

IEA Heat Pumping Technologies Annex 47

Heat Pumps in District Heating and Cooling Systems

Task 2: Demonstration projects

Authors:

Roman Geyer (AIT Austrian Institute of Technology GmbH)
Diego Hangartner (Hochschule Luzern Technik & Architektur)
Markus Lindahl (RISE Research Institutes of Sweden)
Svend Vinther Pedersen (Danish Technological Institute)
Martin Betz (Glen Dimplex)

Project website:

<https://heatpumpingtechnologies.org/annex47/>

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Description of existing DHC systems and demonstration and R&D projects with Heat Pumps.

1: Introduction

Heat Pump projects in connection to District Heating can be complex and very different. There are a lot of different types and possibilities both in relation to heat sources but also in relation to temperature levels and in which part of the district heating grid they are implemented.

In Task 2 is different case studies described, where Heat Pumps is integrated in the district heating grid. The intention is that this collection of cases shall inspire to considerations regarding how heat pumps can be a part of the district heating production in a future district heating system, but also in which ways it can be implemented.

The project group has intended to describe the projects in a short and equally structured format, in which the different projects can give an inspiration and a short overview. If detailed and further information is needed you have to contact the project organization.

	HT	LT	VLT	ULT	TG
Typical Temperature Supply/Return	100 °C/50°C	80 °C/40°C	60 °C/30°C	45 °C/30°C	28 °C/8°C
Domestic Hotwater production type	Tank/ Instantaneous heat exchanger unit	Tank/ Instantaneous heat exchanger unit	Tank/ Instantaneous heat exchanger unit	Micro Booster Heat pump/electrical heater/Gas or oil	Micro Booster Heat/ Decentral Heat Pump
Heating system usable	Radiator/floor heating	Radiator/floor heating	Radiator/floor heating	Floor Heating/ Air coils	Floor Heating

Overview of the projects described

	Project description / Name	Country	Heat Source	Usage	Temperature level	Heat pump output [MW]
1	Flue gas Condensation with Electrically- powered Heat Pumps in bjerringbro	Dk	Flue-gas	HT Heating Suburban	85/35	0,8 and 0,5
2	Wastewater as Heat Source in Kalundborg	Dk	Waste water	HT Heating Urban	86/35	10
3	District Heating and Cooling in Høje Taastrup	Dk	Cooling Network	LT Heating/Cooling Suburban	73/30	2,3
4	Heat Pump using Ambient air	Dk	Ambient air	LT Heating Suburban	64/34	0,81
5	Ground Water based Heat Pumps and solar heating in Gl. Rye	Dk	Groundwater/Solar	LT Heating Suburban	75/35	2,0
6	Super Supermarkets	Dk	Supermarket/Cooling	LT Heating Suburban/local		
7	Geothermal District Heating in Thisted	Dk	Geothermal	LT Heating Suburban		10,5
8	Excess Heat and Cooling at Bjerringbro and Grundfos	Dk	Excess Heat	HT Heating Suburban		4,6
9	Gas Engine Driven Heat Pumps in Tønder	Dk	Excess Heat/Ambient air	LT Heating Suburban	70/40	2,3-4,9
10	District Heating Network Riehen (Basel)	Ch	Geothermal	HT Heating Urban	90-70/55-47	3,5
11	Residential Neighborhood Oberfeld, Ostermundigen (Bern)	Ch	Solar/Boreholes	VLT		0,2
12	Anergy network at Campus ETH Hönggerberg (Zurich)	Ch	Energy network Anergy	TG Heating/Cooling Local	(24 to 8)	5.5MW

