spain, Poland, Hungary, Bulgaria

Project coordinator: Politecnico di Milano

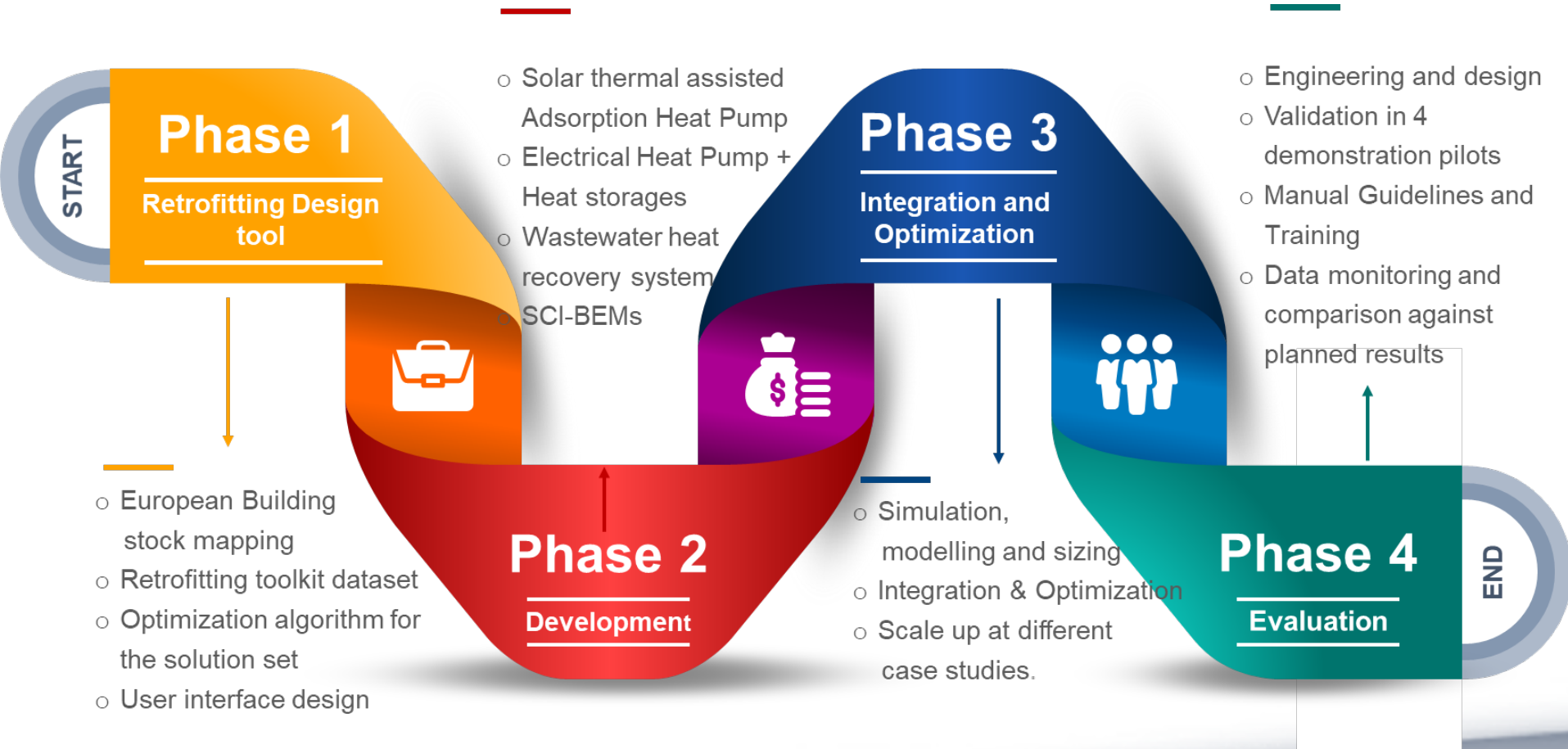
- 3 manufacturing SMEs
- 6 engineering SMEs
- 3 academia/research
- 1 industry association



