

Enhancing operational efficiency of Cankova DH system

Local Energy Agency Pomurje

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Introduction of DHS in Cankova

- **System construction in 2003: from fossil fuel to RES, 800 kW boiler, 660 MWh/year**
- **Fuel: wood biomass – wood chips**
- **Connected customers in 2005: 18 (7+11) - (including the municipality, health center, primary school, kindergarten, cultural and tourist centre, some private businesses and residential buildings)**
- **System upgrade and expansion in 2020: construction of a new boiler house and the installation of a new boiler (CHP, 500 kW, 793 MWh, 10.000 litres of thermal storage tank for peak load balancing)**
- **Connected customers in 2022: 28 (additional households)**
- **REHEATEAST pilot project in 2025**



Introduction of pilot: DHS Cankova - SI



- **Local energy agency Pomurje – partner**
- **Jožef Štefan Institute – partner**
- **Sončna zadruga (Solar Cooperative) - associated strategic partner**
- **Municipality of Cankova, as the owner of the Wood Biomass District Heating**
- **The municipality gave in 2019 the concession for the management of the DHS to Sončna zadruga**

Pilot: DHS Cankova – 3 phases

1. Preparation phase

- Problem/challenges (meetings with stakeholders, draft work definition, etc.)
- Pilot project concepts
- Definition of the needed resources (IR camera, etc.)
- Finalization (site visits, meetings, etc.)

2. Implementation phase

- Inventory of the situation (interviews, data collecting, IR thermal footage)
- Starting points of expert analysis (min. heat losses, max. EE, reduction of operational cost, etc.)
- Conducted (loss) analysis (EE, expansion - analytics and projection & video animation)
- Optimization technique (Conceptual design and economic analysis of the investment
- LL approach - expansion of the biomass-based DHS)

3. Analytics/reporting phase

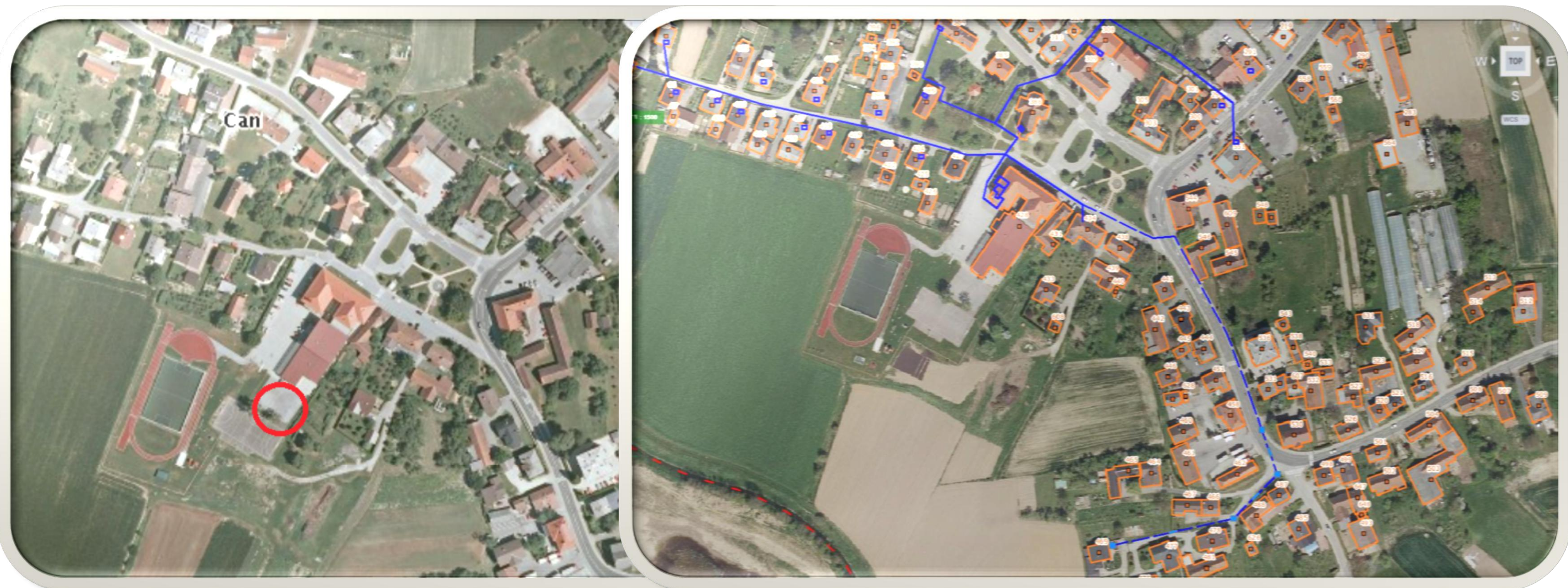
- Follow – up (operational)
- Analytics (reporting and presentations, verifications)
- Visibility (dissemination of results and findings)



