

# A CASE STUDY ON ASPHALT COLLECTOR INTEGRATION WITH HEAT PUMPS

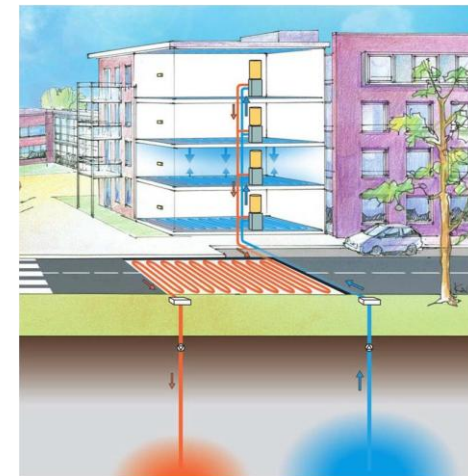
Low-temperature heat sources combined with  
geothermal energy and heat pumps

**DR. EDITH HASLINGER**

Heat Pump Conference

Workshop Annex 61 – Heat pump concepts for Positive Energy  
Districts

26.05.2026



# PROJECT OVERVIEW

- „WientalTerrassen“ - Käthe-Dorsch-Gasse 17, 1140 Vienna, Austria
  - 295 apartments
  - Construction period: 2020 – 2022
  - **Goal: 100 % renewables for heating in cooling in a social housing project**



**Winner of the 2022 ÖGUT Environmental Award  
Category: 'Climate-neutral city'**

**Nominated for the 2024 State Prize  
for Architecture and Sustainability:  
Building for Climate Protection**

# OVERVIEW OF THE HEATING SYSTEM

- 64 borehole heat exchanger (heating and free cooling)
- Three heat pumps



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- Wastewater heat recovery



Quelle: FEKA – Energiesysteme AG, Bad Ragaz, Schweiz

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- 64 borehole heat exchanger (heating and free cooling)
- Three heat pumps
- Wastewater heat recovery
- Unglazed low-temperature solar collectors



Quelle: FEKA – Energiesysteme AG, Bad Ragaz, Schweiz

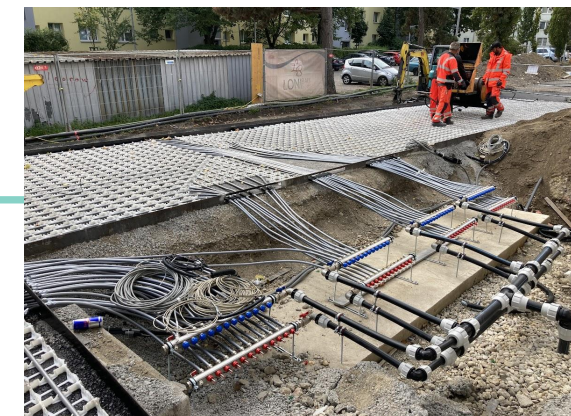


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- Unglazed low-temperature solar collectors
- Asphalt collector



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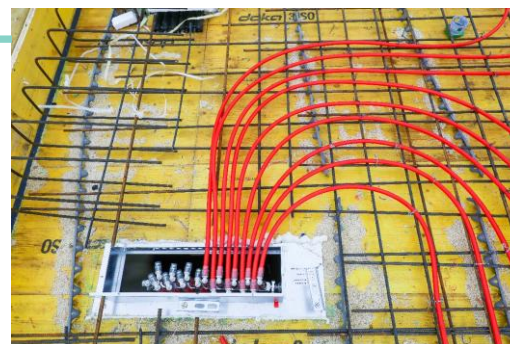


