

# On the way to climate neutral district heating in Vienna

## XXII. District heating conference, Budapest



# Our Portfolio



We supply electricity, gas, heating and cooling to **2 million people**



We are investing in **hydro-** and **windpower** plants



We transform 1 million tons of waste into **green heating & electricity**



We are Austria's **largest solar power producer**



We are promoting the expansion of **e-mobility**



We will achieve **net zero emissions in 2040**



We operate a large **district cooling network**

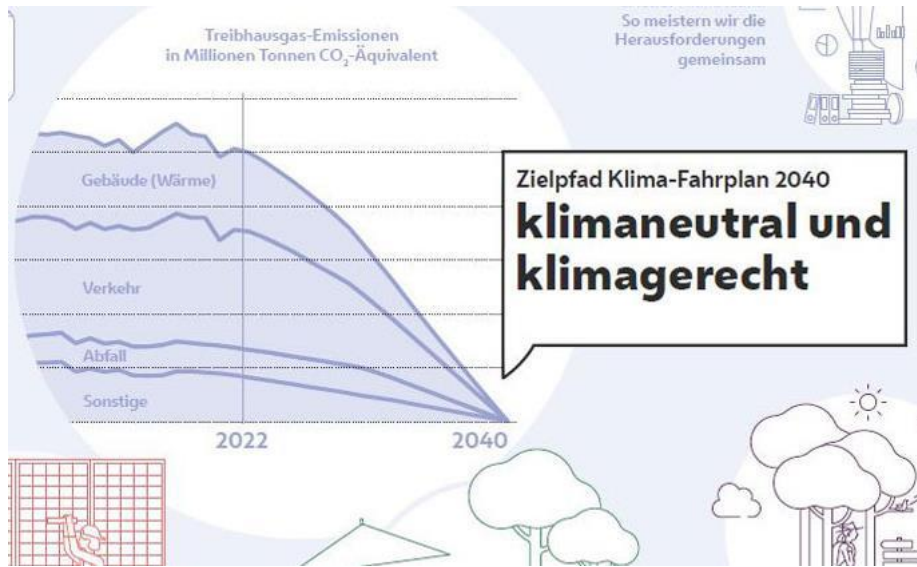


We actively **promote energy efficiency** and offer energy-related services

# Decarbonizing Vienna's building sector

# Wien Energie part of decarbonising heat market in Vienna

## Vienna published path to climate neutrality 2040



© Wiener Klimafahrplan

Vienna ist growing – energy demand needs to be lowered by 30% per capita

More than 600.000 households use fossil fuels

thereof 440.000 with individual boilers

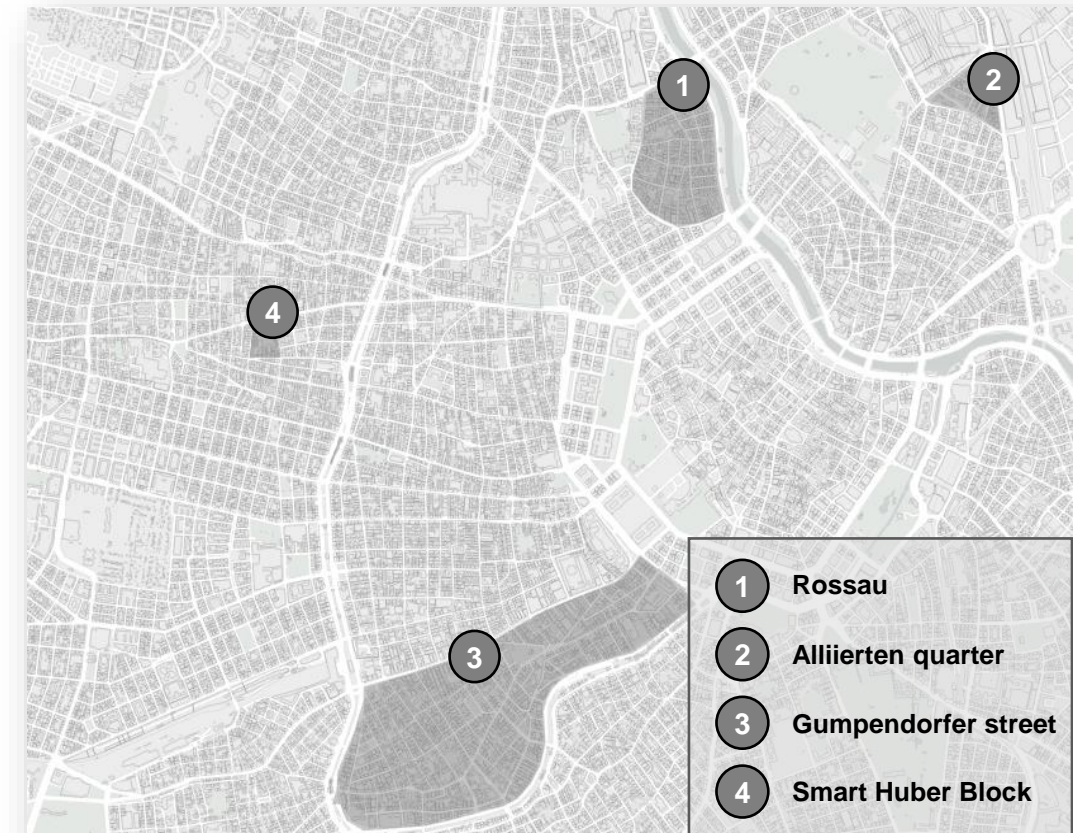
### Plan till 2040 to decarbonise building stock in Vienna

- **Renovate** at least partly more than 700.000 households
- **Connect** to district heating in dense areas and along existing infrastructure
- **Build up** small scale low temperature district heating with surplus heat
- **Change** “remaining” households to heat pumps

# Area based growth of district heating

via the implementation of pilot areas

- **Development** of the district heating **infrastructure** for the supply of the selected areas
- Focus on technical and economical aspects to benefit from a **scale effect** for follow-up areas
- **Process optimization** for an efficient network development
- **Strategic expansion** of the district heating network, despite lack of customer commitments for conversions
- Execution of **preparatory work** crucial to achieve climate targets