Optimization scenario 1

In the 2024/2025 heating season, a total of 1,107 MWh of heat was produced and 785 MWh of heat was sold from DHS Cankova.

Location of the boiler of DHS Cankova & maps of pipe lines



Optimization scenario 1

The difference between the produced and sold heat are the heat losses of DHS Cankova = **total of 322.12 MWh, which is 29.08%** of total heat produced.

Different reasons:

Heat loss in pipes: During the transfer of heat through a hot water system, heat loss can occur in the pipes

Leaks in the system: Leaks in pipes, valves or connections can cause water loss and consequently heat

Excessive water temperature: If the temperature of the water traveling through the hot water system rises too high, heat losses also increase.

Improperly balanced system: If the heating stations / heat exchangers in buildings are incorrectly balanced, there may be excessive or insufficient hot water flow.

Optimization scenario 1

Locations for IR analysis

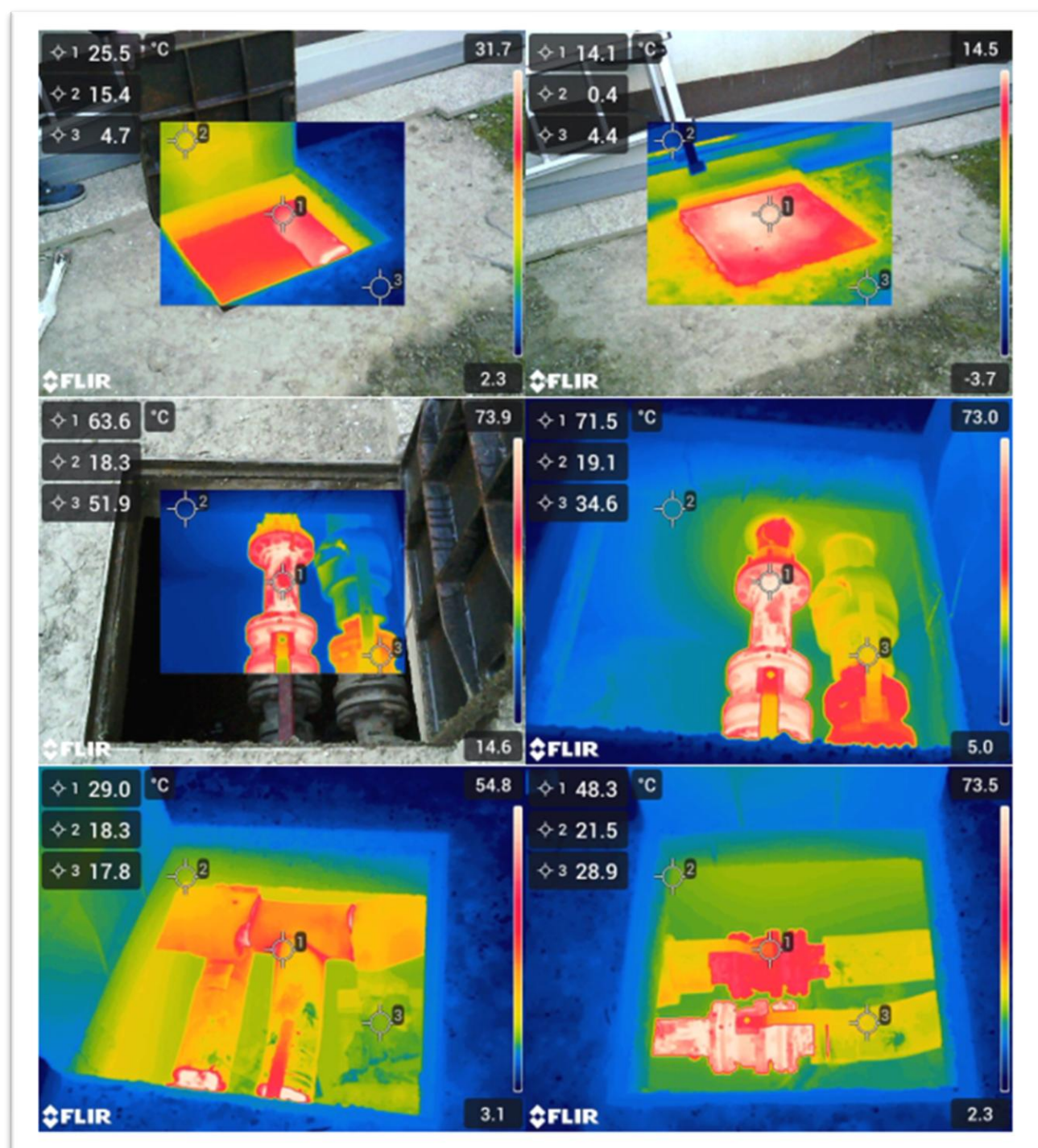


We wanted to perform an analysis for 6 locations, but in the process of creating the analysis, we covered 10 critical locations.



