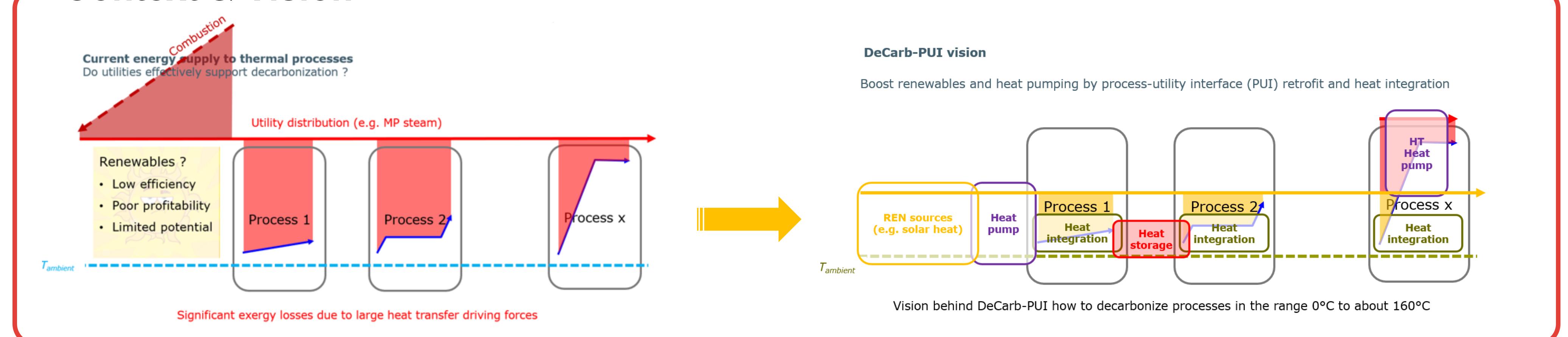


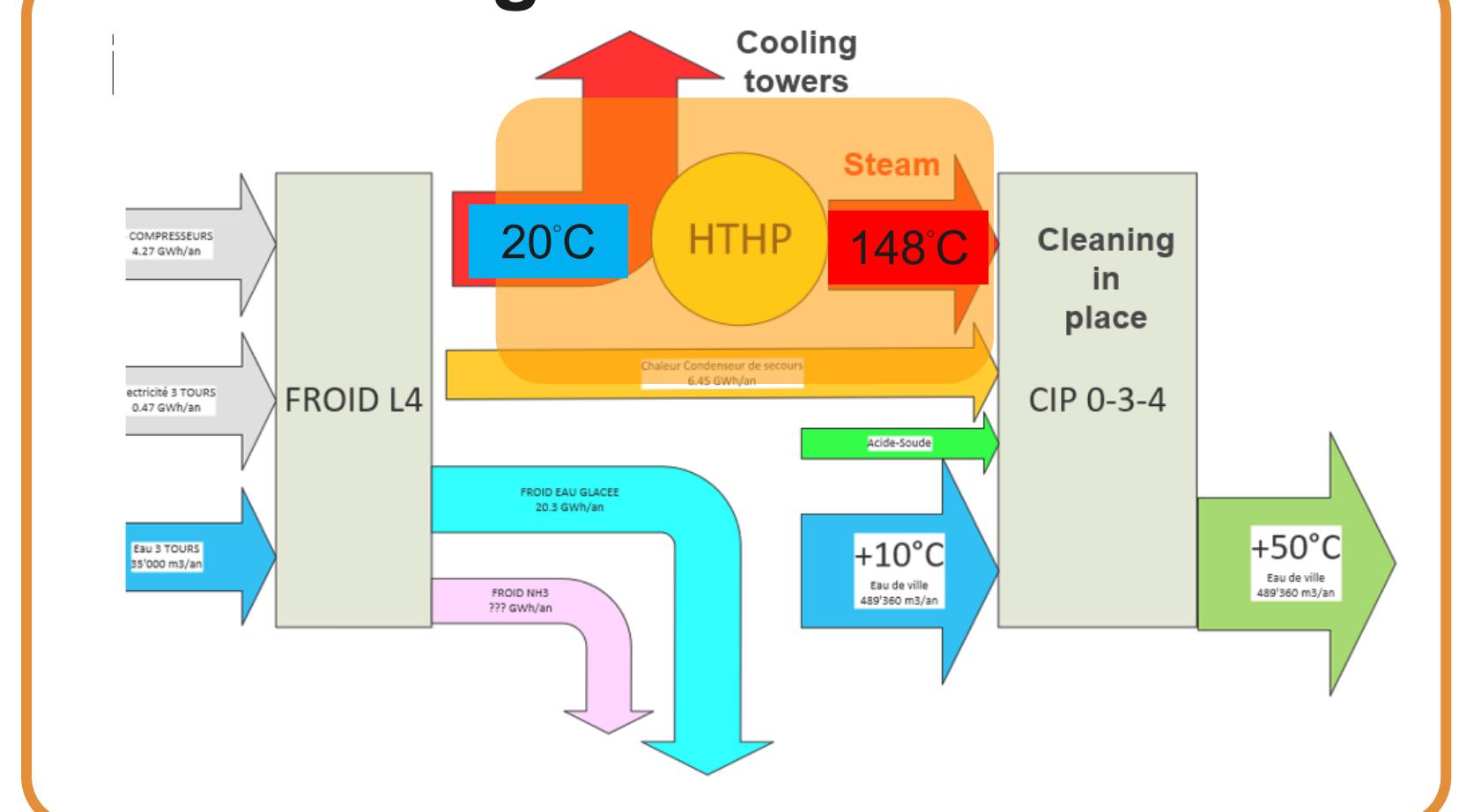
# Heat pump integration in industry: method & case study