# OVERVIEW OF THE HEATING SYSTEM

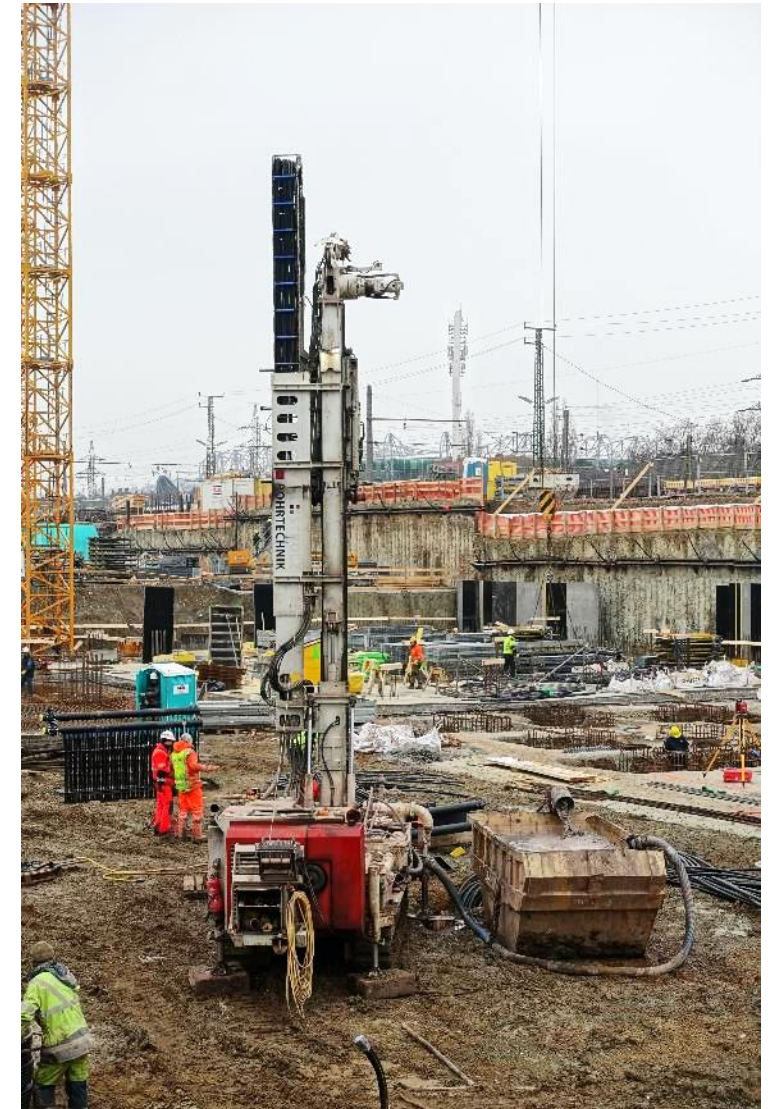
- 64 borehole heat exchanger (heating and free cooling)
- Three heat pumps
- Wastewater heat recovery
- Unglazed low-temperature solar collectors
- Asphalt collector
- Photovoltaic system
- Concrete core activation