Optimization scenario 1

Location 1

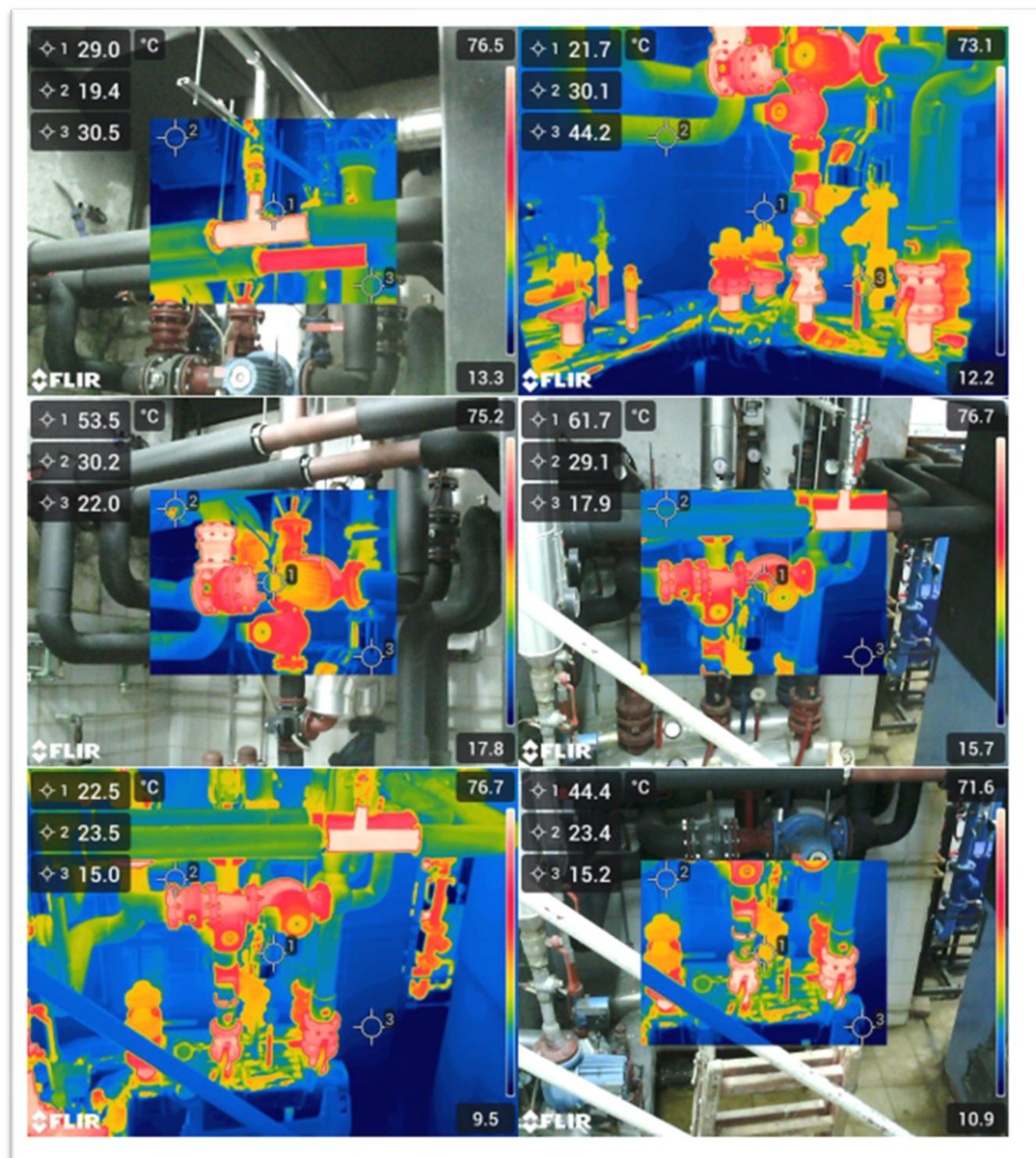


REHEATEAST

Status:	obstoječe stanje		Status:	stanje po izvedbi izolacije	
Izgube s konvekcijo			Izgube s konvekcijo		
DN:	80	mm	DN:	80	mm
Av=	0,315	m ²	Av=	0,315	m ²
Ac=	0,45	m ²	Ac=	0,45	m ²
Tp=	70	°C	Tp=	35	°C
To=	20,1	°C	To=	20,1	°C
α=	10	W/m ² K	α=	8	W/m ² K
Qk1=	381,74	W	Qk1=	91,19	W
Izgube s sevanjem			Izgube s sevanjem		
DN:		mm	DN:		mm
Ac=	0,765	m ²	Ac=	0,765	m ²
Tp=	70	°C	Tp=	35	°C
To=	20,1	°C	To=	18	°C
e1=	0,93		e1=	0,93	
e2=	0,78		e2=	0,78	
σ=	5,6697E-08	W/m ² K ⁴	σ=	5,6697E-08	W/m ² K ⁴
sevanje proti betonskom površinam			sevanje proti betonskom površinam		
q1=	340,69	W/m ²	q1=	96,40	W/m ²
Qs1=	208,50	W	Qs1=	59,00	W
sevanje proti jeklenemu pokrovu jaška			sevanje proti jeklenemu pokrovu jaška		
q2=	285,74	W/m ²	q2=	80,85	W/m ²
Qs2=	44,57	W	Qs2=	12,61	W
Skupaj izgubljena toplotna moč:			Skupaj izgubljena toplotna moč:		
ΣQ=Qk1+Qs1+Qs2=	634,81	W	ΣQ=Qk1+Qs1+Qs2=	162,80	W
Skupaj izgubljena energija:			Skupaj izgubljena energija:		
ob upoštevanju ur ogrevanja:	5000	ur	ob upoštevanju ur ogrevanja:	5000	ur
Izgubljena energija/leto:	3174,05	kWh	Izgubljena energija/leto:	814,00	kWh
			Prihranek na letni ravni:	2360,05	kWh