# Small scale low temperature district heating

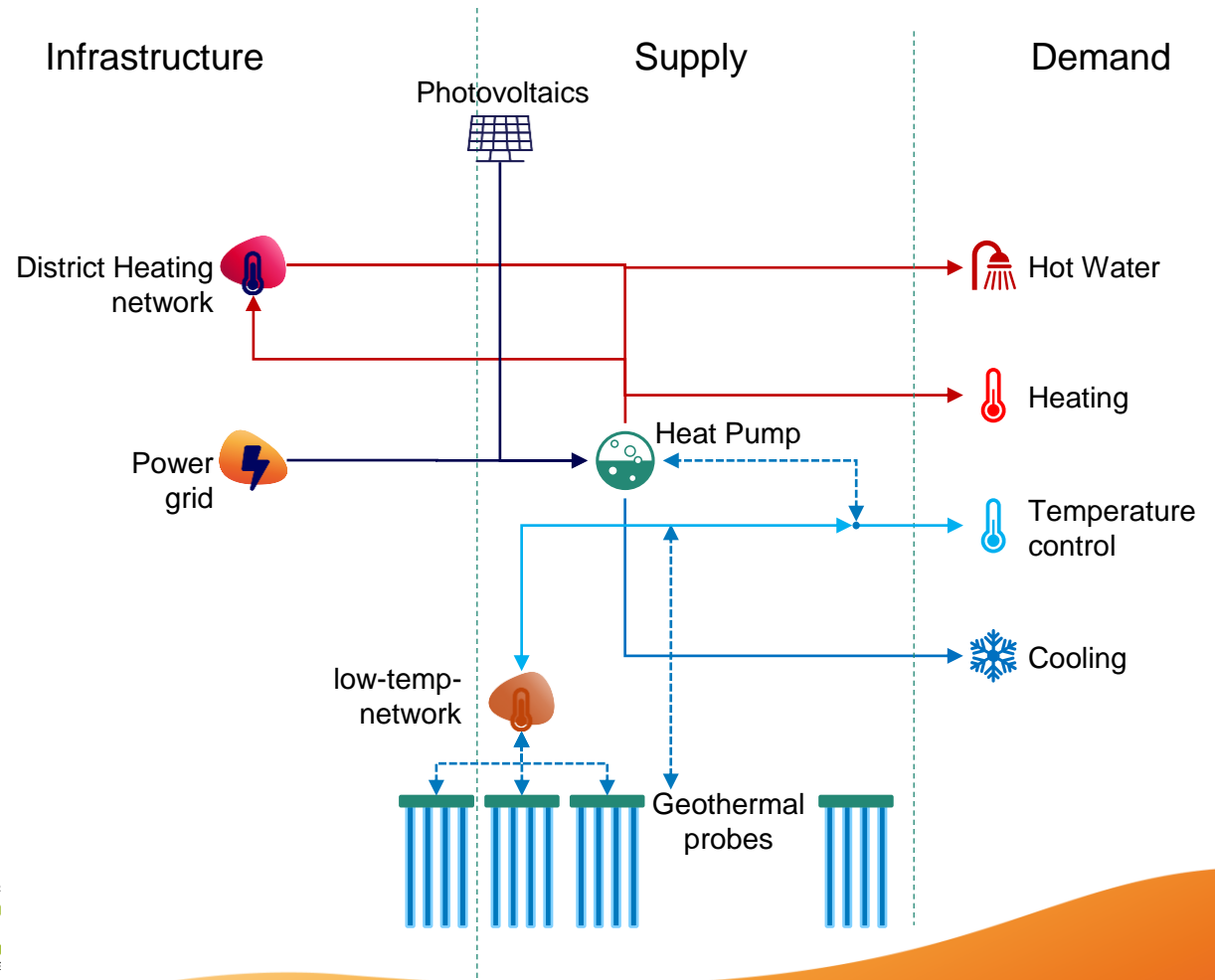
„Village im Dritten“ – Integrated combined energy supply system for a city quarter with 2000 apartments, school- and commercial buildings – 5th generation district heating and cooling network



Low(est) temperature network connects geothermal probes and enables load management.

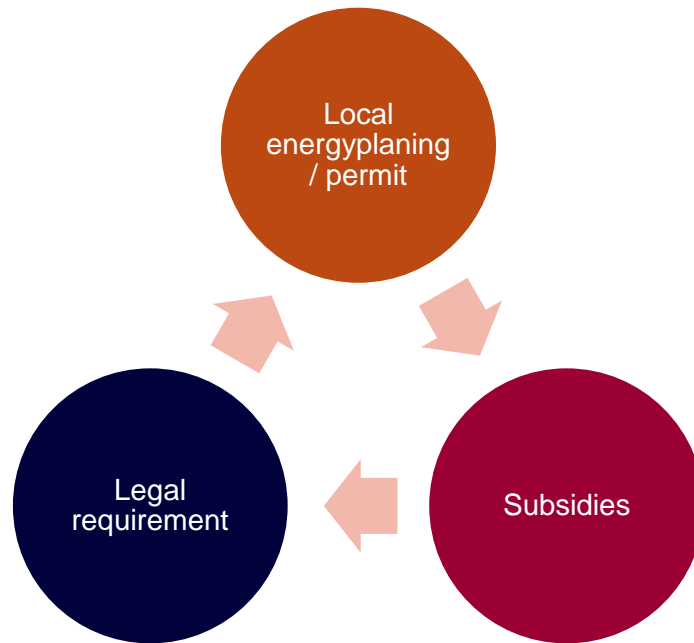
Earth probes enable temperature control (free cooling)

Regeneration made by heat pump / waste heat from cooling / tempering



# Climate neutral heating system in Vienna

## 3 pillars - needed framework



- Legal requirements for changing fossil heat sources in buildings
- Optimised local strategic planning of demand and available sources
- Used for permission of building up infrastructure
- Investment security is fundamentally needed for infrastructure investments
- Subsidies for changing heat supply, thermal renovation of buildings, district heating networks and heat supply

## Funding changing heat supply

Subsidies for **replacement** of fossil with climate friendly heating system

- one- or two-family houses
- multi-storey buildings

Changing to

- heat pumps
- Biomass
- efficient district heating

### Funding rate

One family house for example € 7.500 by national subsidy, and 30% of investment by state