Quelle: FEKA – Energiesysteme AG, Bad Ragaz, Schweiz



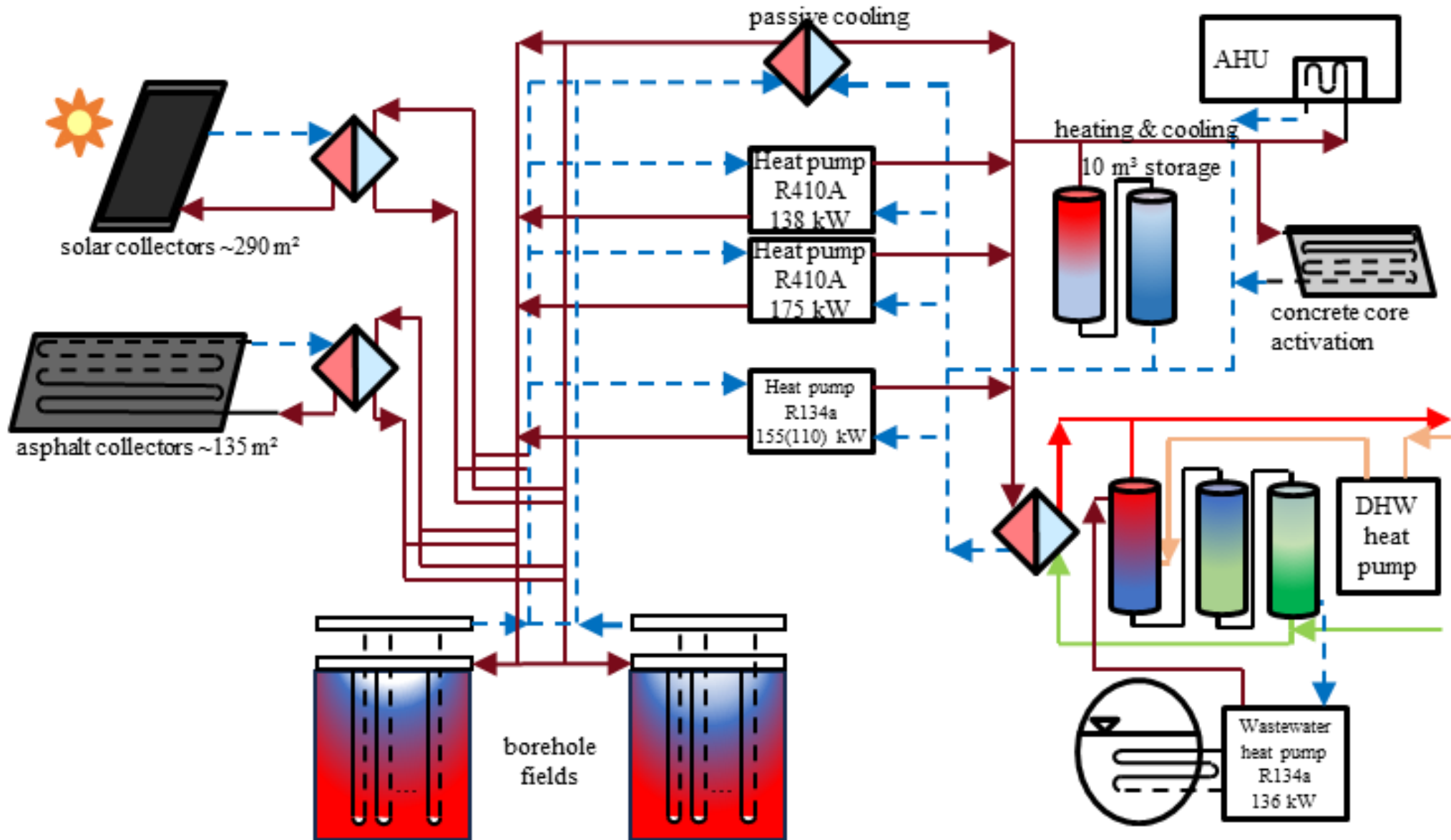
# BOREHOLE HEAT EXCHANGER



# BOREHOLE HEAT EXCHANGER



# SYSTEM OVERVIEW



# THE FIRST ASPHALT COLLECTOR IN AUSTRIA

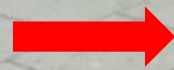
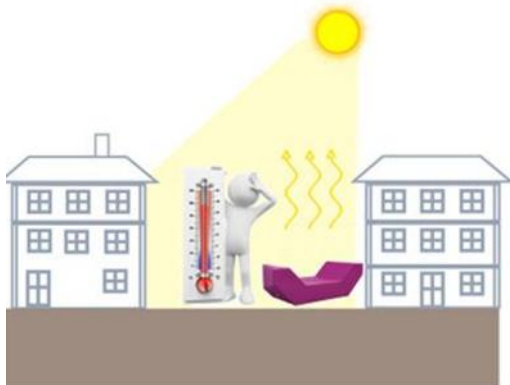
Realisation of a research prototype of an asphalt collector for an innovative building project

# IDEA

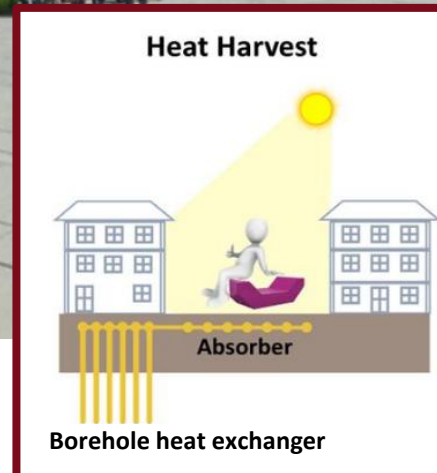
**Excess heat** from ‘urban hot spots’ is ‘harvested’ in summer, **stored underground** and used to heat buildings in winter. The technology is particularly useful in areas where greenery and water features cannot be used, as well as on **large paved surfaces** such as **car parks**.



