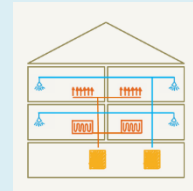


## Heat Pumps in Contracting Model, Germany

Renovation with one heat pump for space heating and one for water demands



A2

### Key facts

#### Buildings

Location	<i>Freiburg im Breisgau, Germany</i>
Construction	<i>2002</i>
Renovation	<i>2020</i>
Project type	<i>Retrofit</i>
Heat distribution	<i>Underfloor heating</i>
Heated space	<i>3430 m<sup>2</sup></i>
No. of apartments	<i>40</i>
Level of insulation	<i>Very good</i>

#### Heat pump and source

Number of	<i>1x low-temperature HP 1x high-temperature HP</i>
Operation mode	<i>Monoenergetic</i>
Heat source	<i>Groundwater</i>
HP only/ Hybrid	<i>HP Only</i>

#### Heating system

Heat demand	<i>60 kWh/m<sup>2</sup>a</i>
Installed power	<i>146 kWth</i>
Heating temperature	<i>67°C</i>
Average Yearly Coefficient of Performance	<i>4,0</i>

#### Domestic hot water

Type of system	<i>Central</i>
Max. temperature	<i>75 °C</i>
Installed power	<i>77 kWth</i>
Storage tank	<i>2x 900L</i>
Average Yearly Coefficient of Performance	<i>2,5</i>

#### Lessons learned

- Groundwater-source heat pumps can cover full heating and hot water demand in MLB without fossil backup.
- Optimizing hot water temperatures improves system efficiency significantly

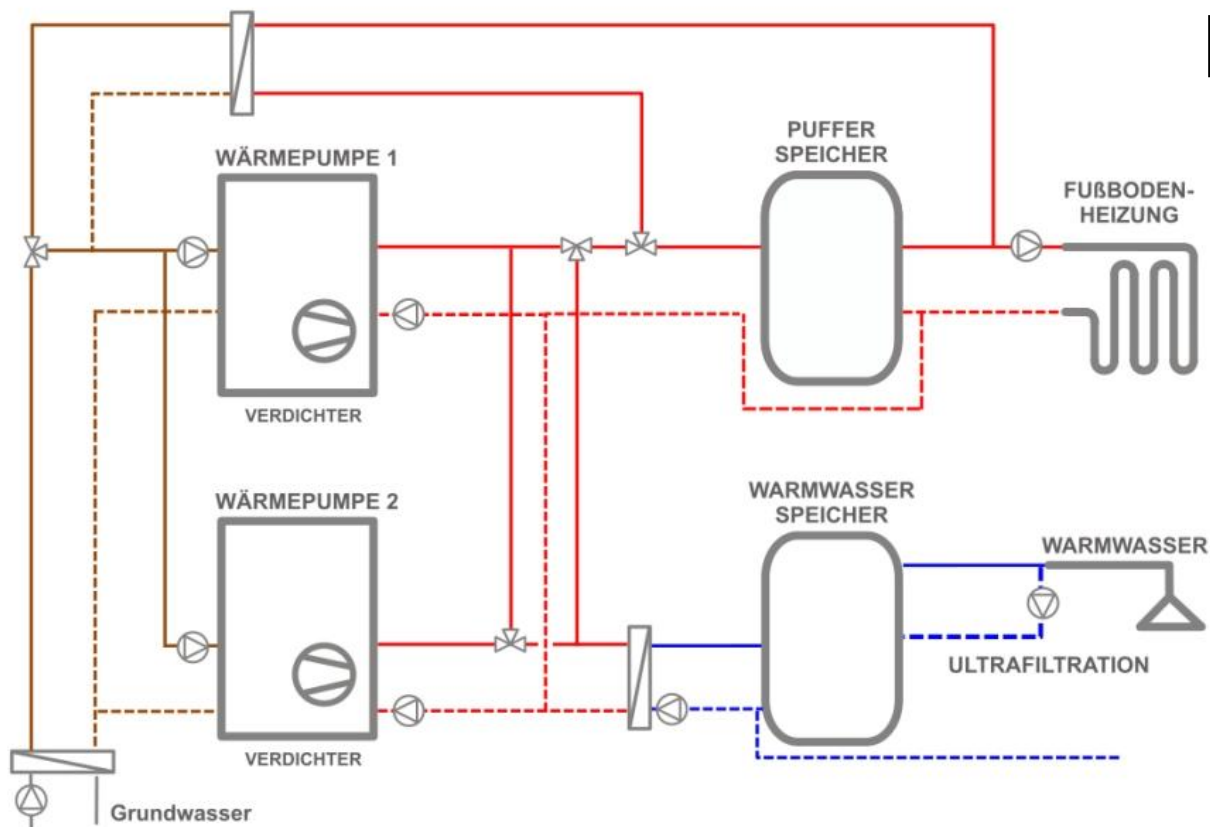


Picture: Gebäudeforum Klimaneutral

As part of the SanBest research initiative, a comprehensive modernization of the heat supply system was implemented in a multi-building residential complex located in the Mooswald district of Freiburg im Breisgau, Germany. The project, titled "Wärmepumpe im Contractingmodell", serves as a demonstrator site under the name "Freiburg Seepark." The ensemble consists of two multi-family buildings (11 and 15 dwellings), two terraced housing rows (5 houses each), and two semi-detached houses, totaling approximately 40 residential units and a heated area of 3,432 m<sup>2</sup>. Originally constructed in 2002, the buildings were served by a shared heating central unit utilizing an earlier-generation groundwater heat pump system.

Due to poor performance and the unavailability of spare parts for the original heat pump system, a new system was commissioned and implemented under a contracting model. The previous system achieved a seasonal performance factor (JAZ) of only ~1.9 and relied heavily on an electric resistance heater for domestic hot water production, leading to high electricity costs. The new heat pump installation aimed to increase system efficiency, operational reliability, and compatibility with long-term contracting frameworks by offering guaranteed minimum seasonal performance figures (JAZ of 4.0 for space heating and 2.5 for hot water).

## Heat Pumps in Contracting Model, Germany



Picture: SanBest

### Description of the technical concept

The heating system at Freiburg Seepark uses two groundwater-source heat pumps to provide space heating and hot water for approximately 40 residential units. Heat is drawn from a groundwater well, where stable underground temperatures enable efficient energy extraction. The water passes through heat exchangers and is then returned to the ground via a reinjection well.

The system includes two Waterkotte heat pumps: a low-temperature unit (146 kW) for underfloor space heating and a high-temperature unit (77 kW) for domestic hot water. Each uses scroll compressors with two-step modulation (50%/100%) for efficient load matching. Heat is distributed from a central plant room to the apartments via insulated pipes. A legionella filter allows lower hot water circulation temperatures, improving energy efficiency. The system is monoenergetic, fossil-free, and designed to fully meet heating demands year-round with seasonal performance factors (JAZ) of 4.0 (heating) and 2.5 (hot water).



Picture: SanBest