Multi storey buildings combined up to 60% of investment costs combined with national and state subsidies

## Funding program for climate-friendly district heating

Funding for **expansions of climate-friendly district heating systems** to supply at least **one end user** that is not affiliated with the district heating company. This includes the construction of:

### District heating systems, in particular:

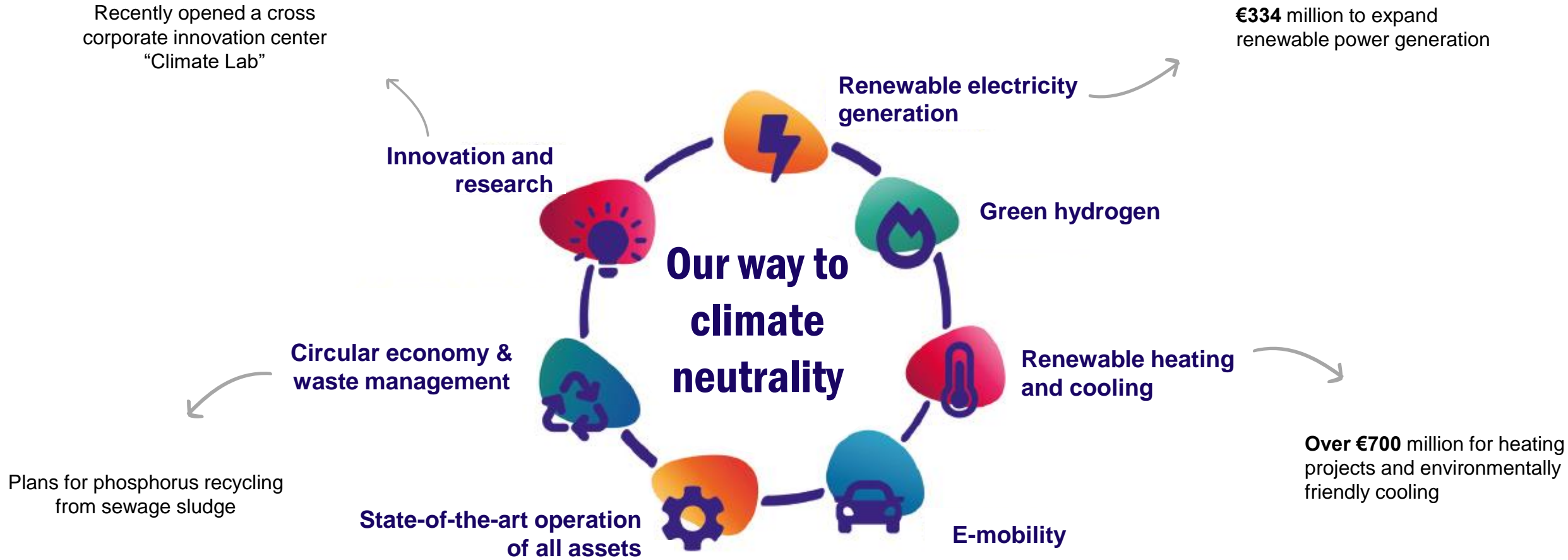
- Heat distribution networks
- Transport pipelines
- Ring connections of networks
- Consumer connections

Actual funding rate max. 25% of the investment



# Climate neutral district heating by 2040

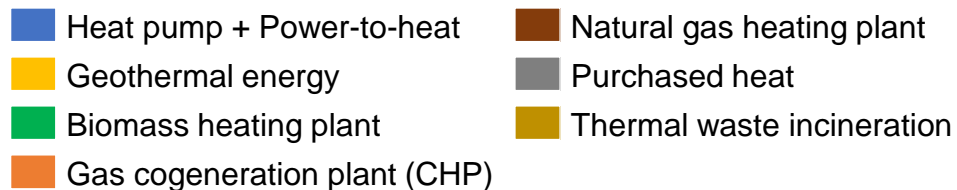
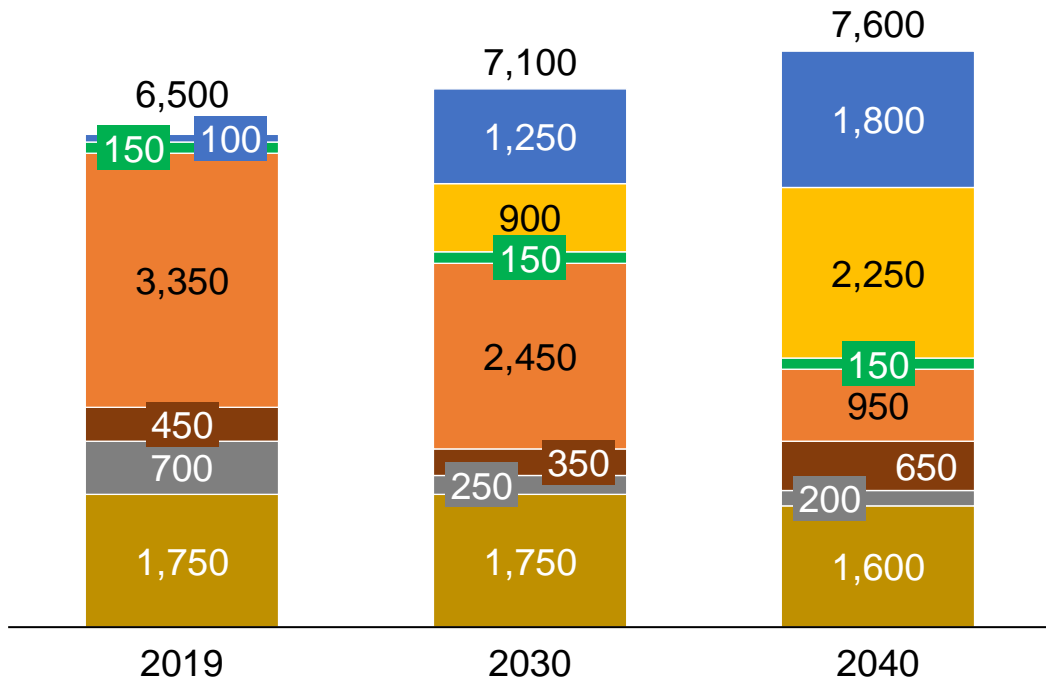
# We have identified seven central levers to decarbonize Wien Energie



