UTES Symposium Zurich,
6 October 2025

WIEN ENERGIE
WIENER STADTWERKE GRUPPE

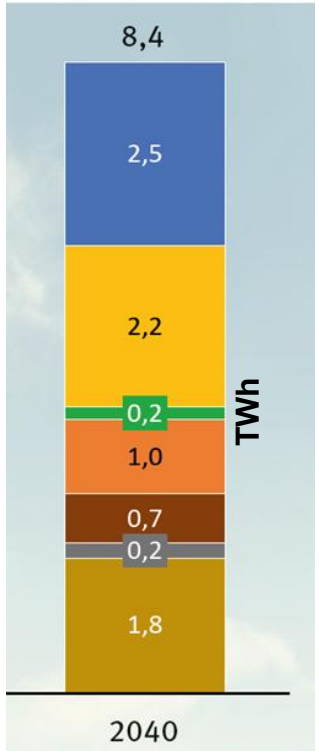
Role and pathway for integrating thermal energy storage (TES) into decarbonized Vienna district heating system

Integrating thermal energy storage (TES) into decarbonized DHC

Decarbonisation of district heating until 2040 is defined in long term Wien Energie strategy

- Heat Pumps
- Geothermal
- Biomass
- CHP
- Power-to-Heat
- Industrial waste heat
- Waste incineration

Numerical values are rounded to whole 50 GWh; sums of rounded values do not always correspond to the rounded total sum values.



Green district heating

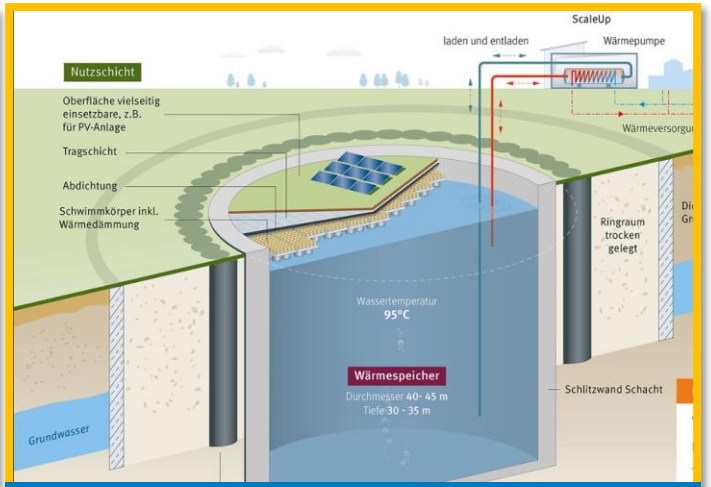
- **Deep geothermal energy** and **large-scale heat pumps** will produce 55% of district heating in 2040.
- The first **large-scale heat pump** was commissioned in 2019
- Commissioning of the first **deep geothermal plant** is planned for 2028
- **Diversification** of renewable heat sources is crucial
- **Thermal storage** is necessary to enable **flexibility** and balance seasonal fluctuations in heat demand

Integrating thermal energy storage (TES) into decarbonized DHC

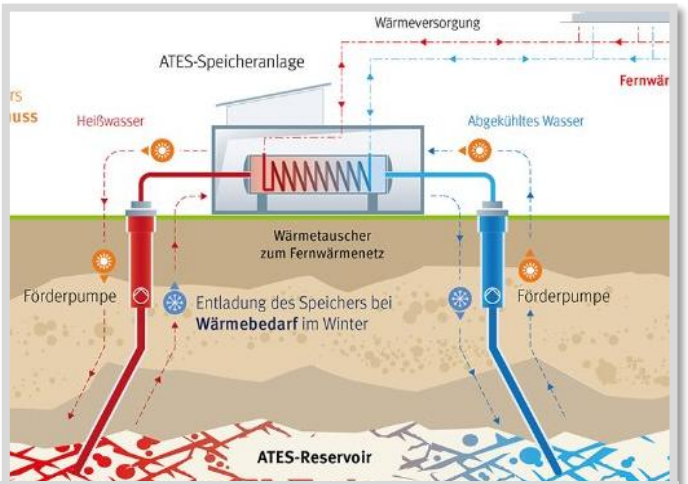
Thermal storage contributes to decarbonization and flexibility