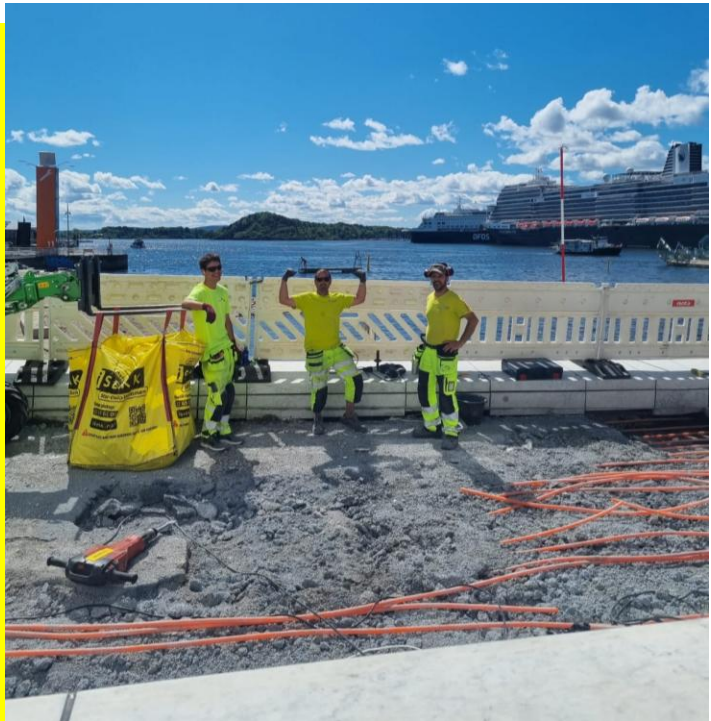
Urban Heat Island



Heat Harvest



- Technology developed and investigated ca. **25 years** ago und erforscht (van Bijsterveld et al., 2001); **technological advantages investigated** (Bobes-Jesus, 2013)
- Only **2,5 km<sup>2</sup>** of asphalt surfaces **worldwide thermally activated** (Lund & Toth, 2021)
- Literature (e.g. Trauninger et al. 2019):
  - **Heat extraction capacity** for different surfaces between **150 and 450 W/m<sup>2</sup>**;
  - **Heat yield ~250 kWh/m<sup>2</sup>.a** (Road Energy Systems<sup>®</sup>, Ooms)
  - **Temperature reduction** between **5 K (concrete)** and **10 K (asphalt)**



Anna Preis, FH Technikum



Anna Preis, FH Technikum



Ooms Civiel



Ooms Civiel

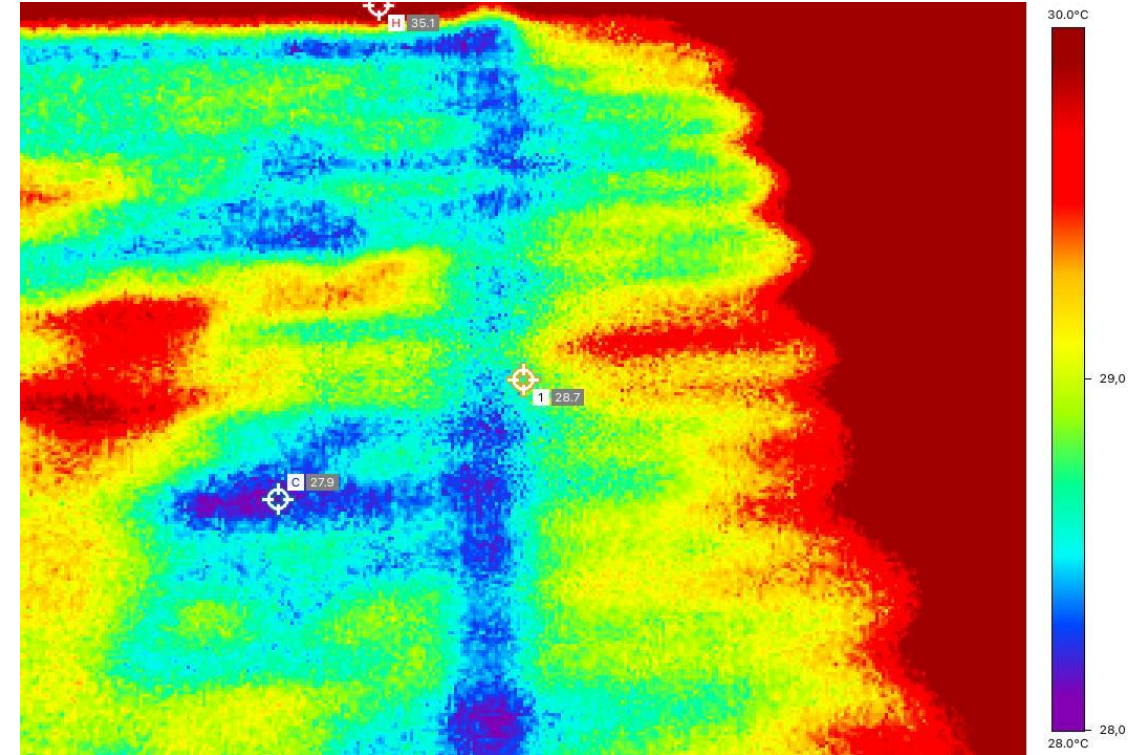
# THE FIRST ASPHALT COLLECTOR IN AUSTRIA