# Path to decarbonize district heating

## Climate neutral generation of district heating

(Values rounded to 50 GWh, sums above the rounded values do not always correspond to the rounded sum values)



## 6 key factors

1. Expansion of geothermal energy
2. Expansion of large-scale heat pumps
3. Implementation of carbon capture technologies
4. Use of green gases in power plants
5. Utilization of seasonal energy storage
6. Temperature reduction in district heating network

# Geothermal energy

## Road to our first geothermal project

First study on potential

Start research

2D seismic

3D seismic

Geological 3D model

Production test

2015

2016

2017

2018/19

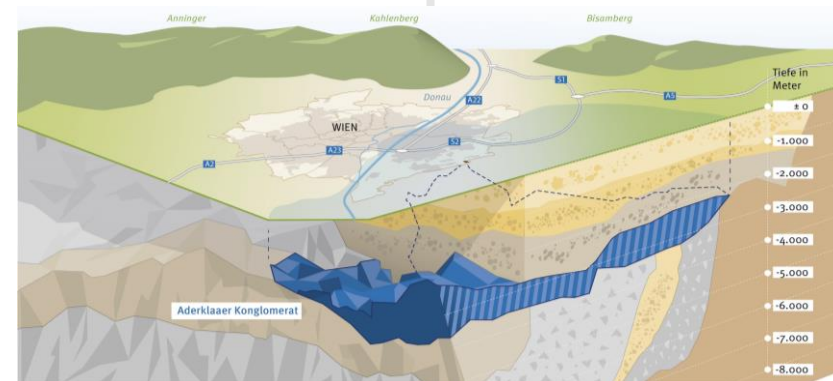
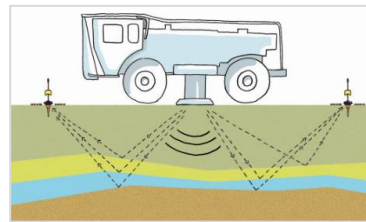
2020

2021



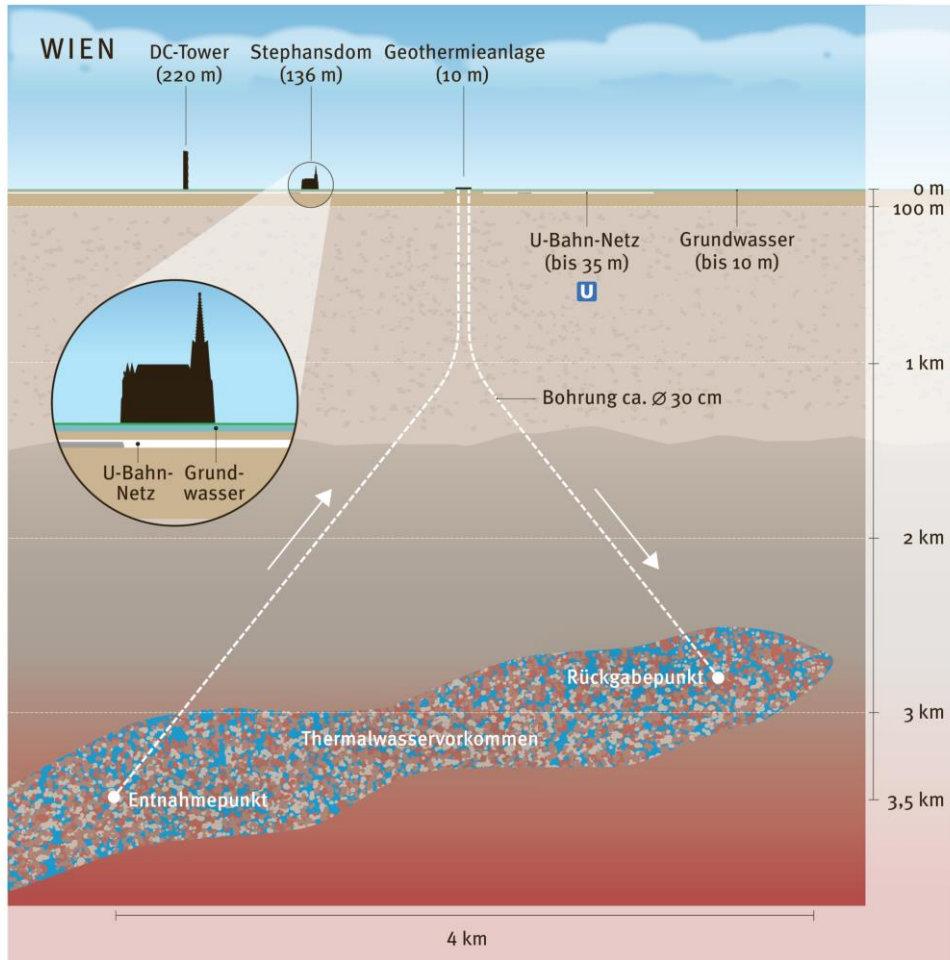
**GeoTief Wien**

powered by 



# Geothermal energy

## First geothermal plant in Seestadt Aspern



### Project parameter

- Capacity: up to 20 MW thermal
- Temperature: approx. 100°C
- CO2-saving: up to 54.000 t/a
- Heat supply for 20.000 households
- confirmed by production test

### Project plan

- 1) Obtaining authority approvals & permissions
- 2) Construction of drilling site
- 3) Construction of geothermal energy power plant
- 4) Commissioning of first geothermal energy power plant by 2026
- 5) First of many more to come