Heat4Cool objectives



Heat4Cool project phases



- **Tools and integrated systems developed:**
 1. Building retrofitting **design planner tool**
 2. Solar Thermal + VC Heat Pump + **Adsorption Heat Pump**
 3. Photovoltaics + VC Heat Pump + **PCM storage**
 4. **Wastewater Heat Recovery system** + EHP (district level)
 5. Self-Correcting Intelligent Building Energy Management System (**SCI-BEMS**)



1. Building retrofitting design planner tool



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Building characteristics

Which type of building would you like to assess?
Whole apartment block

When was it built?
From 1945 to 1969

Where is it located?

Country
Spain

City
Valencia_swec

Building orientation and boundaries

Building size

Length (m)
13

Width (m)
15.5

Number of storeys
4

Storey height (m)
3

**Orientation angle: deviation from North clockwise
(see diagram on the right)**
320

Wall 1
Exposed to outside

Percentage of windows: 40%

Wall 2
Adjacent to another building

Percentage of windows: 25%

Wall 3
Exposed to outside

Percentage of windows: 26%

Wall 4
Adjacent to another building

Percentage of windows: 25%

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Heating system characteristics

Which energy source is used for space heating and domestic hot water?
Natural gas

Which device is used for heating water?
Boiler

Which type of emitter system is present?
Radiators

Which type of heat pump is used?
None

Is there a hot water storage tank?

☒ Yes
☐ No

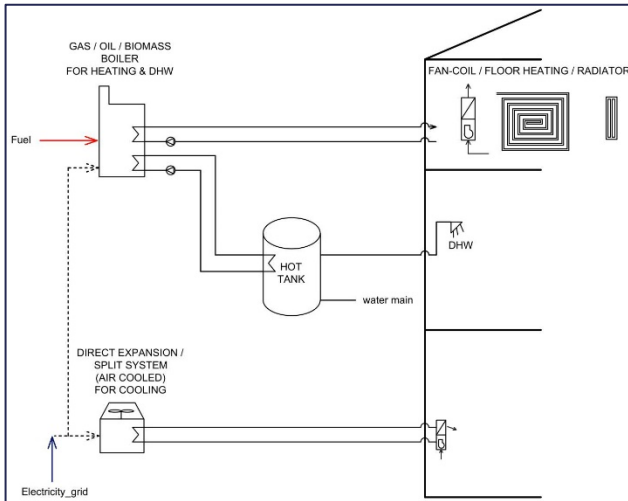




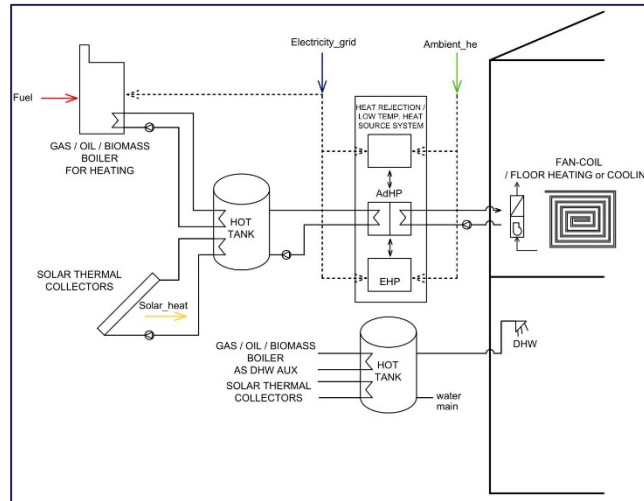
1. Building retrofitting design planner tool



