



# Increasing flexibility in district heating networks – Results from the flagship project ThermaFLEX

Workshop: Achieving energy-efficient district heating with waste heat  
10<sup>th</sup> November 2022, Online

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2022

AEE - Institute for Sustainable Technologies was founded in 1988 as a non-university research institute. It is today one of the leading institutions in the field of renewable energy and resource efficiency.



AEE INTEC

1988



# Our Team



# 75

## Staff Members

# 10-15

Master Students

# 4

PhD Students

# 10

Different nationalities

# Our Main Research Topics



# ThermaFLEX - facts



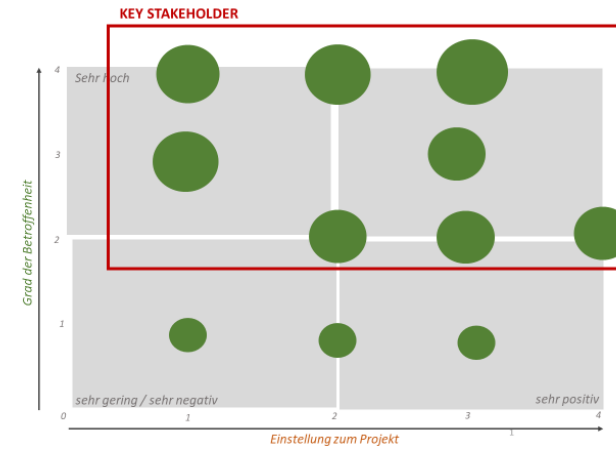
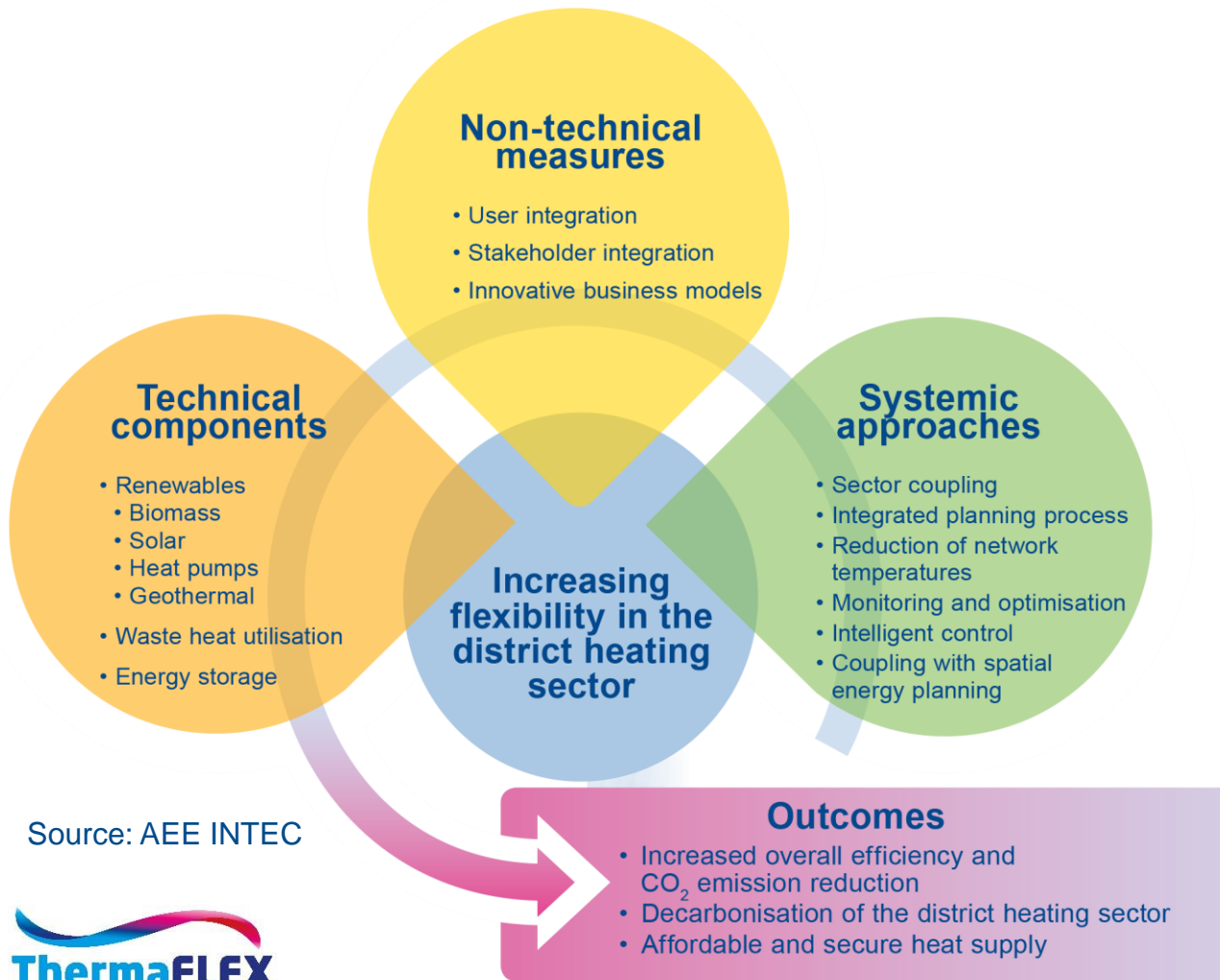
## Problem/challenges identification