# Utilisation of waste heat

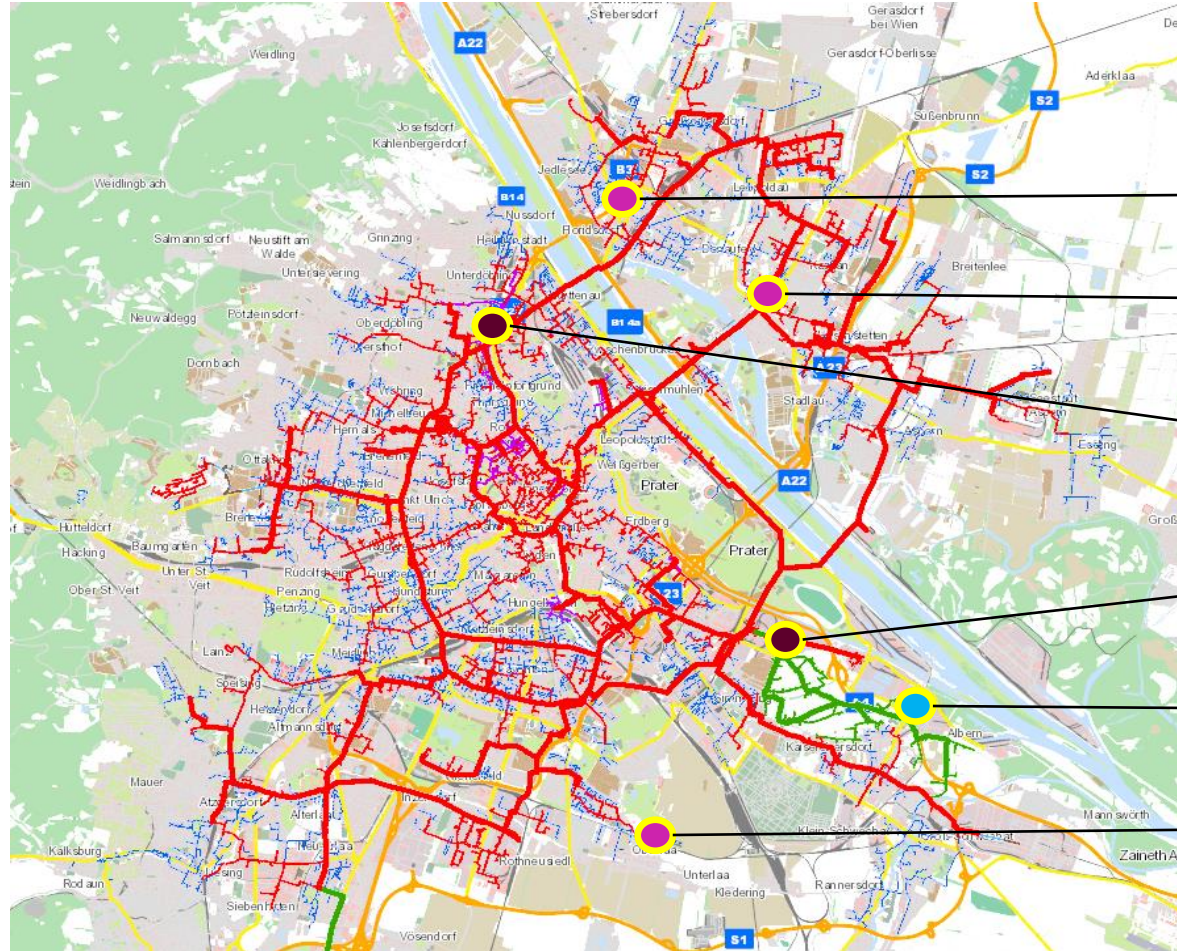
## District heating grid & localisation of waste heat utilisation plants

### Primary DH System

- Transport Grid
- Large Generators
- Large industrial Clients
- High temperature (140 °C)

### Secondary DH System

- Local distribution
- Small heat generators
- Residential and business
- Low temperature (< 90 °C)



### Waste heat source for large scale heat pumps

data center InterXion (3 MW, 2023)

recooling of cooling center  
UNO City (4 MW, 2021)

Flue gas heat waste incineration  
Spittelau (16 MW, 2025)

Cooling water of power plant  
Simmering (up to 39 MW, 2019)

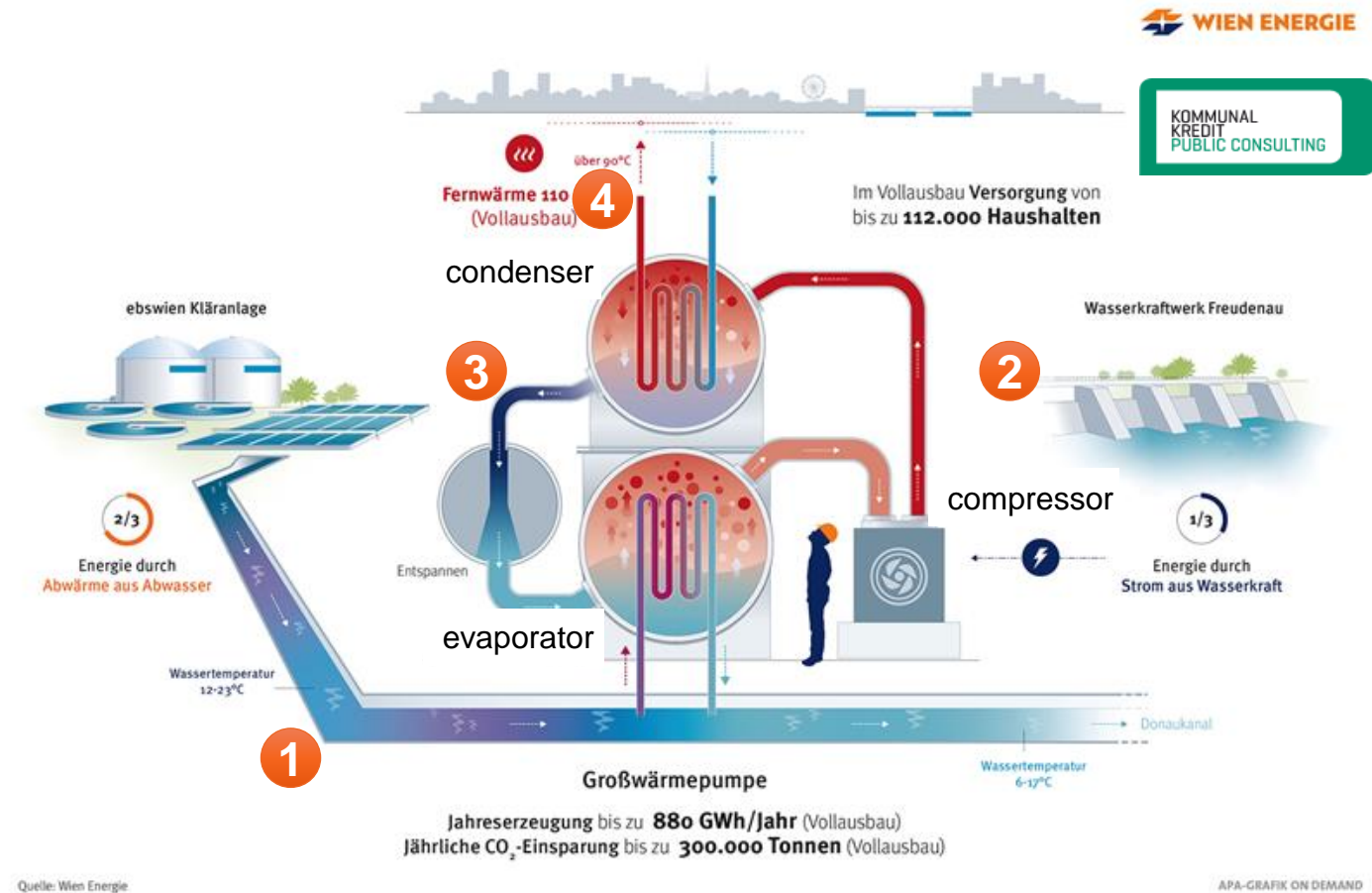
Wastewater treatment ebs  
(110 MW, starting 2024)