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13	Anergy Network Friesenberg of the family corporation zurich	Ch	Energy network Anergy	TG Heating/Cooling Local	(28-8)	3,9
14	Borhood "Hintere Aumatt", Hinterkappeln(Bern)-	Ch	River	VLT Heating Suburban/local	50/	0,55
15	District Heating System Region Bern AG	Ch	Ground Water	TG Heating local		1,5
16	Potential of CO2-based District Heating and cooling Networks	Ch	Energy network CO ₂	TG Heating/Cooling Suburban	/15	20
17	Thermal network of the Jardins de la Pâla, Bulle	Ch	Ground Water Thermal network Anergy	TG Heating/Cooling local	/(8-12)	2,0
18	District Heating Network "Dreispietzareal" In Köniz (Bern)	Ch	Groundwater	LT Heating Local		1,1
19	District Heating La Tour-de-Peilz	Ch	Lake Energy Network	LT/VLT Heating Local	/(6-3)	10
20	District Heating Network Tamsweg	A	Flue gas condensation	HT Heating/Urban	100/(50-40) 21HP 58/(45-40)	0,9
21	District Heating network Krumpendorf	A	Flue gas condensation/ solar thermal	HT Heating/Suburban	90/48 HP(65/23)	0,245
22	Compression Heat Pump at the Ökoenergiepark Bergheim	A	Flue gas condensation/ solar thermal	HT Heating/Suburban	85/30 HP(60-50/50-30)	1,0
23	Absorption Heat Pump in Hallein	A	Flue gas/Absorption HP	HT Heating/Urban	90/60 HP(90/(60-40)	7,0
24	Compression Heat Pump in Lehen	A	Solar	LT Heating/Suburban	65/40	0,16
25	District Heating Network Flachau	A	Flue gas	HT Heating/Suburban (microgrid)	(99-80)/(51-46) HP (64/49)	1,2
26	District-Boost Vienna	A	Return Flow	HT Heating/Suburban	(145-80)/60	0,25

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27	BigSolar Graz	A	Solar/Gas absorption HP	HT Heating/Urban	(120-75)/(60-55)	16
28	Flue Gas condensation at the biomass cogeneration plant Klagenfurt-east	A	Flue gas/Absorption HP	HT Heating/Urban	(120-85)/(80-60)	20
29	Innovative Waste Heat Utilization Vienna	A	Waste Heat from chillers	HT Heating/Urban	(90)/(65-58) Cooling(7)	0,4
30	Waste Heat Recovery at the steel and rolling mill Marienhütte GmbH, Graz	A	Waste Heat	HT Heating/Urban	(90-63)-(69-43)/(33,8-28)	5,75
31	Profitable heat recovery with open district heating	S	Excess Heat data	LT Heating/cooling Urban	68/	0,975
32	Värtaverket supplies renewable energy to most of Stockholm using heat pumps	S	Seawater, fluegas	HT Heating/cooling Urban	86/	300
33	Operational experience from a super insulated multi-family house, kv-Seglet, Karlstad	S	District Heating Returnflow	VLT Heating/Building	/(40-20)	
34	Heat Pumps in combination with district heating increases energy efficiency at Hammarbyverket	S	Wastewater	LT Heating/Cooling	(80/70)/(22-7)	225
35	Exhaust air heat pumps in district heated buildings	S	Exhaustair	VLT Heating/Building	55/35	
36	Skanska TES – Thermal Energy Storage	S	Storage	HT Heating/Cooling Urban	(99-95)/(45)	33
37	Heat Pumps in combination with district heating at Volvo cars	S	Excess heat from cooling and proces	LT Heating Local	(65-45)/25	2,5

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38	Ectogrid increases energy efficiency reusing excess heat in combination with heat pumps	S	Energy network Ectogrid	TG	40/5	
39	Kingston Heights London	UK	River Water Booster HP	TG	4-25	2.3
40	Bunhill Heat and Power – Islington London	UK	Waste Heat from the Underground Metro	LT	80/28-18	1
41	Enfield - London	UK	Aquifer Thermal Storage (ATES) Booster	TG		2.5
42	Broke Street – south derbyshire	UK	Boreholes	VLT MicroGrid	60-55/10-6	0,12
43	Borders College - scotland	UK	Sewage	VLT Microgrid	60-50/16-7	0,8
44	Wandsworth riverside Quarter	UK	Aquifer Thermal Storage (ATES) Booster	ULT	45-35/17	1,2