- Idea & concept development
- Planning & realisation
- Implementation & monitoring
- Evaluation & optimisation

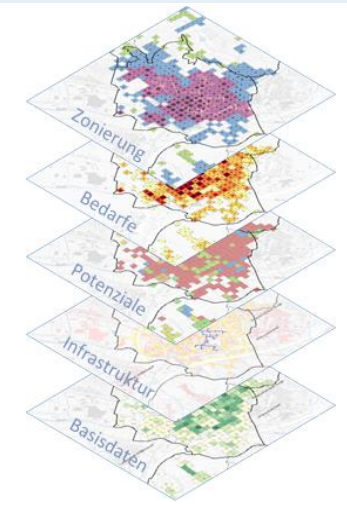
Best practice scenarios  
Know-how transfer  
Scalability and transferability  
Roll-outs etc. for whole DH sector



# Flexible DH networks: More than just one thing



Stakeholder analysis  
Source: StadtLabor

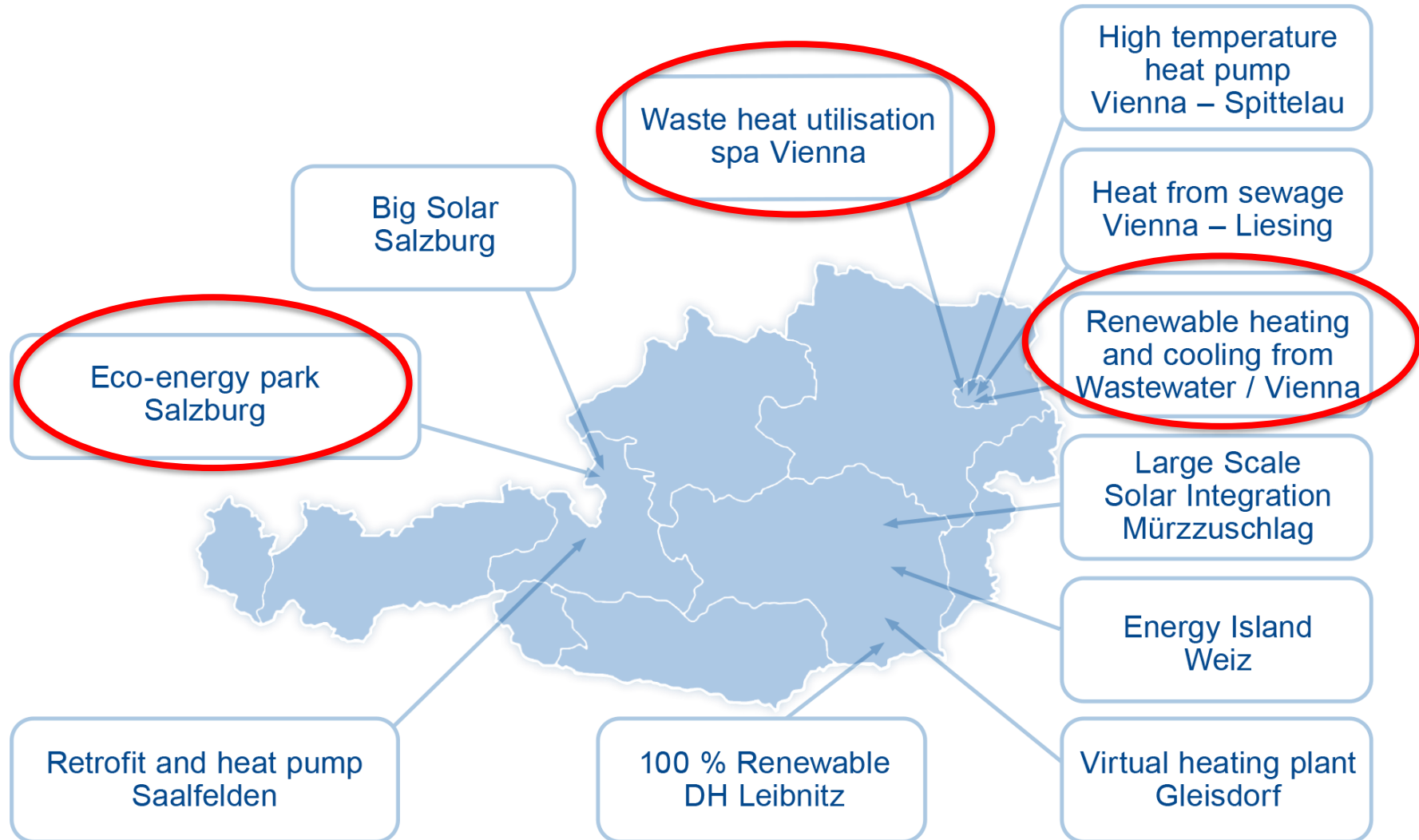


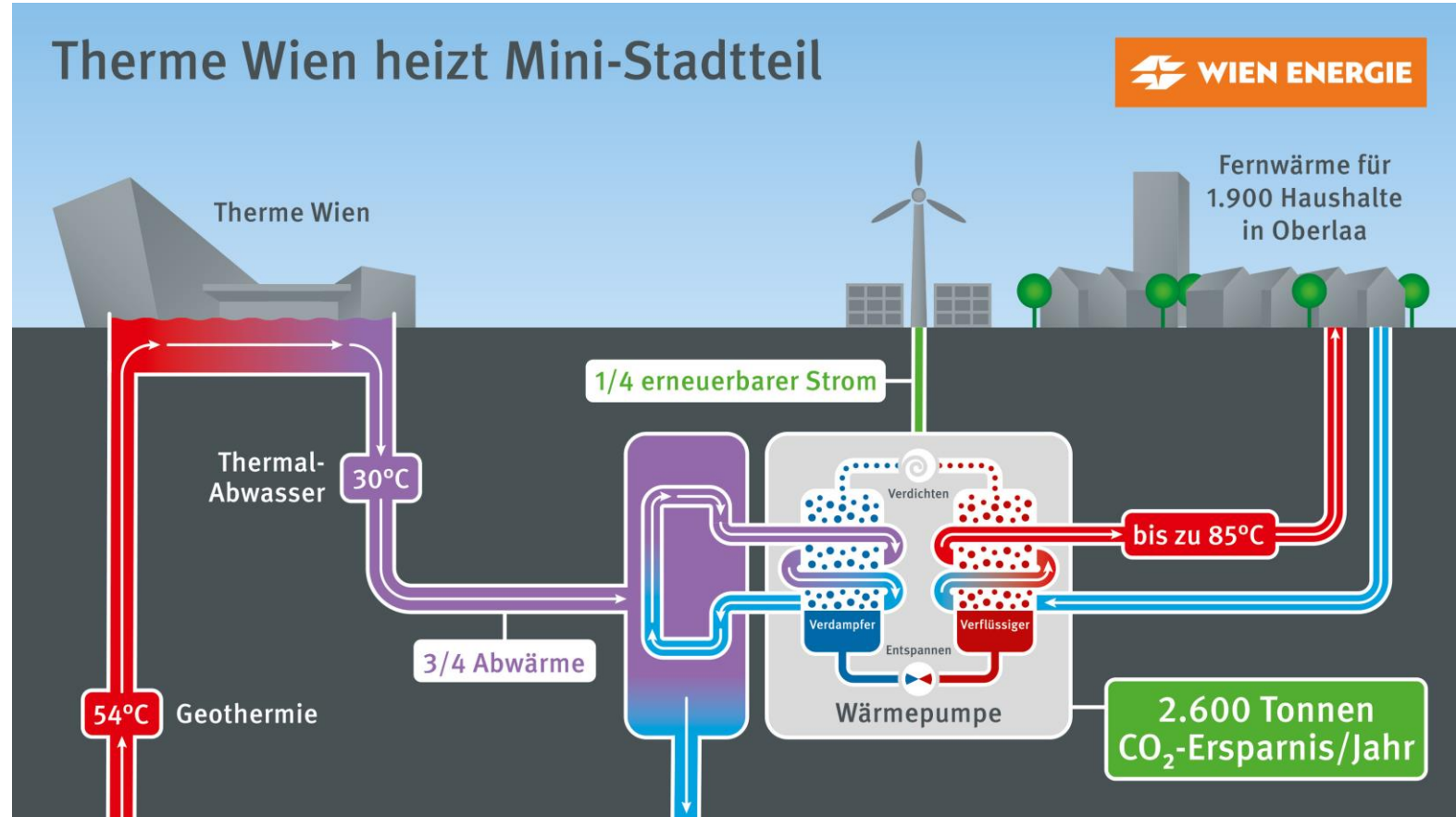
Coupling with Spatial Energy Planning  
Source: AEE INTEC



Integration of local sources and waste heat  
Source: Klimafonds/Krobath

# Demonstration in various Austrian DH systems





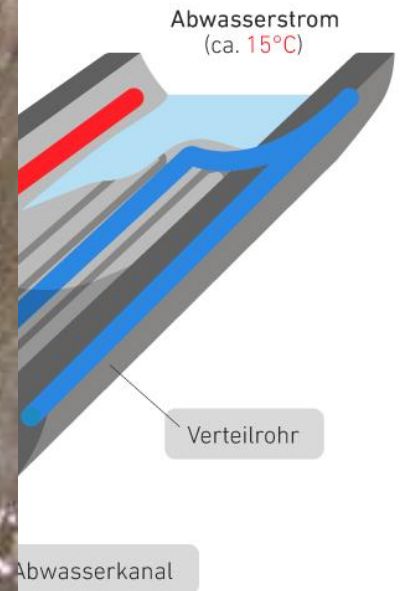


# Waste heat utilization spa Vienna

- Waste heat from the thermal (waste) water of spa Vienna (Oberlaa)
- Two heat pumps: 2,2 MW (in total)
- Refrigerant: ammonia (NH<sub>3</sub>, R717)
- Electrical boiler: 375 kW
- Heat exchanger: Titan
- Feeding in secondary DH network of Vienna
- In operation since May 2022