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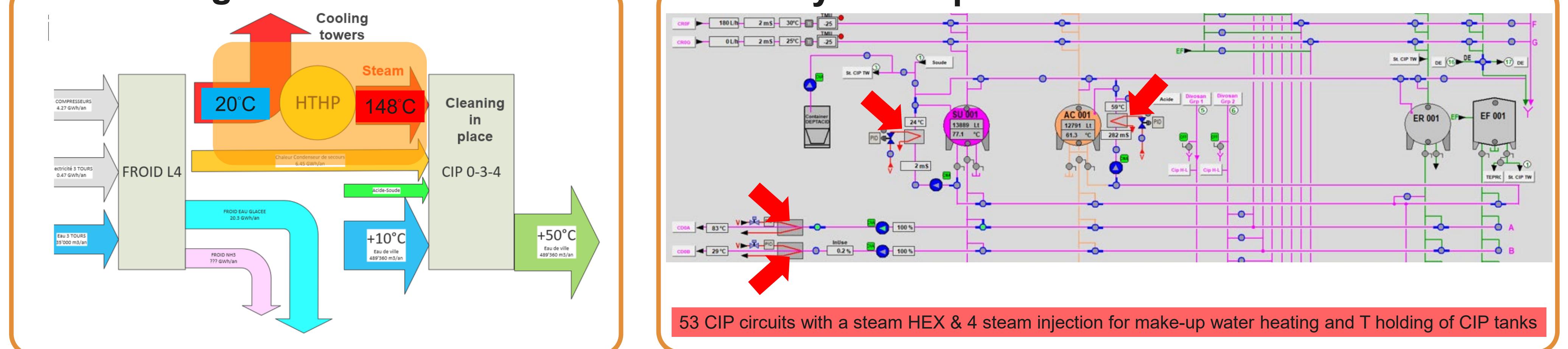
## Context & Vision