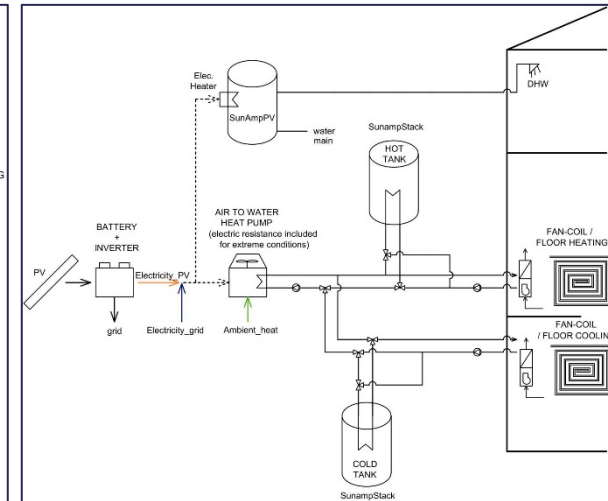
Current



AdHP + SC



EHP + PV + PCM



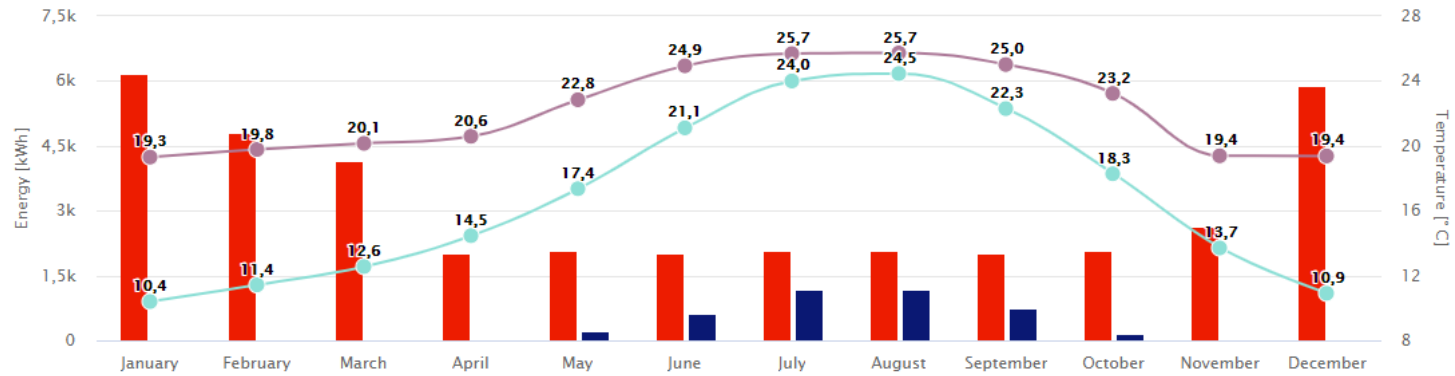
Simulation name	Layout	Ranking	Non-renewable primary energy (kWh/m2/y)	Renewable energy contribution	Greenhouse gas emissions (kgCO2eq/m2/y)	Electricity fed to the grid (kWh/y)	Average Comfort deviation (°C)	Technical and regulatory information	NZEB compliance according to EU 2016/1318
+AdHP+SC	4	1	26.5	92%	4.3	0.00	-0.81	show	No
+AdHP+SC+BEMS	4	2	28.2	92%	4.7	0.00	-0.81	show	No
Current	2	3	64.1	0%	13.0	0.00	-1.07		
+BEMS	2	4	63.8	0%	13.0	0.00	-1.07	show	No
+EHP+PV+PCM+BEMS	5	5	82.5	83%	13.5	10357.76	-0.86	show	No