# Heating and cooling with wastewater



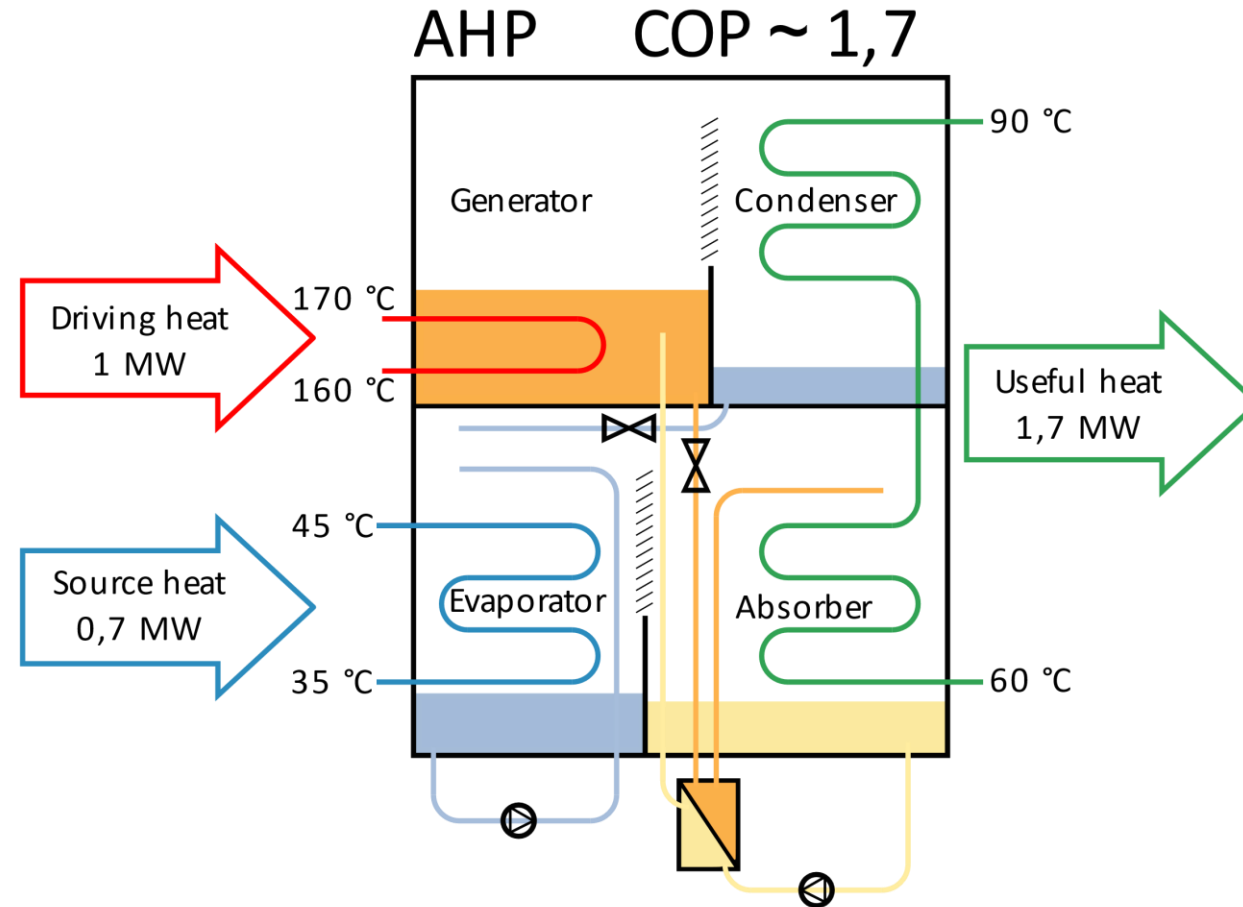


# Heating and cooling with wastewater

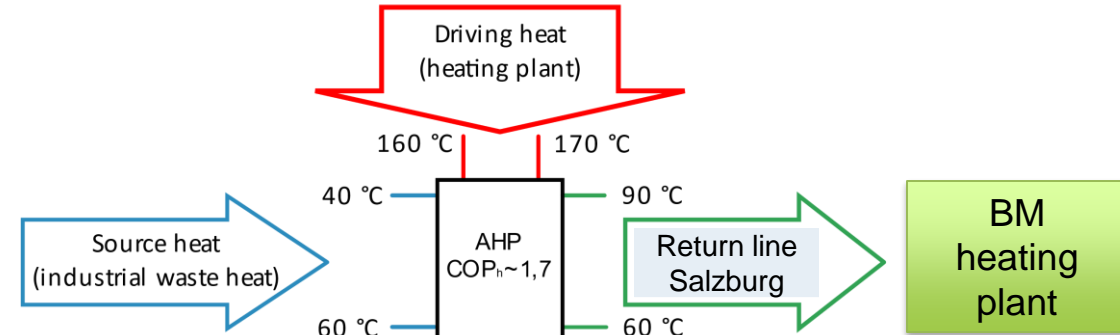
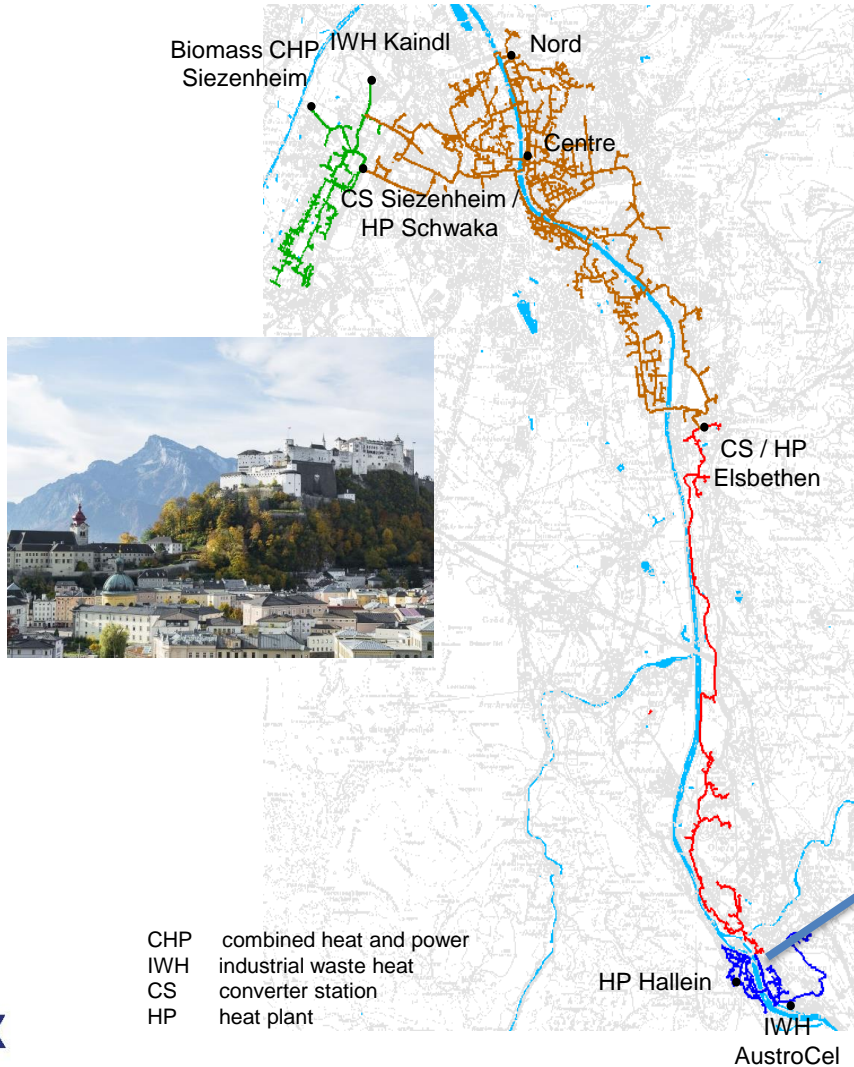
- Use of wastewater energy for **heating and cooling** of office building
- Custom-made heat exchanger
  - Approx. 80 meters
  - Directly placed in sewer
- Two heat pumps with in total
  - 460 kW heating capacity
  - 430 kW cooling capacity
- Innovative monitoring system installed → influence on the sewer/waste water
- In operation since end of 2021