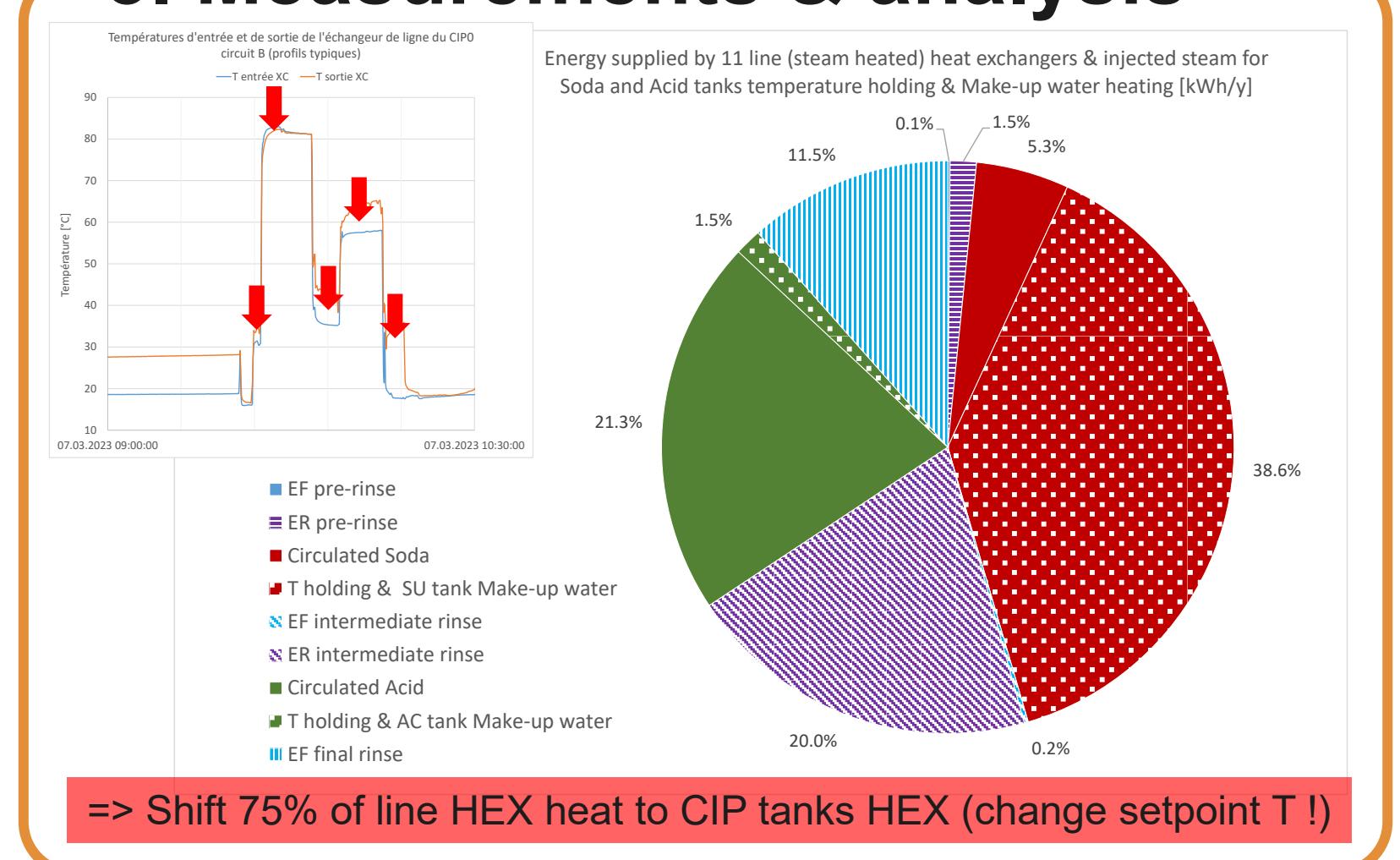
## 1. HP integration: idea of client



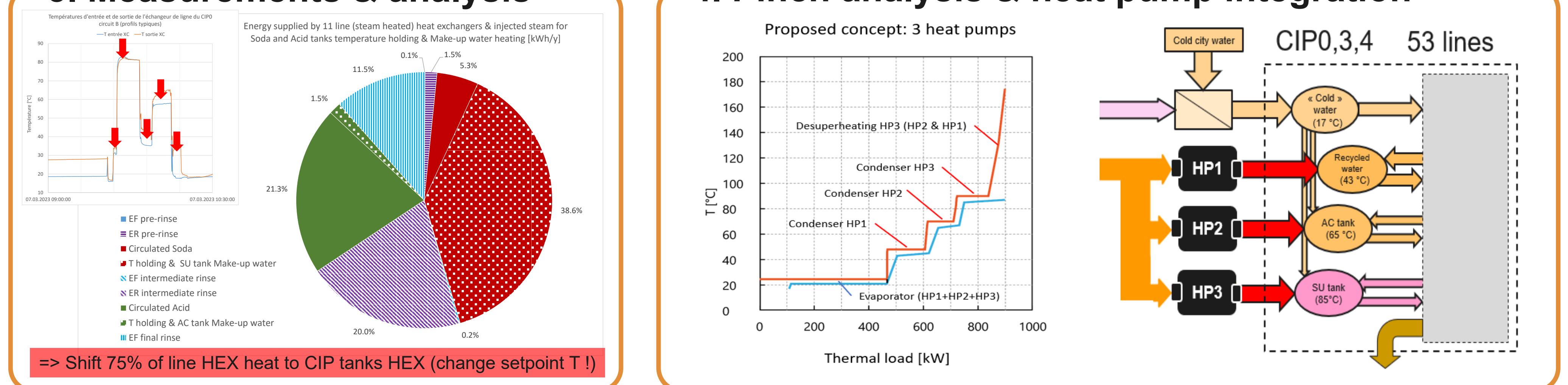
## 2. Analyse CIP process & steam consumers



## 3. Measurements & analysis



## 4. Pinch analysis & heat pump integration



## Results & Conclusions

- Modified utility-process interface => actually no need for a high temperature heat pump !
- Much larger overall COP : average COP  $\approx$  4.0 instead of  $\approx$  1.8 => higher CO<sub>2</sub> savings & profitability

### Core partners



**HSLU** Hochschule Luzern

**OST**  
Ostschweizer Fachhochschule

**ETH** zürich

**zhaw** School of Engineering

**Empa**  
Materials Science and Technology

### Associate partners

Scuola universitaria professionale della Svizzera italiana

**SUPSI**

**HE**  
**VD**  
**IG**

**cem**

**INDP**

### Cooperative partners:

**SWISSOLAR**

**Weisskopf**  
Partner GmbH

**AMSTEIN+WALTHERT**

**BASF**  
We create chemistry

**JURA CEMENT**  
A CRH COMPANY

**Energie aus Abfall**

**gaz energie**

**VBSA ASEASTIR**

**SIG**

**fernwärme**  
Die Komfort-Energie

**ENERGIE-AGENTUR**  
DER WIRTSCHAFT

**SBB CFF FFS**

Stadt Winterthur

**BELIMO**

**CASALE**

**viteos**

**Emi**

**MIGROS**

**SE FAR**

**e+p**

**BUILDING TRUST**

**Danfoss**

**Abicht**  
Gebäudetechnik Zukunftssicher planen

**ewb**

**FELDSCHLÖSSCHEN**  
Part of the Carlsberg Group

**anex**

**Nestlé**