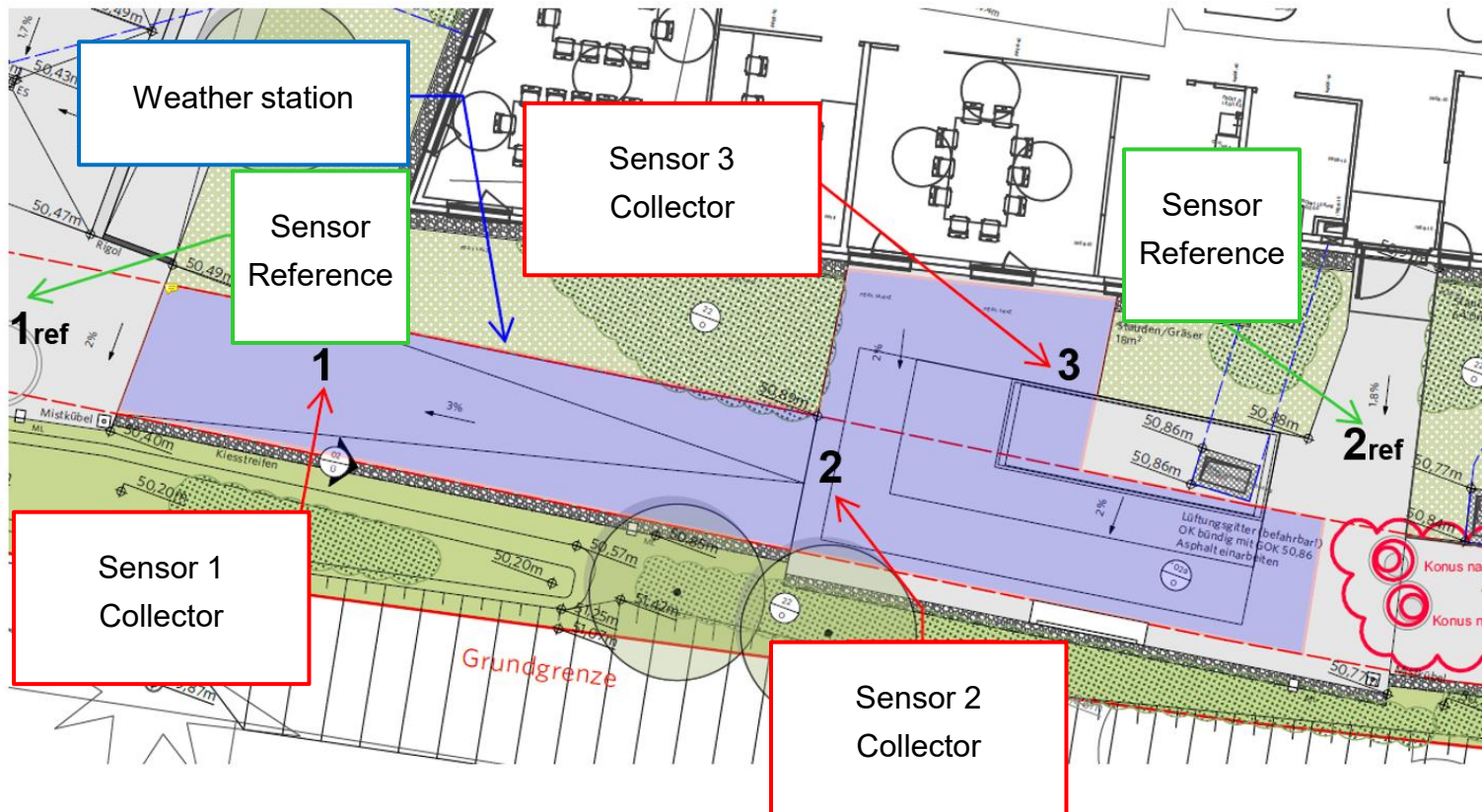
# THE FIRST ASPHALT COLLECTOR IN AUSTRIA