# Absorption heat pump – a thermally driven process



# Integration of Abs Heat pump at AustroCell Hallein





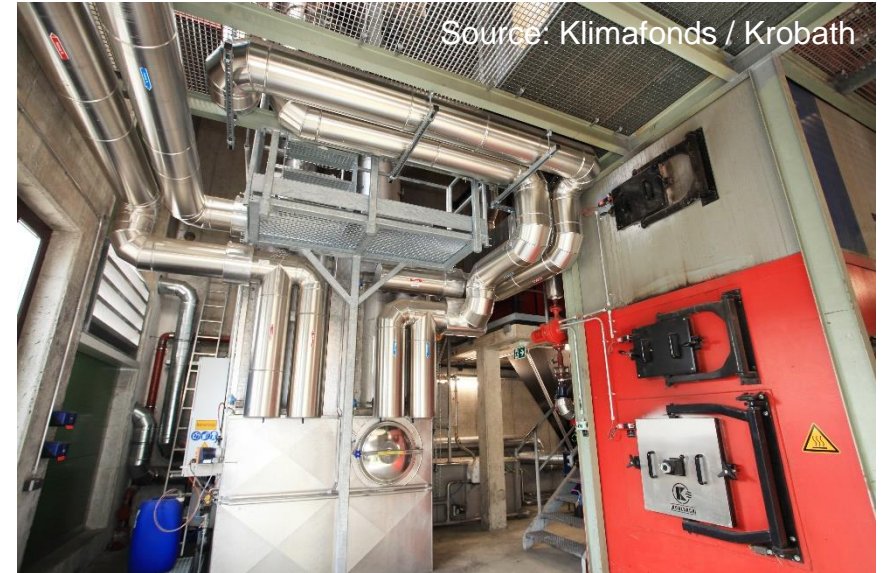
# Low temperature waste heat utilization

- Waste heat of low-temperature source (flue gas condensation of biomass-CHP)
- Cellulose manufacturer AustroCel (Hallein)
- Absorption heat pump: 8 MW
- Working pair: H<sub>2</sub>O/LiBr
- Feeding in DH network of Salzburg
- Simulation model developed
- Installation: January 2020



# Other investigated waste heat sources

- Flue gas condensation units
  - Biomass boiler of DH network in Saalfelden
  - Waste incineration plant Vienna Spittelau
- Industry/infrastructures
  - Rendering plant Gabersdorf/Leibnitz
  - Waste water treatment plant Gleisdorf