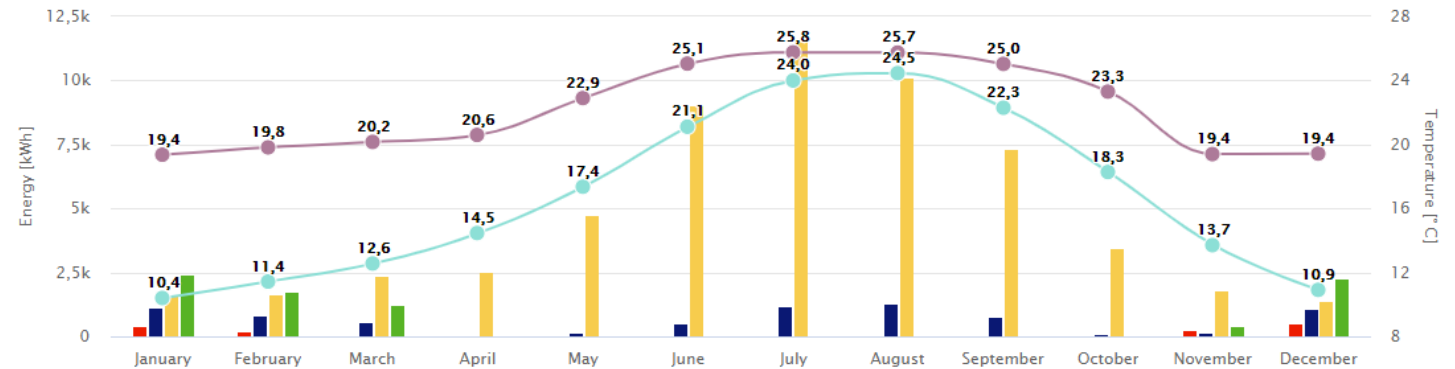


1. Building retrofitting design planner tool

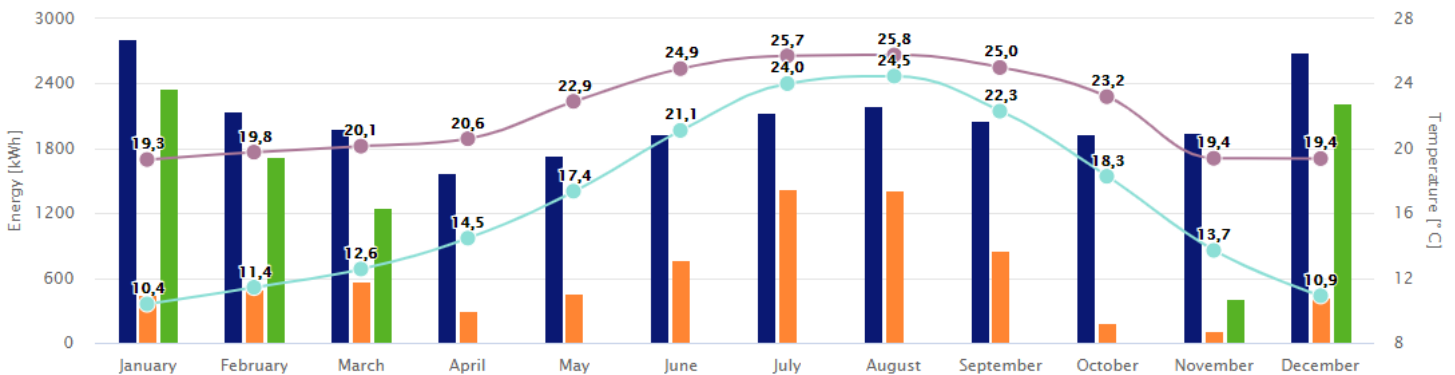
Current



AdHP + SC



EHP + PV + PCM

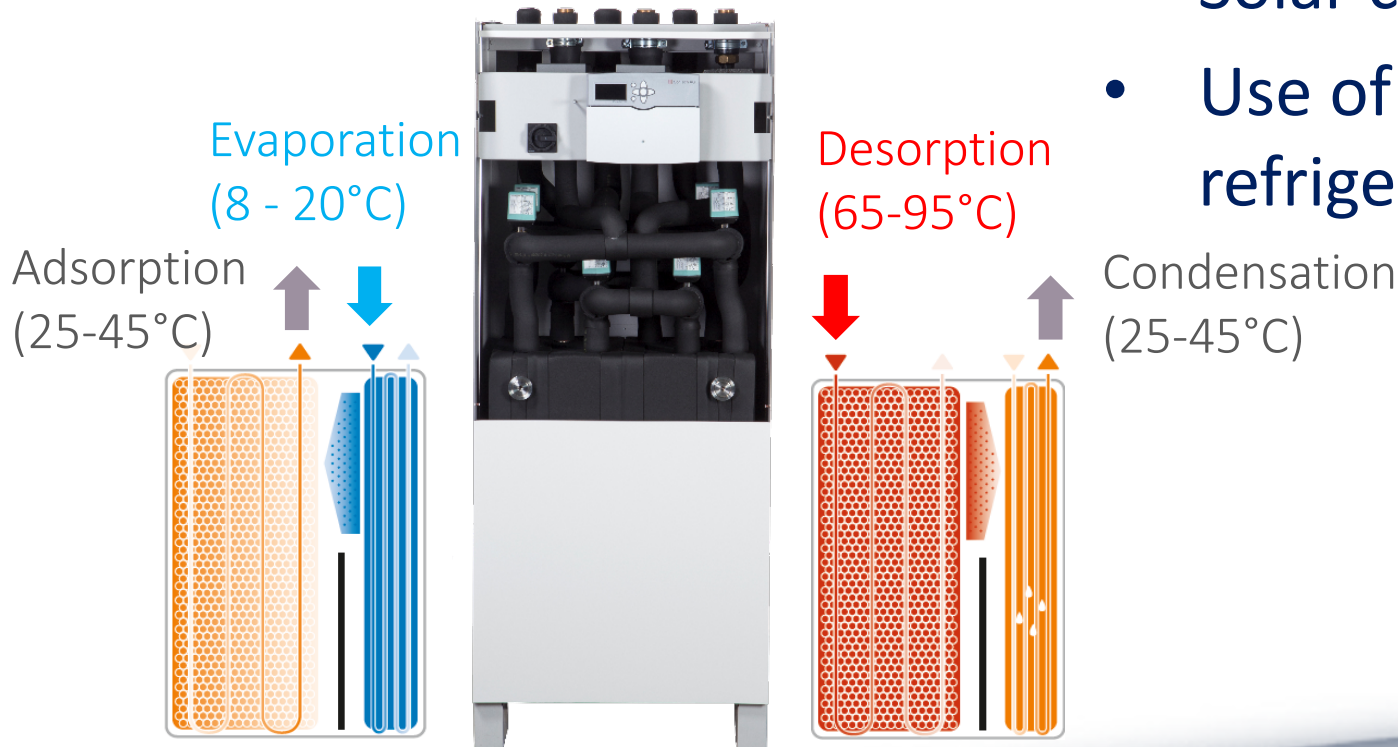