Flexibility ⟵ ⟶ Seasonality

Short-term thermal storage



Pit thermal energy storage



Aquifer storage

Integration

- **Storage volume**: up to 55.000 m³
- **Storage temperature**: up to 150°C

Pilot

- **Storage volume**: up to 500.000 m³
- **Storage temperature**: up to 95°C

Research

- **Storage volume:** not distinguishable
- **Storage temperature:** up to 95°C

Integrating thermal energy storage (TES) into decarbonized DHC

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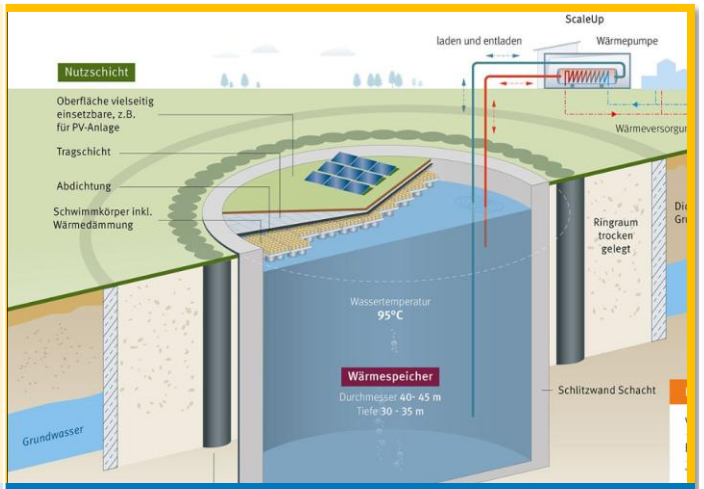

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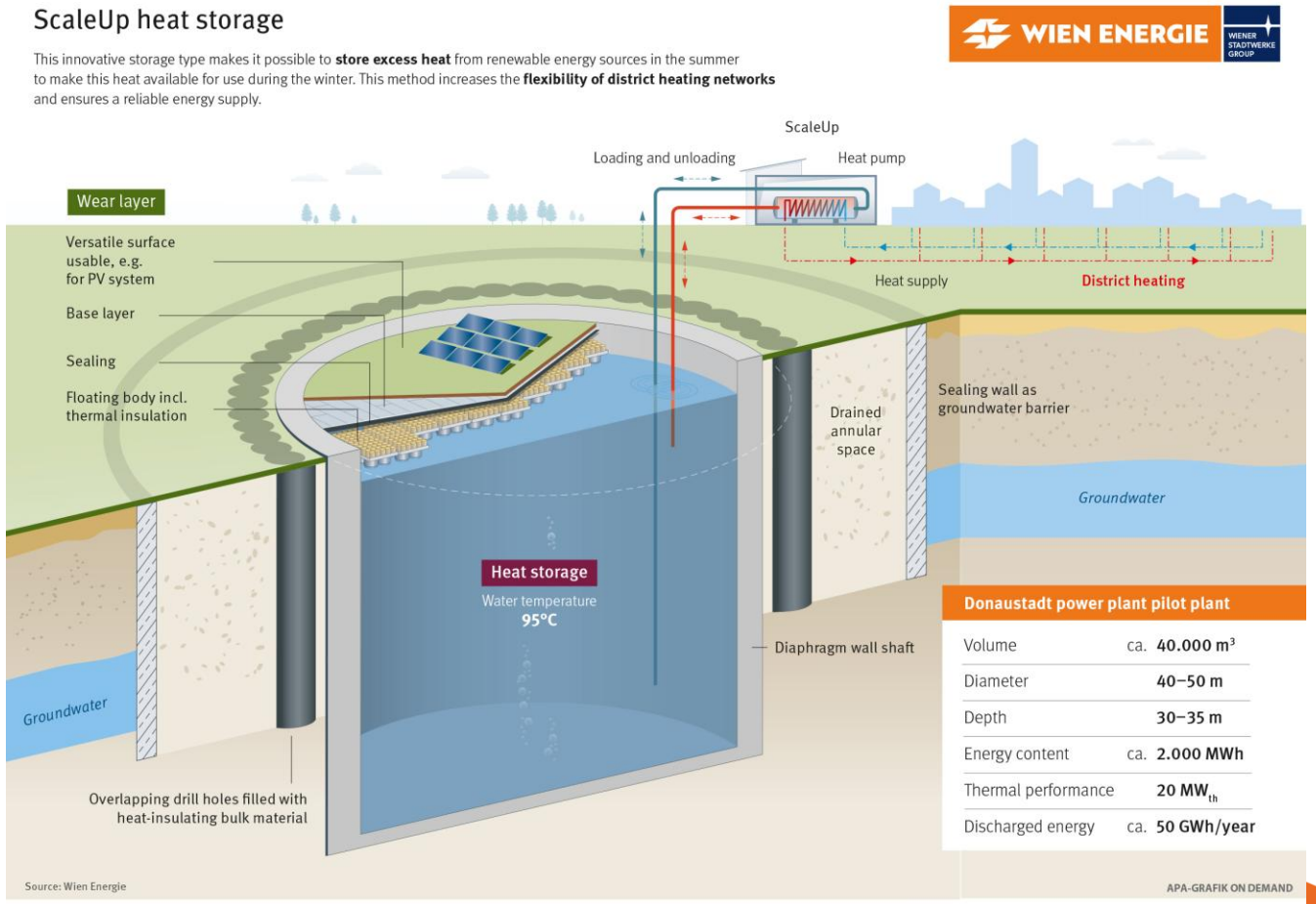
Integrating thermal energy storage (TES) into decarbonized DHC