Optimization scenario 1

Location 3

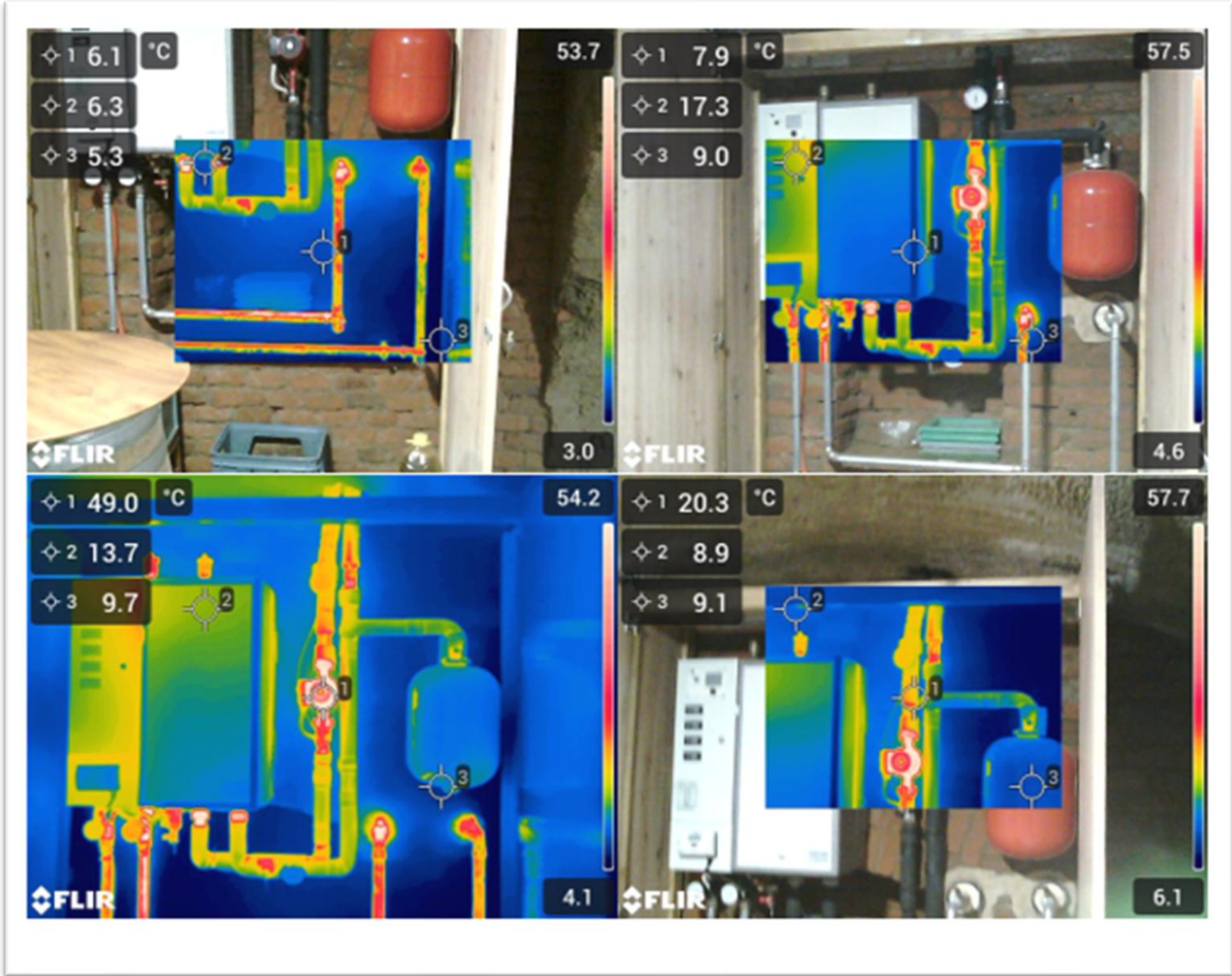


REHEATEAST

Status: obstoječe stanje			Status: stanje po izvedbi izolacije		
Izgube s konvekcijo			Izgube s konvekcijo		
DN:	80 mm		DN:	80 mm	
Av=	0,628 m ²		Av=	0,628 m ²	
Ac=	0,3 m ²		Ac=	0,3 m ²	
Tp=	71,6 °C		Tp=	40 °C	
To=	23,4 °C		To=	20 °C	
α=	10 W/m ² K		α=	8 W/m ² K	
Qk1=	447,30 W		Qk1=	148,48 W	
Izgube s sevanjem			Izgube s sevanjem		
DN:	mm		DN:	mm	
Ac=	0,928 m ²		Ac=	0,928 m ²	
Tp=	71,6 °C		Tp=	40 °C	
To=	23,4 °C		To=	20 °C	
e=	0,93		e1=	0,93	
σ=	5,6697E-08 W/m ² K ⁴		σ=	5,6697E-08 W/m ² K ⁴	
sevanje proti betonskom površinam			sevanje proti betonskom površinam		
q1=	336,58 W/m ²		q1=	117,47 W/m ²	
Qs1=	249,87 W		Qs1=	87,21 W	
Skupaj izgubljena toplotna moč:			Skupaj izgubljena toplotna moč:		
ΣQ=Qk1+Qs1=	697,17 W		ΣQ=Qk1+Qs1=	235,69 W	
Skupaj izgubljena energija:			Skupaj izgubljena energija:		
ob upoštevanju ur ogrevanja:	5000 ur		ob upoštevanju ur ogrevanja:	5000 ur	
Izgubljena energija/leto:	3485,85 kWh		Izgubljena energija/leto:	1178,46 kWh	
			Prihranek na letni ravni:		
			2307,39 kWh		

Optimization scenario 1

Location 5



Status:	obstojeće stanje			Status:	stanje po izvedbi izolacije		
Izgube s konvekcijom				Izgube s konvekcijom			
DN:	25	mm		DN:	25	mm	
Av=	0,2	m ²		Av=	0,2	m ²	
Ac=	0,22	m ²		Ac=	0,22	m ²	
Tp=	71,6	°C		Tp=	40	°C	
To=	8,9	°C		To=	8	°C	
α=	10	W/m ² K		α=	8	W/m ² K	
Qk1=	263,34	W		Qk1=	107,52	W	