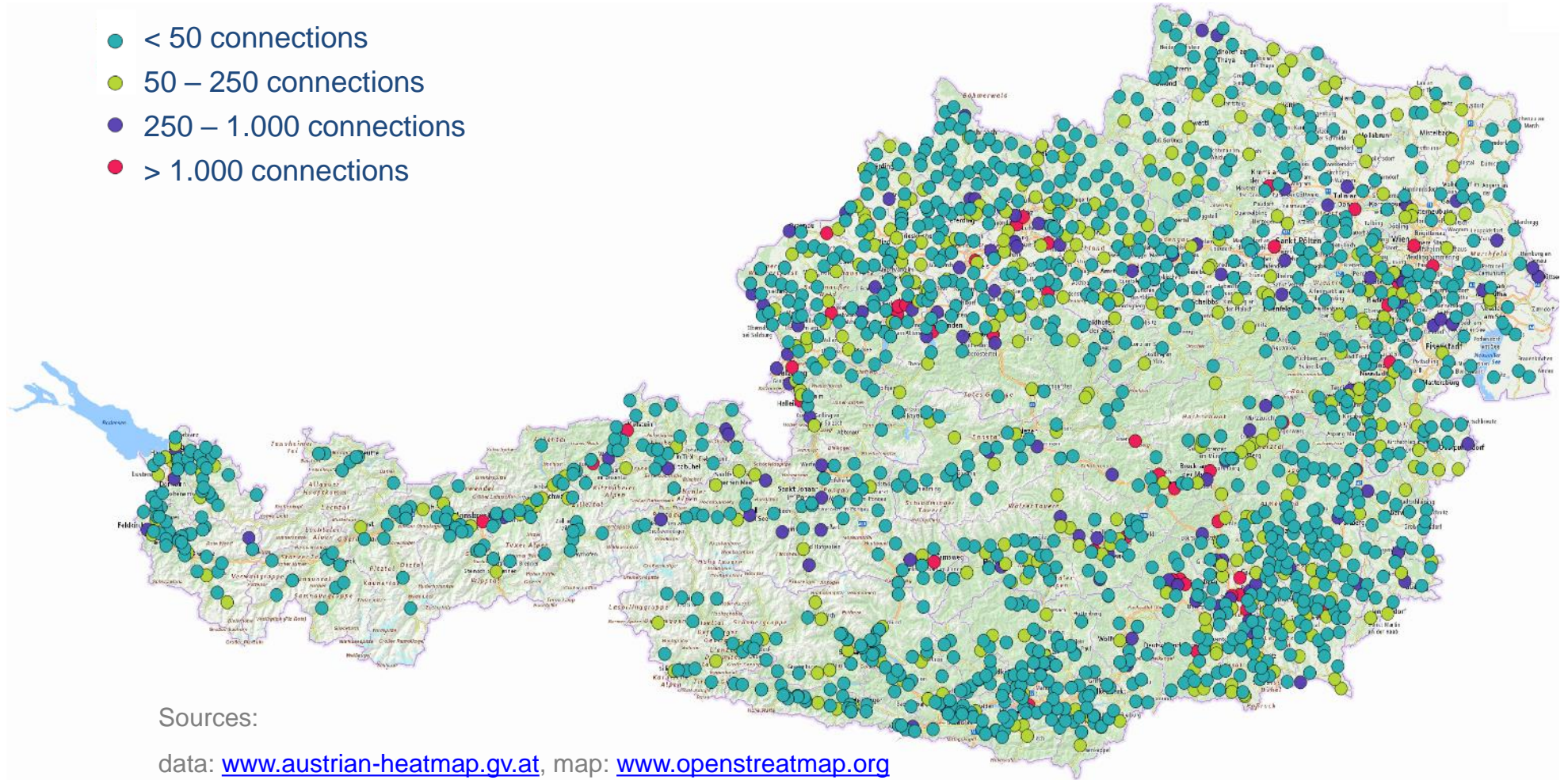






# District heating market in Austria

- < 50 connections
- 50 – 250 connections
- 250 – 1.000 connections
- > 1.000 connections



Sources:

data: [www.austrian-heatmap.gv.at](http://www.austrian-heatmap.gv.at), map: [www.openstreetmap.org](http://www.openstreetmap.org)

# Take-home messages

- Development and implementation of flexibility measures and continuous adaption is vital → long-lasting process
- Use all options for improving the flexibility of DH networks
  - Integrate locally available energy sources and waste heat
  - Extension/densification of network → link to spatial energy planning
  - Synergies to other infrastructures or ongoing developments
- Stepwise and consequent reduction of system temperatures as a key measure → start as soon as possible
- Stakeholder/end-user integration and communication vital → no communication / integration, no DH system





**AEE INTEC**

IDEA TO ACTION

ThermaFLEX demonstrates  
solutions for increasing flexibility in  
district heating networks

powered by  klima+  
energie  
fonds



VORZEIGEREGION  
ENERGIE



 **ThermaFLEX**

<https://thermaflex.greenenergylab.at/>

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