"Scale-Up" Underground thermal storage focuses on analyzing the applicability of the technology for DH-Systems!

Project objectives

- **Development and Implementation**
  - Use of materials with high thermal insulation and durability!
  - Usable surface or floating cover for, e.g., energy utilization
  - Technical feasibility of specifications from the development phase
- **Operations management**
  - Efficiency of operational management methods
  - Limits of flexible utilization
  - Behaviour of the materials used



European Investment Bank
Co-funded by the European Union
Emissions Trading System
Innovation Fund
klima+ energie fonds

Integration | **Pilot** | Research

Integrating thermal energy storage (TES) into decarbonized DHC

Scale-up: 8 years from fist idea to commissioning of pilot project

2021

Preliminary study
Application of the results from the gigaTES research project to a specific WE site

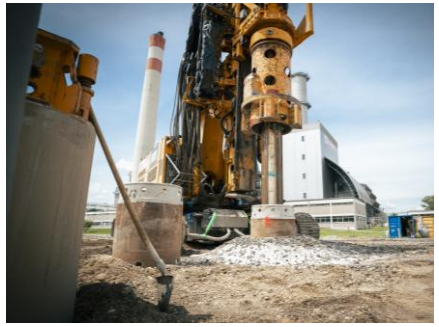
2023

Start Scale-Up

Approval EU-ELENA Funding
Planning activities funded up to 1.45 million EUR

Europäische Investitionsbank

2024



complex research project with testing/material selection

Approval EU-IF
Investment and operational funding up to 17.3 million EUR

2025

National investment funding
Large-scale storage program

2026

Planned WE AR approval & start of construction

2029

Planned commissioning

Integration | **Pilot** | Research

Integrating thermal energy storage (TES) into decarbonized DHC

Location of the storage facility at the Donaustadt power plant

Site selection

- Wien Energie site
- Use of existing infrastructure
- Hot spot district heating expansion (geothermal energy & heat pumps) → synergies
- Current existing technologies: CHPs, Gas-Boilers
- Up-Coming and additional technologies: Scale-Up, deep geothermal energy, large heat pumps in combination with geothermal energy or other sources

Integrating thermal energy storage (TES) into decarbonized DHC

Scale-Up: Research and planning activities were the focus in 2024.