Izgube s sevanjem				Izgube s sevanjem			
DN:	25	mm		DN:	25	mm	
Ac=	0,42	m ²		Ac=	0,42	m ²	
Tp=	71,6	°C		Tp=	40	°C	
To=	8,9	°C		To=	8	°C	
ε=	0,93			ε1=	0,93		
σ=	5,6697E-08	W/m ² K ⁴		σ=	5,6697E-08	W/m ² K ⁴	
sevanje prot i betonskom površinam				sevanje proti betonskom površinam			
q1=	410,56	W/m ²		q1=	177,33	W/m ²	
Qs1=	137,95	W		Qs1=	59,58	W	
Skupaj izgubljena toplotna moć:				Skupaj izgubljena toplotna moć:			
ΣQ=Qk1+Qs1=	401,29	W		ΣQ=Qk1+Qs1=	167,10	W	
Skupaj izgubljena energija:				Skupaj izgubljena energija:			
ob upoštevaniu ur ogrevanja:	5000	ur		ob upoštevaniu ur ogrevanja:	5000	ur	
Izgubljena energija/leto:	2006,43	kWh		Izgubljena energija/leto:	835,51	kWh	
Prihranek na letni ravni				Prihranek na letni ravni	1170,92	kWh	

Optimization scenario 1

Total for Optimization scenario 1

	Naziv lokacije	letna poraba pred obnovo	letna poraba po obnovi/izolaciji	prihranek letno
		[kWh]	[kWh]	[kWh]
1.	jašek telovadnica	3174,05	814,00	2360,05
2.	jašek župnišče	2775,12	1003,95	1771,17
3.	kurilnica razvodi	3485,85	1178,46	2307,39
4.	povezava nova_stara kurilnica	22440,00	13464,00	8976,00
5.	toplotni dr.Avgusta Pavla	2006,43	835,51	1170,92
6.	toplotni občinska stavba	5326,23	2045,30	3280,93
7.	toplotni stara kurilnica	5801,12	2268,88	3532,24
8.	vod cerkev_telovadnica	8282,00	4961,00	3321,00
9.	vod cerkev	2020,00	1210,00	810,00
10.	vod občinska	11352,00	7128,00	4224,00
	skupaj:			31.753,70