Recirculated water of thermal bath  
Therme Wien (2 MW, 2021)

# Waste heat from wastewater

Using waste heat from cleaned sewage water as a heat source

- waste heat from cleaned wastewater
- ebswien is running central wastewater treatment plant in vienna – capacity for 4 mio inhabitants
- Wien Energie is leasing property from ebs including usage rights for wastewater
- Thermal Output 110 MW<sub>th</sub> built in 2 stages
- Provides sustainable heat for up to 120.000 Households
- Increases the renewable share in Vienna DH-System by up to 13,8%-pts.



# Waste Heat from wastewater

Located besides wastewater treatment plant

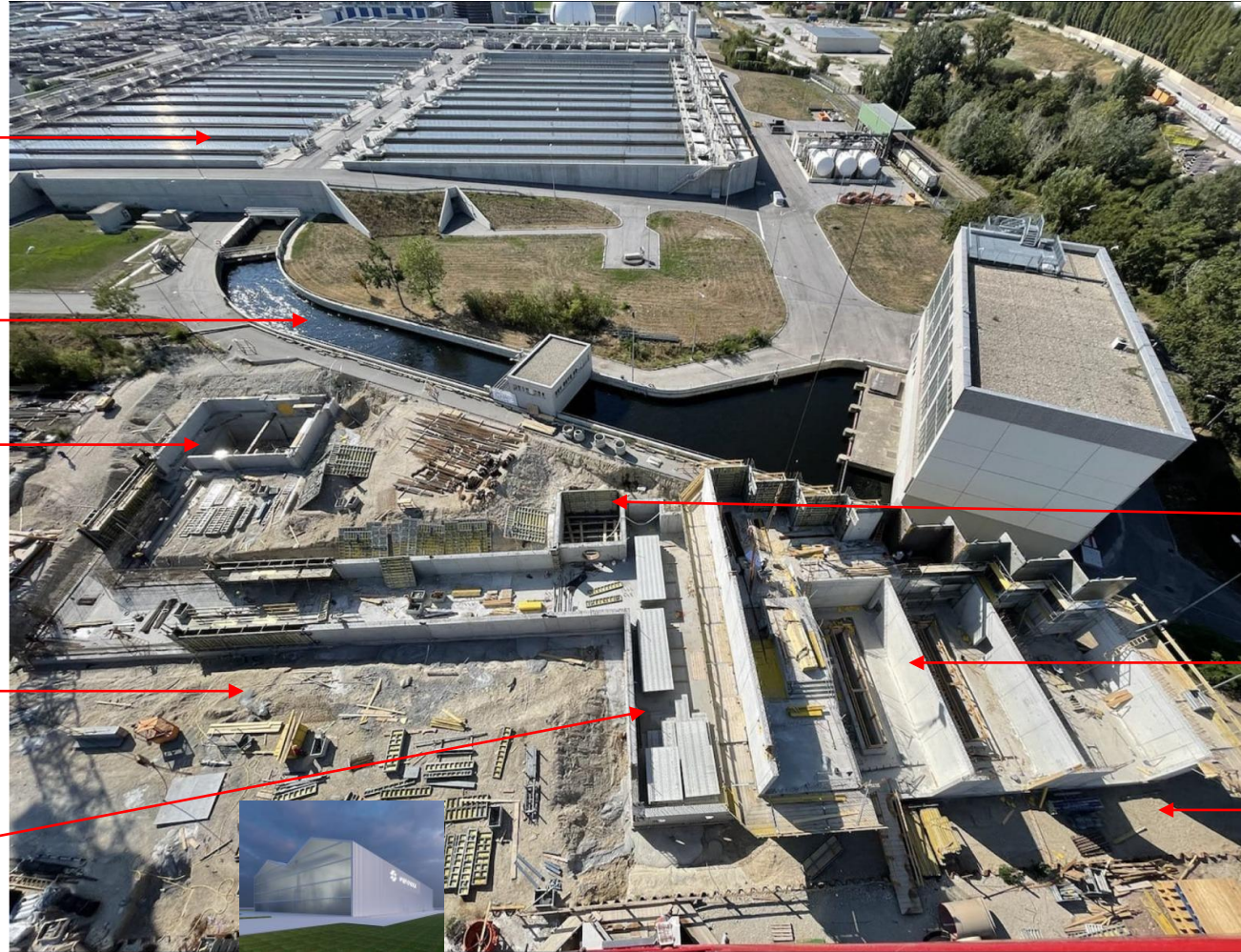
Wastewater treatment plant **ebswien**

Heat source – water channel to danube

Water distribution to heat pump

Heat pump hall

District heating pumping station



recirculating Water to water channel

Electrical system building

110 kV electricity supply from waterpower



# Utilisation of waste heat

First installation until end of 2023

## Key facts

3 heat pumps from Johnson Controls

~ 18 MW heat output per heat pump