Ground assessment

1

- Core drillings up to a depth of 50 meters, dynamic probing, geotechnical laboratory tests
- Basis for geotechnical and geohydraulic simulations

Special wall construction with insulation

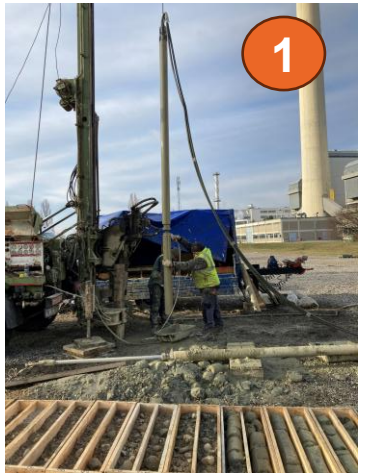
2

- Testing of the wall structure and the insulation material mixtures used
- Basis for the detailed planning of the wall construction

Model of a floating cover

3

- Testing of the diverse requirements for the cover structure
- A usable, walkable surface is a key foundation for large-scale implementation in urban areas



Integration | Pilot | Research

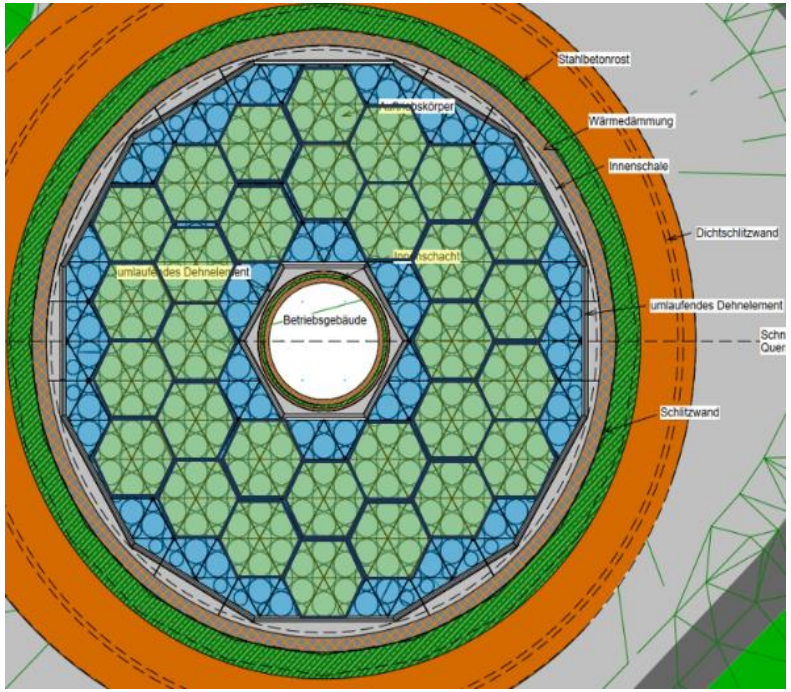
10.10.2025

Integrating thermal energy storage (TES) into decarbonized DHC

Scale-Up: Research and planning activities regarding to the walkable surface

Floating lid model

- 2 mock-ups were carried out Q4 2023 – Q2 2025 by university JKU Linz
- Testing of the diverse requirements for 2000m² of usable, walkable surface area
- Usable, walkable surface is an important basis for large-scale implementation in urban areas
- Utilization of the claimed area, integration of the storage facility into the cityscape



Ingenieurbüro ste.p ZT-Gmbh

Hexagonal, like a honeycomb pattern

Integration | **Pilot** | Research

10.10.2025

Integrating thermal energy storage (TES) into decarbonized DHC

Detailed planning and tender implementation are in progress, targeting completion in 2025 and 2026

- Civil engineering for the storage facility, including storage monitoring
- Storage cover and liner (steel construction)
- Plant engineering for the storage facility
- Heat pump
- Electrical engineering
- District heating connection

General project structure

- Overall transport logistic for the site because of starting other alternative projects
- District heating and electrical slots are embedded in a site-wide concept
- Project includes various lots (without general contactor)
- Interface management until commissioning lies with Wien Energie