2. Thermally driven adsorption heat pump



- Zeolite and silica gel coating
- Solar cooling
- Use of water as refrigerant





3. PCM storage



Sunamp
Heat Batteries™

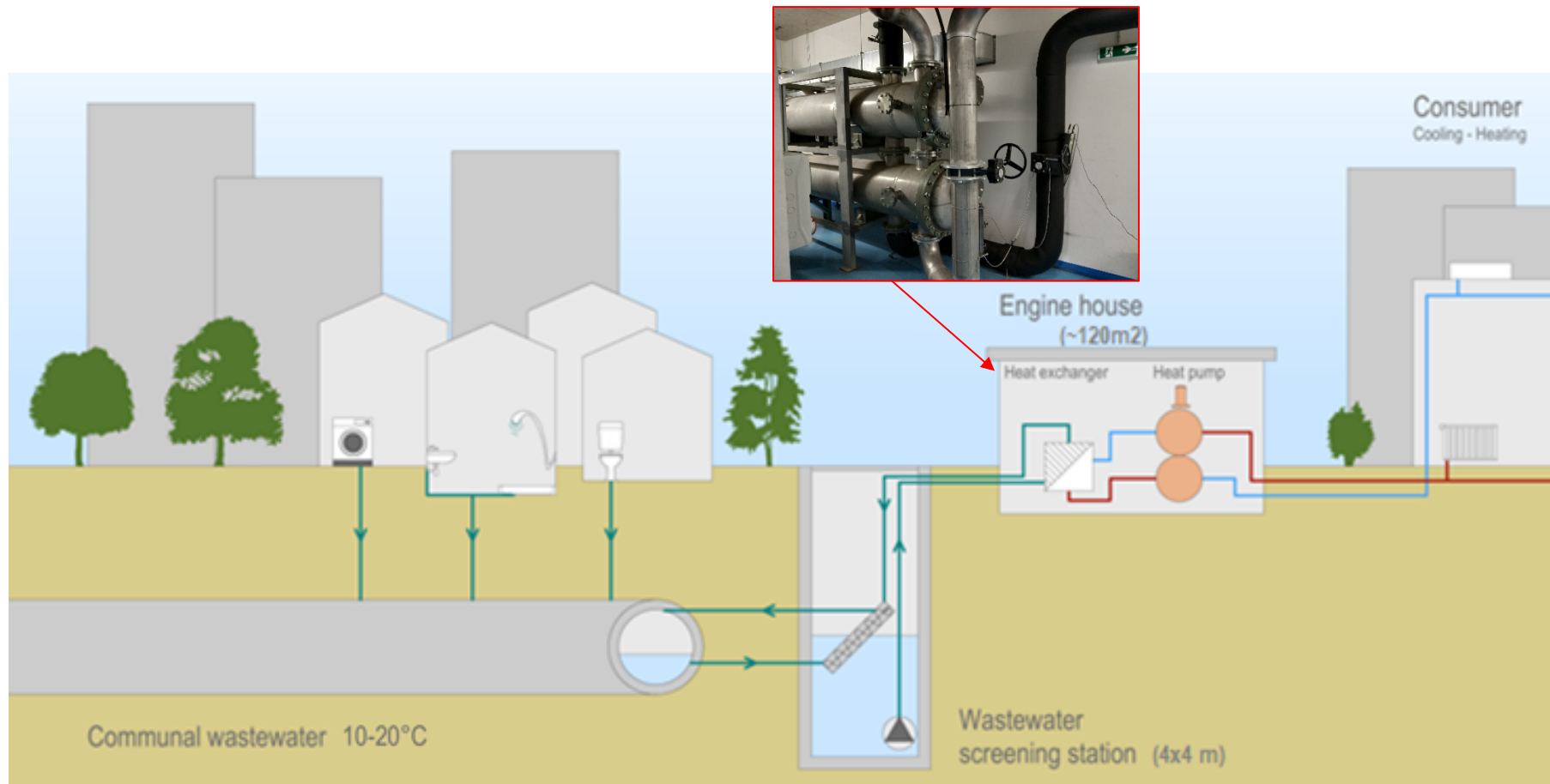


- Compact heat and cold storage system
- 9 kWh module eq. to 210 l cylinder
- 56% reduction in volume
- 40% reduction in heat loss
- Modular and scalable
- Dual ported heat exchanger: simultaneous charge and discharge