Impact of optimization scenario 1 = 10 % loss reduction

Optimization scenario 1

The difference between the produced and sold heat are the heat losses of DHS Cankova = total of 322.12 MWh, which is 29.08% of total heat produced

Impact of optimization scenario 1 = 10 % loss reduction – 31,753 MWh

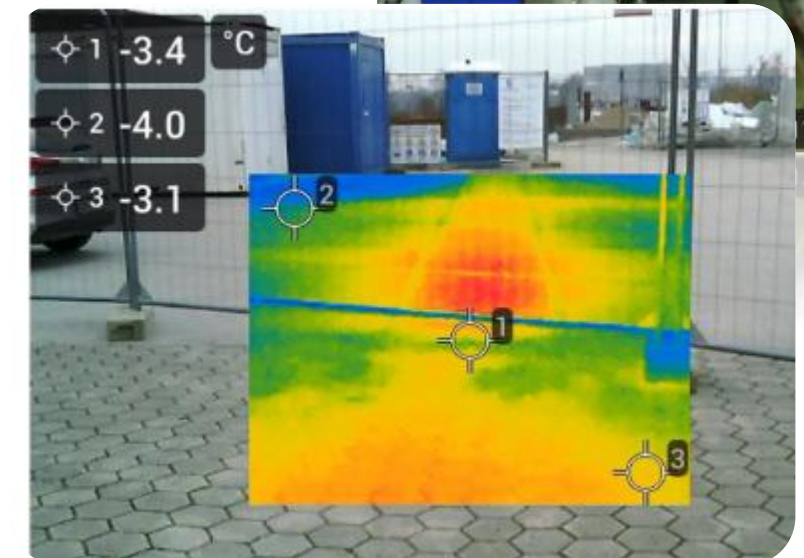
10 measures foreseen in this scenario:

- the cost of implementing individual measures is from 240 to 35.700 €
- the payback period of the investment for the implementation of individual measures is from 0,93 to 62,5 years.
- the cost of implementing of all measures is 76,000 € and the payback period is 28,28 years.
- **INVESTMENT & FINANCING** within the framework of ongoing maintenance according to individual measures!?

Optimization scenario 2

Additional boiler for new users and peak loads (Primary school Cankova):

- **250 kW** - only the boiler and installations, because can be placed in the existing (old) boiler room, where the old and currently unusable boiler from previous system, with a power of 800 kW is now positioned - which one will be removed
- the wood chip storage tank and most of the installations are existing - only new connections and controls need to be added
- the current heat exchanger is also being removed
- additional savings 3,53 MWh/a (L7-100%) and 7,18 MWh/a (L4-80%)
- **energy security of the system**
- **more chips at any time in the system**
- **330 MWh of heat from RES & new connections:**
 - 12 apartments in a multi-apartment building and 3 houses
 - 300 meters of new heating pipe
 - CO2 emissions saving!!



Optimization scenario 2

Public call for co-financing the construction and restructuring of district heating and cooling systems based on RES for the period 2025 to 2029

<https://www.energetika-portal.si/javne-objave/arhiv-energetika/javni-razpisi/r/javni-razpis-za-sofinanciranje-prestrukturiranja-daljinskih-sistemov-na-ove-za-obdobje-2024-do-2026-noo-repwr-do-ove-2024-1-1422/>

Publication date: 18.07.2025 (call is still open – last project submission deadline: 11th of Sept. 2026)

European cohesion policy 2021-2027

Covered:

- Installation of heat generators using RES, waste heat or a combination of both (heat pumps, solar collectors, wood biomass boilers)
- Construction of combined heat and power (CHP) plants from RES
- Construction of new or expansion of existing district heating systems using RES/waste heat

Optimization scenario 2

- The funds for co-financing projects under this call = 51,238,602,35 €
- The eligible costs of the operation are co-financed by European cohesion policy funds up to a maximum of:
- 45% of eligible costs for large enterprises;
- 55% of eligible costs for medium-sized enterprises;
- 65% of eligible costs for small and micro enterprises.