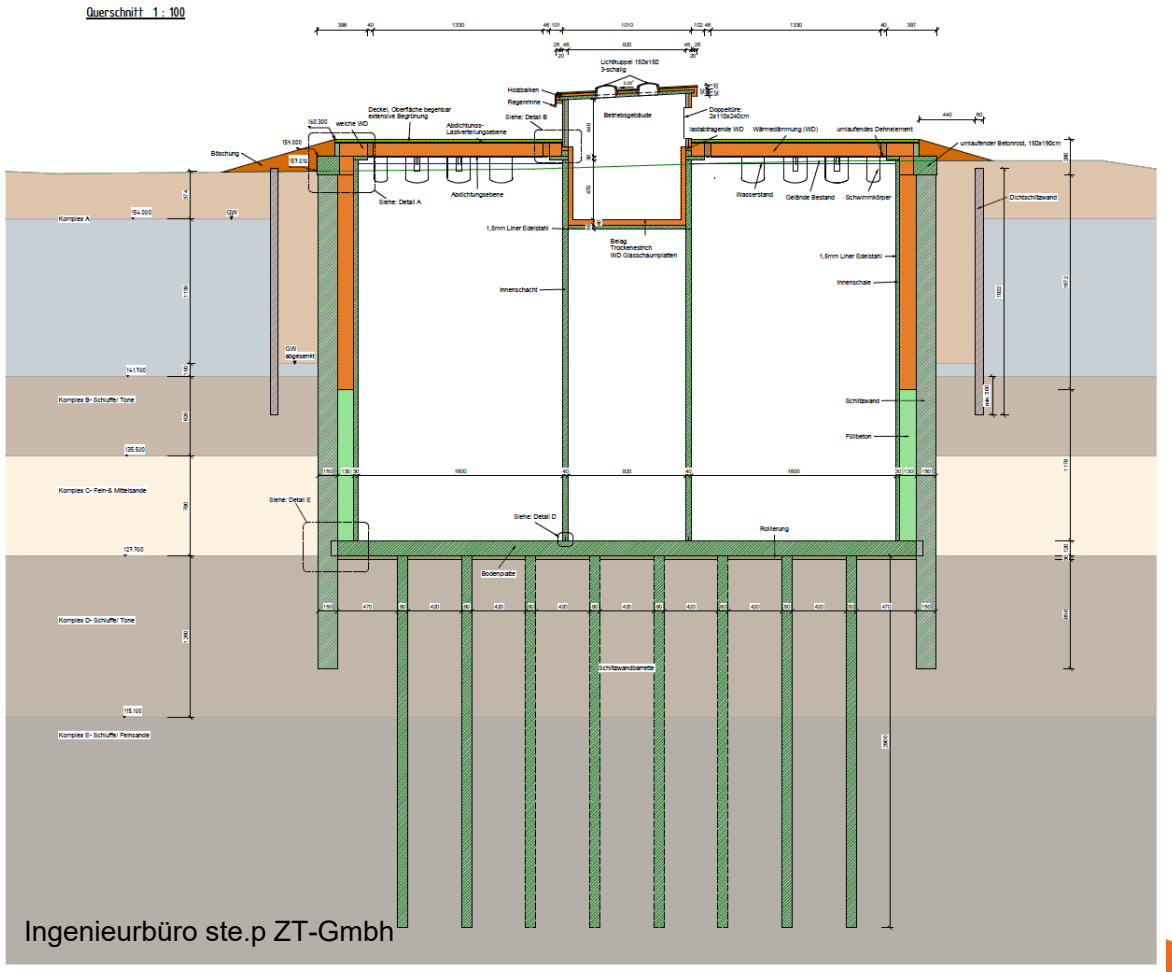
Integrating thermal energy storage (TES) into decarbonized DHC

Summery

We integrate various technical innovation in one project like useable surface, integrated expansion tank (absorption of pressure and temperature changes)

A comprehensive monitoring will be carry out with focus on efficiency and CO2 impacts

Team development from idea to research and than managing a high investment project



Ingenieurbüro ste.p ZT-Gmbh

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