# THERMOGRAPHY MEASUREMENTS AND MONITORING JULY 2023

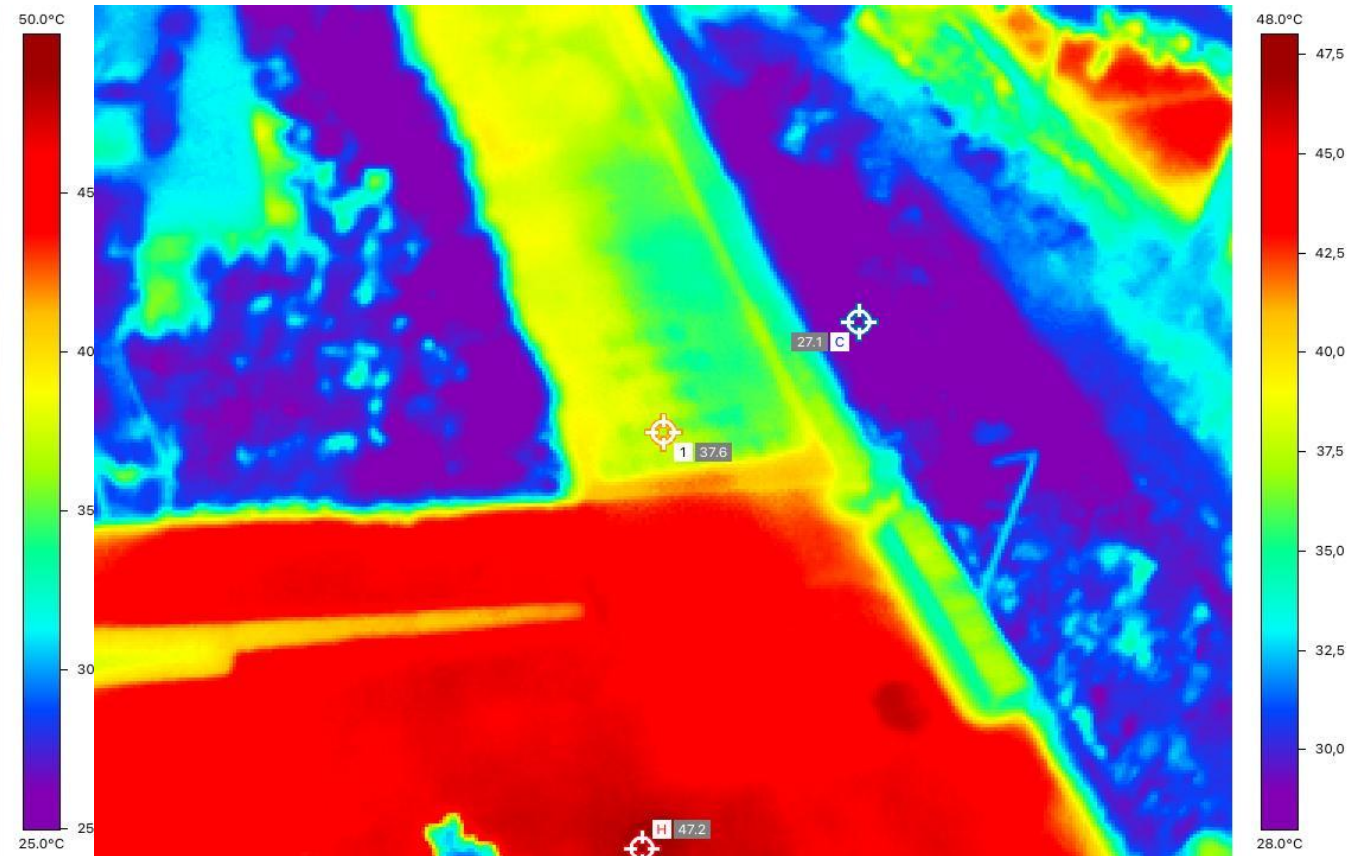
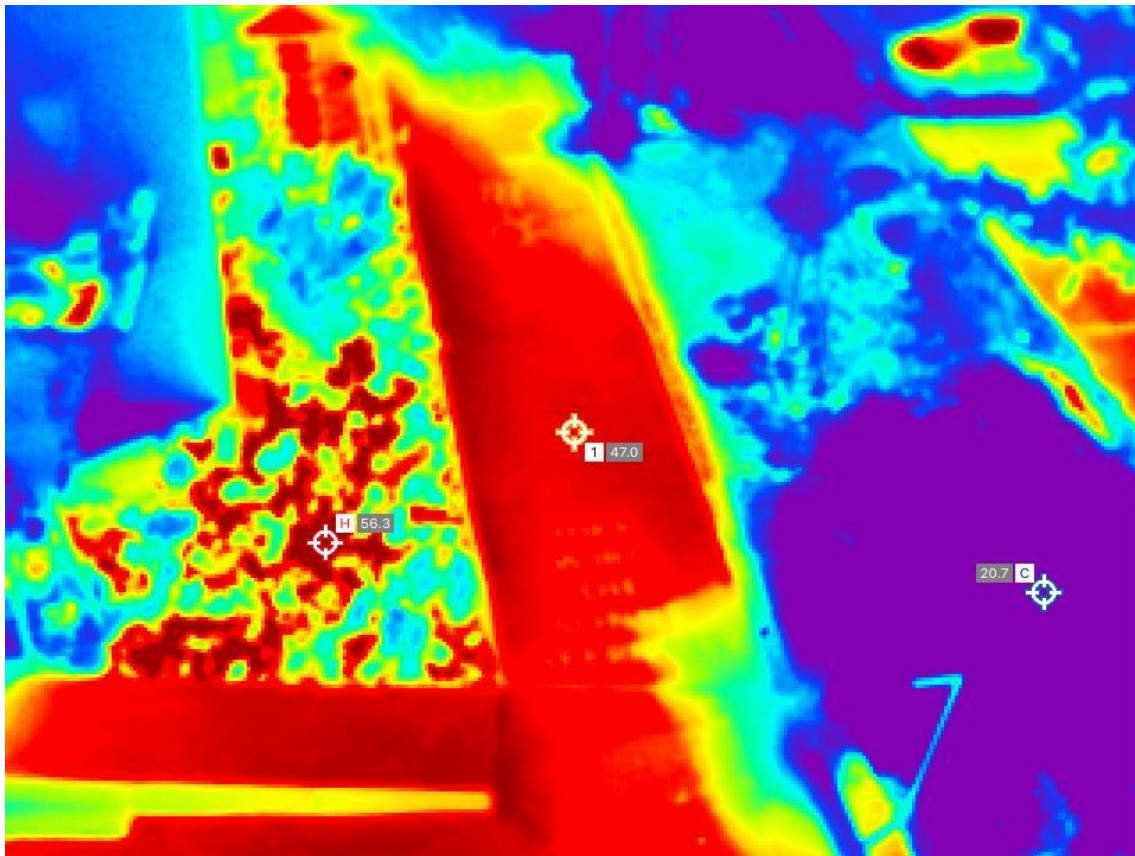