~ 18 t of low GWP refrigerant R1234zE per heat pump

Turbo compressor with 7,1 MW electrical power

Direct supply of electrical power from waterpower plant

Water temperature cleaned water 12 – 23°

Outlet temperature < 93°C

COP ~ 3,0



# Change of heat sources ....

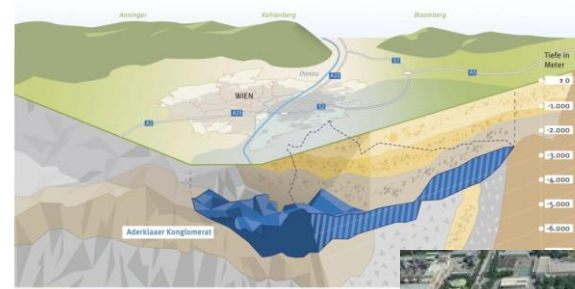
## Production recent

- Large central plants
- Load control driven
- High temperatures available
- Waste treatment plants
- CHP plants (natural gas, biomass)
- Heat only boilers (natural gas, electrical)

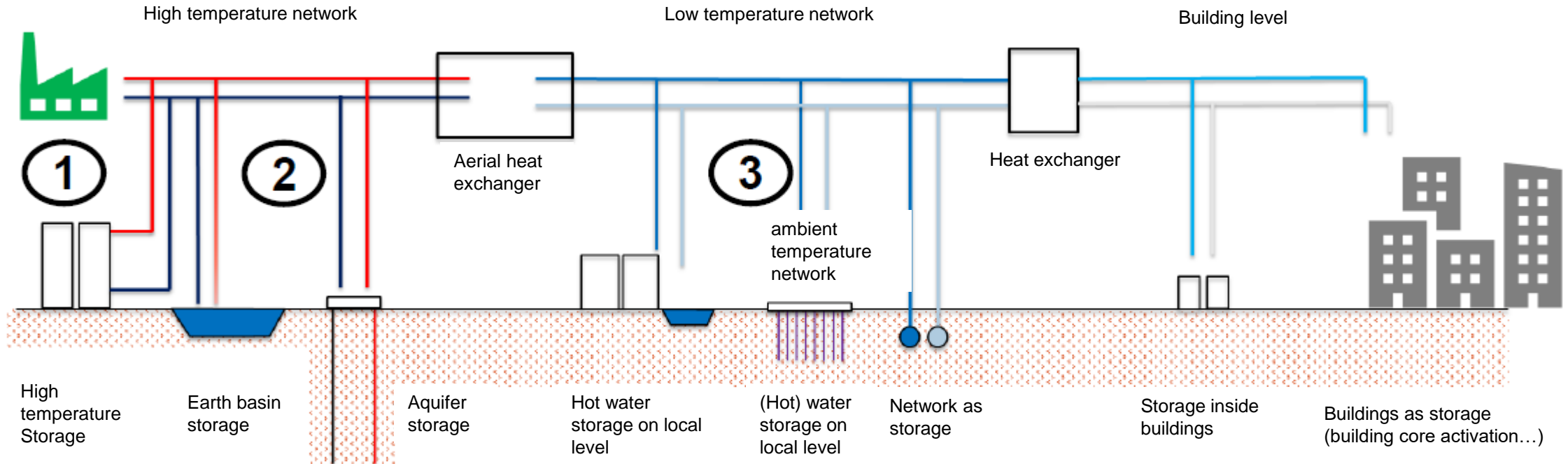


## Production 2030-2040

- more decentralised plants
- Driven by heat source
- Temperatures limited
- **Geothermal plants**
- **Heat pumps**
- Waste treatment, greengas CHP



## ... needs heat storage



- Different technologies for different purposes in long- and short-term use
- In combination with heat pumps and electrical boilers suitable for the use of stabilizing electricity sector

# Seasonal storage

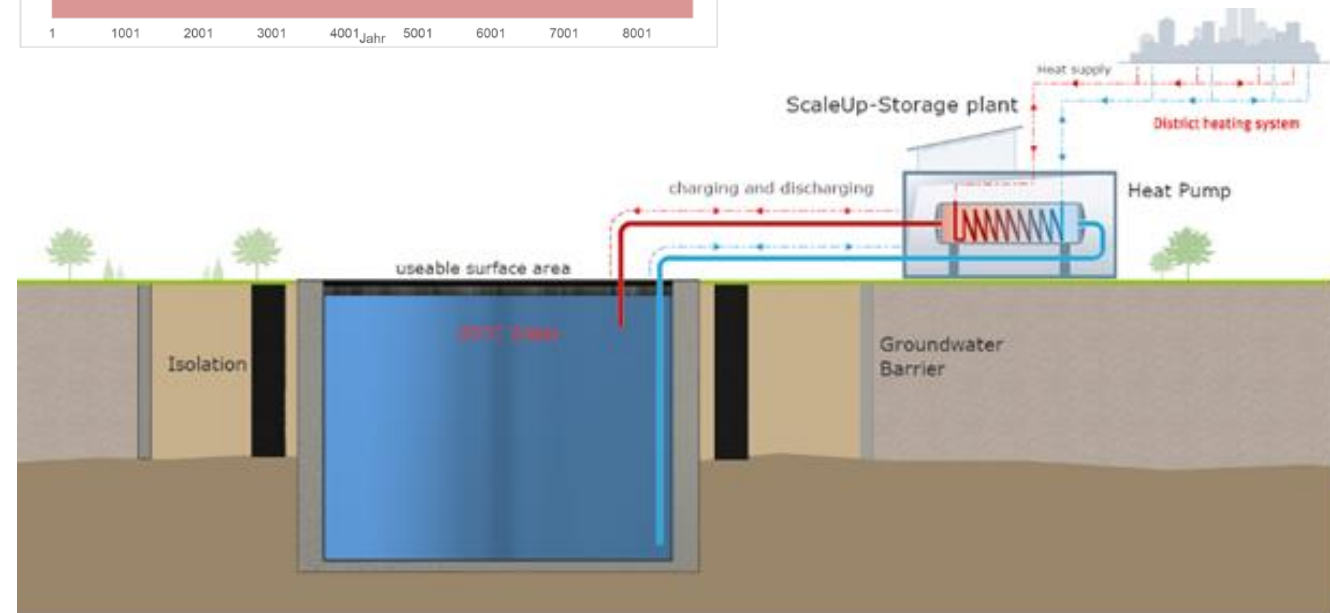
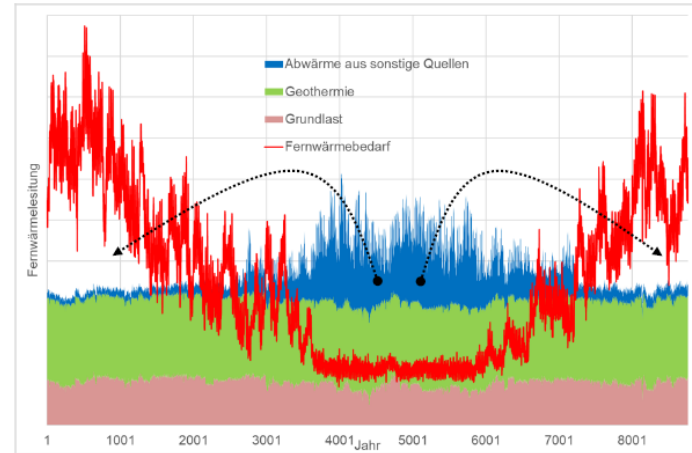
## Scale up – co financed testing facility