Maximum allocated funds per projects: 30,000,000 €

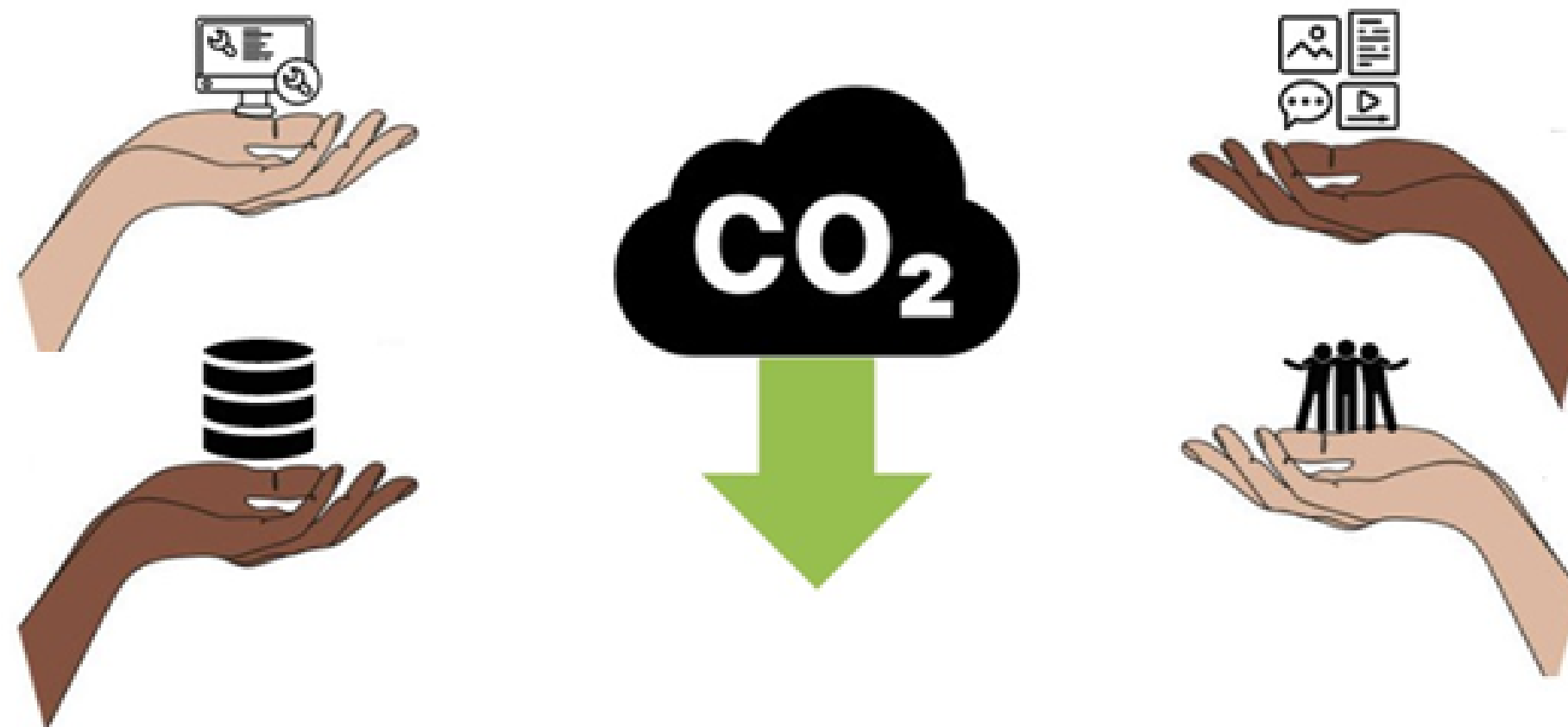
The deadlines: 11.9.2025, 8.1.2026 and 11.9.2026

Current assessment and concept: Investment cost – 200.000 €

Co-financing from the call = 130.000 €

Investor's own share = 70.000 €

Thank you for your attention!



Optimization of DHS Cankova

Contact for futher questions:

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