# ASPHALT COLLECTOR

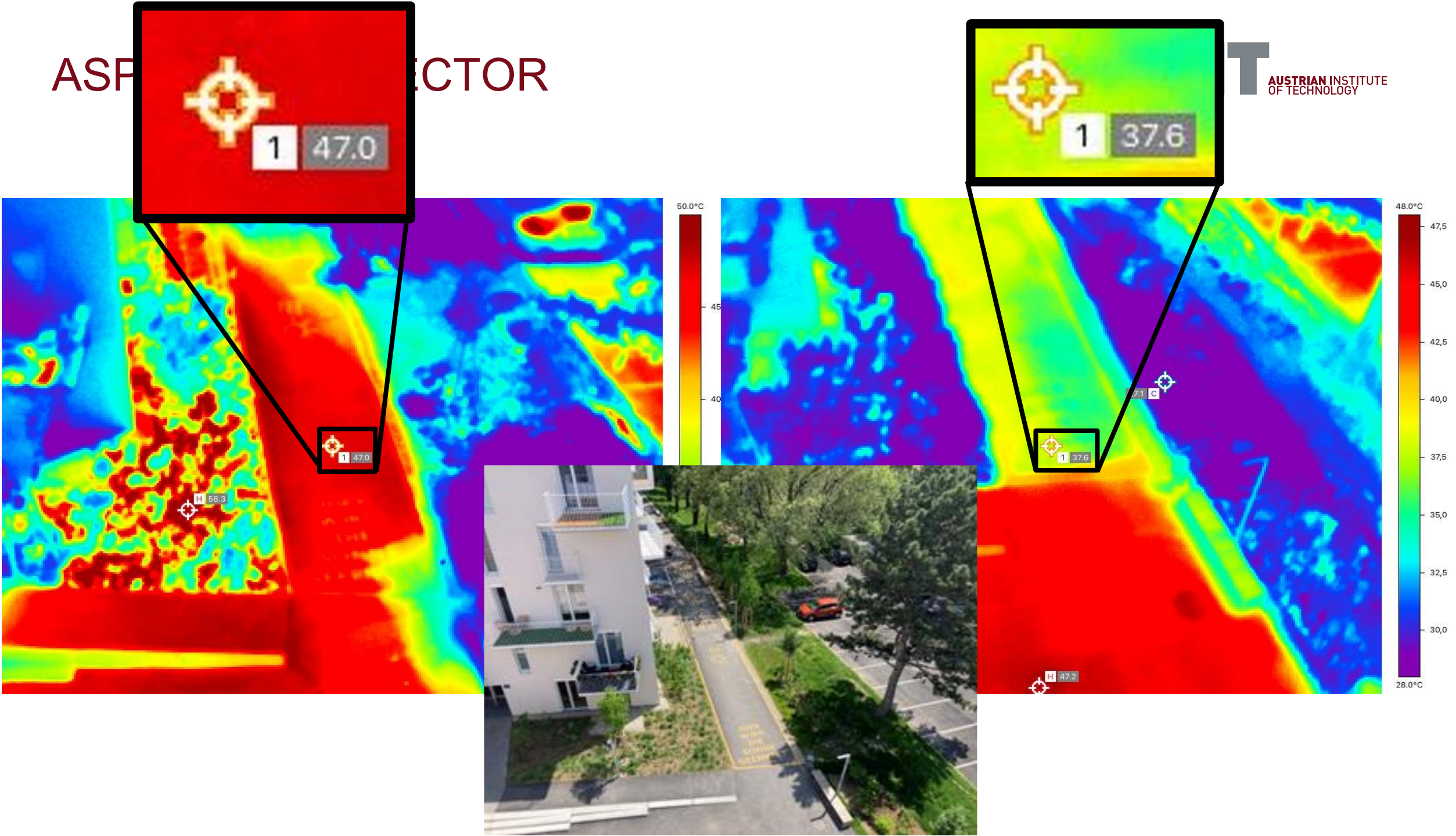


- **Installation of monitoring**
- **Temperature sensors at various points** and levels incl.
- **Reference surface** for thermography and
- **A weather station** in an unshaded location

# ASPHALT COLLECTOR



# ASPH PAVEMENT FACTOR



# RESULTS

## Control strategies:

### 1. Continuous operation:

- Inclusion of night-time temperatures → Low energy density

### 2. ΔT control:

- Wrong programming (secondary outlet SC instead of AC)

### 3. Daylight control:

- Asphalt collector with too low flow rate (~10%)
- Low regeneration from asphalt collector

**Table 1.** Energy generation from AC and SC during 2023 and 2024

Month	kWh				kWh/m <sup>2</sup>			
	2024		2023		2024		2023	
	AC	SC	AC	SC	AC	SC	AC	SC
1	50*	840			0,4	3		
2	150*	4.840			1,1	17		
3	10**	10.880			0,1	38		
4	30**	17.870			0,2	62		
5	170**	22.960			1,3	79		
6	270**	15.160			2,0	52		
7	1.160**	6.400			8,6	22		
8	1.790 **	24.030	930*		13,3	83	6,9	
9	470 **	16.330	830*		3,5	56	6,1	
10	360 **	7.900	620*	270	2,7	27	4,6	0,9
11			310*	620			2,3	2,1
12			90*	110			0,7	0,4
p.a.	4.460	127.210	2.780	1.000	33	439		

Continuos Operational Cont.

\* dT-operational Cont. (excluded because of a wrong programming of the control strategy)

\*\* Daylight Operational Cont.

Literature: 150 – 250 kWh/m<sup>2</sup> a

# CONCLUSIONS

**Asphalt collectors are a very promising technology for avoiding heat islands and as low-temperature heating source**, provided the following points are observed:

- Clear regulation of **where the heat generated from the asphalt collector is stored or used** → **adapt the overall energy concept** or building services concept to the **various low-temperature sources** → correct hydraulic, temporal, and temperature planning and integration of the different sources → **dynamic regulation** according to temperature and flow
- **Further research/outlook: Control strategy, design, dimensioning, and material use (e.g., number of heating circuits)**

# THANK YOU!



**DR. EDITH HASLINGER**

Senior Scientist

[edith.haslinger@ait.ac.at](mailto:edith.haslinger@ait.ac.at)

<http://www.ait.ac.at>