Seasonal storage increases use of waste heat, and geothermal heat



Key for flexibilisation use in electricity sector



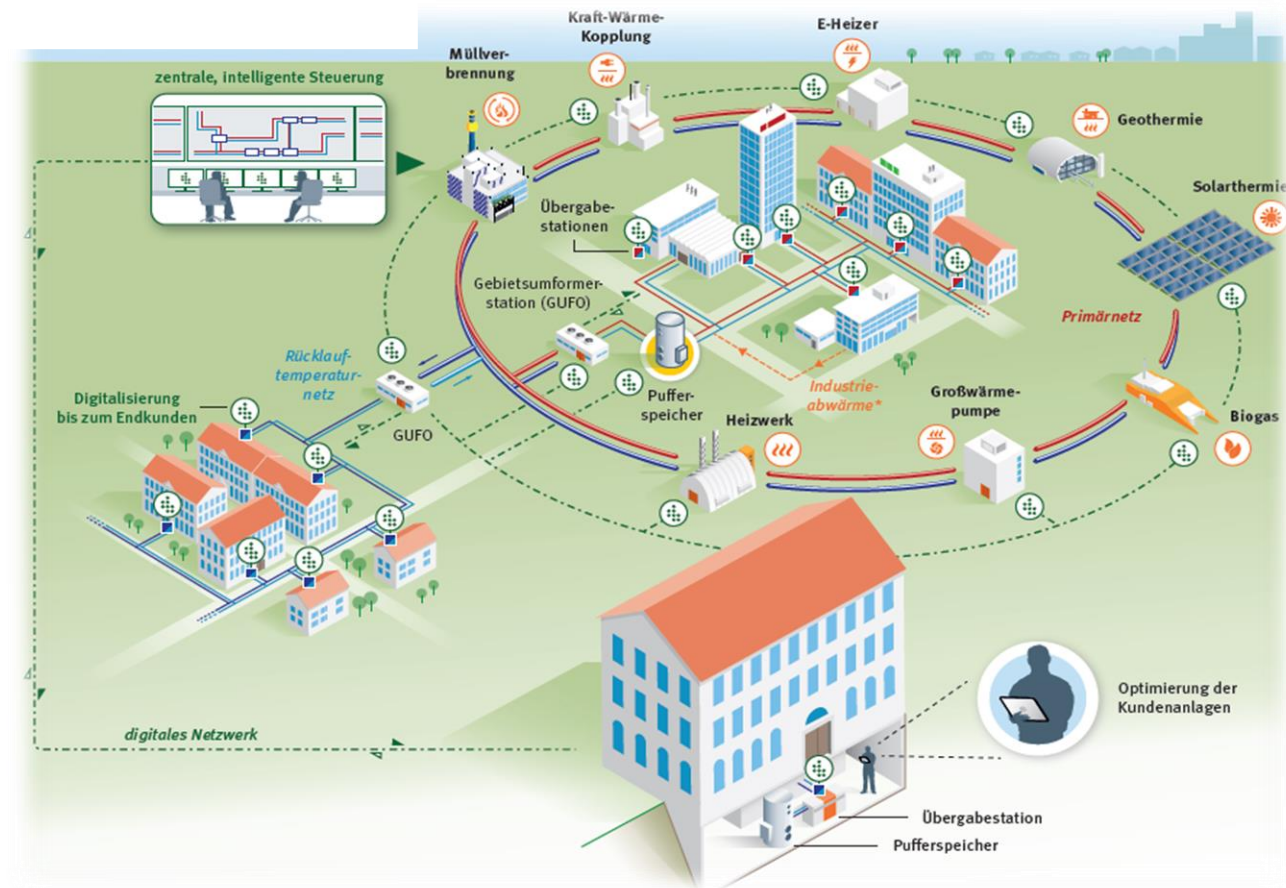
### Key facts

Volume	40.000 m3
Energy content	2.000 MWh
Loading capacity	12 MWth
using heat pumps to enhance capacity	
Starting operation 2027	

# District heating system in Vienna

Energy efficiency, diversification and digitalization are principles getting DH-systems decarbonised

- Using waste heat or environmental heat with heat pumps provides a huge potential for renewable heat
- Renewable fuels and storages are necessary to run safe
- Digitalisation and lowering temperatures in the network is key to implement new heat sources
- Using possibilities for flexibilization of electricity market with heat pumps, electrical boilers, chp and storage systems will be crucial for realising the projects
- Investment security is fundamentally needed for infrastructure investments





**WIEN ENERGIE**

**DIE ENERGIE VON WIEN**

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