4. Wastewater heat recovery \approx THERMOWATT



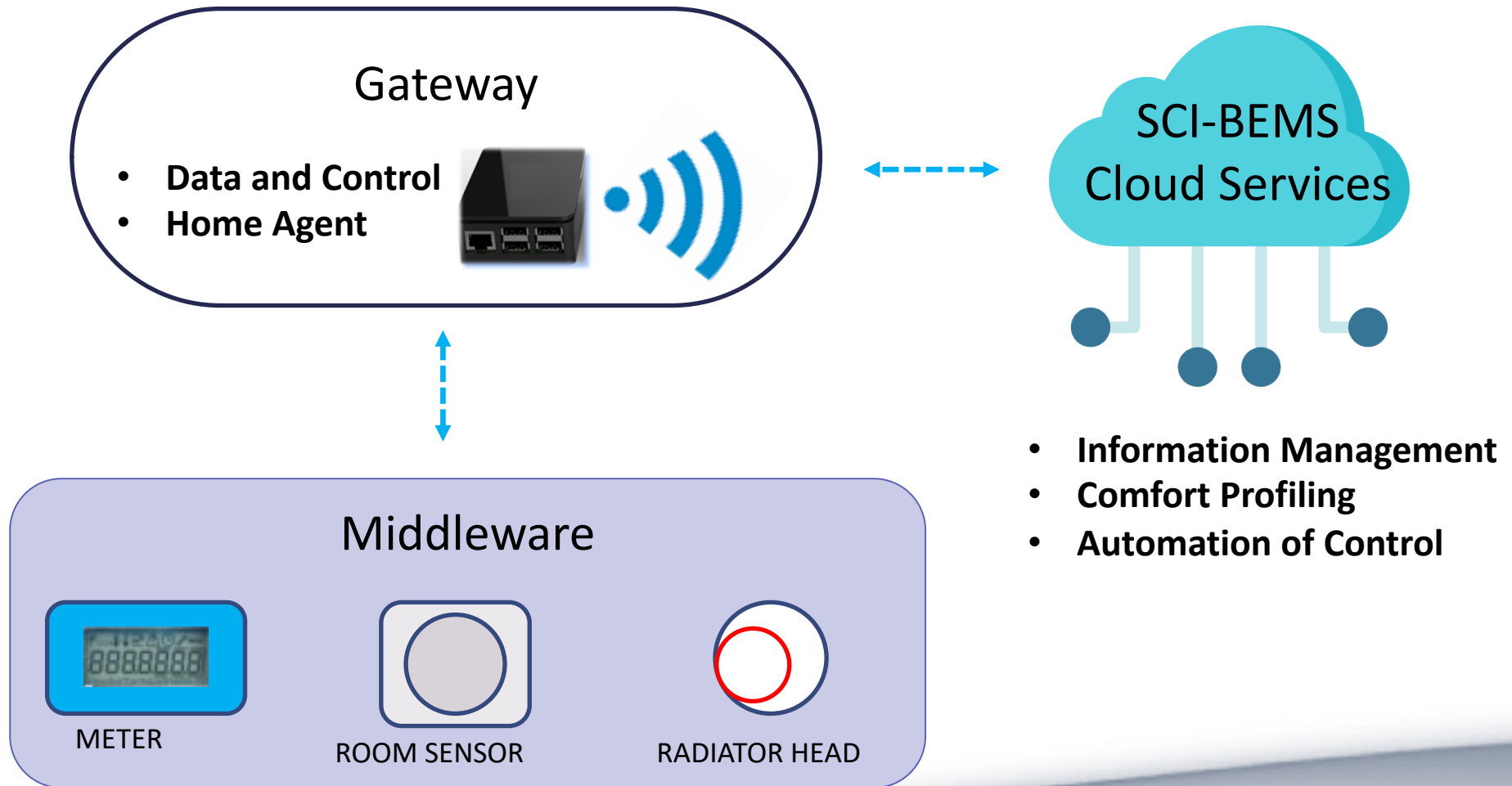


HEAT4COOL

5. SCI-BEMS



WATT+VOLT
ELECTRICITY | NATURAL GAS





Heat4Cool pilot sites



1. Sofia (BG) 2. Valencia (ES) 3. Chorzow (PL) 4. Budapest (HU)



3 floors
4 apartments
350 m²



4 floors
12 apartments
588 m²



4 floors
12 apartments
1330 m²



3 Buildings
1330 m², 1900 m²,
8000 m²





HEAT4COOL



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THANK YOU!

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