Herzo Base, Herzogenaurach, Germany

Booster heat pumps for hot water generation in 8 Row houses in the KfW Efficiency House 40 Plus standard

Key facts

Building

Location	*Herzogenaurach, Germany*
Construction	November *2017*
Heat distribution	*in building*
Heated area	152 *m² living*
Level of insulation	*40 Plus Standard*

Heat pump and source

Number of heat pumps	2
Installed capacity	*kW*
Operation mode	*monoenergetic*
Heat source	*ground source*

Brand and type *Alpha Innotec 2x Alterra SWCV and 8 Alpha Innotec WWB 20 – booster heat pumps*

Refrigerant	*R134a*
Sound level	40 *dB*

Heating system

Heat demand SH: 8.9 kWh/(m2a), 22.7 kW;
SC: 25.6 kWh/(m2a), 52 kW
DHW: 16.9 kWh/(m2a)

Heating temperature *35°C*

Domestic hot water

Type of system	*individual booster heat pump*
Max. Temperature	*65°C*

Circulation system - *individual*

Legionella measures	*temperature*
Storage size	200 *litres*

Number of storage tanks - *8*
Storage losses
Temperature control

Other information

Electric energy

Consumption year	*kWh*
Investments costs	*unknown*
PV installation	98 kWp, 66 MWh/a

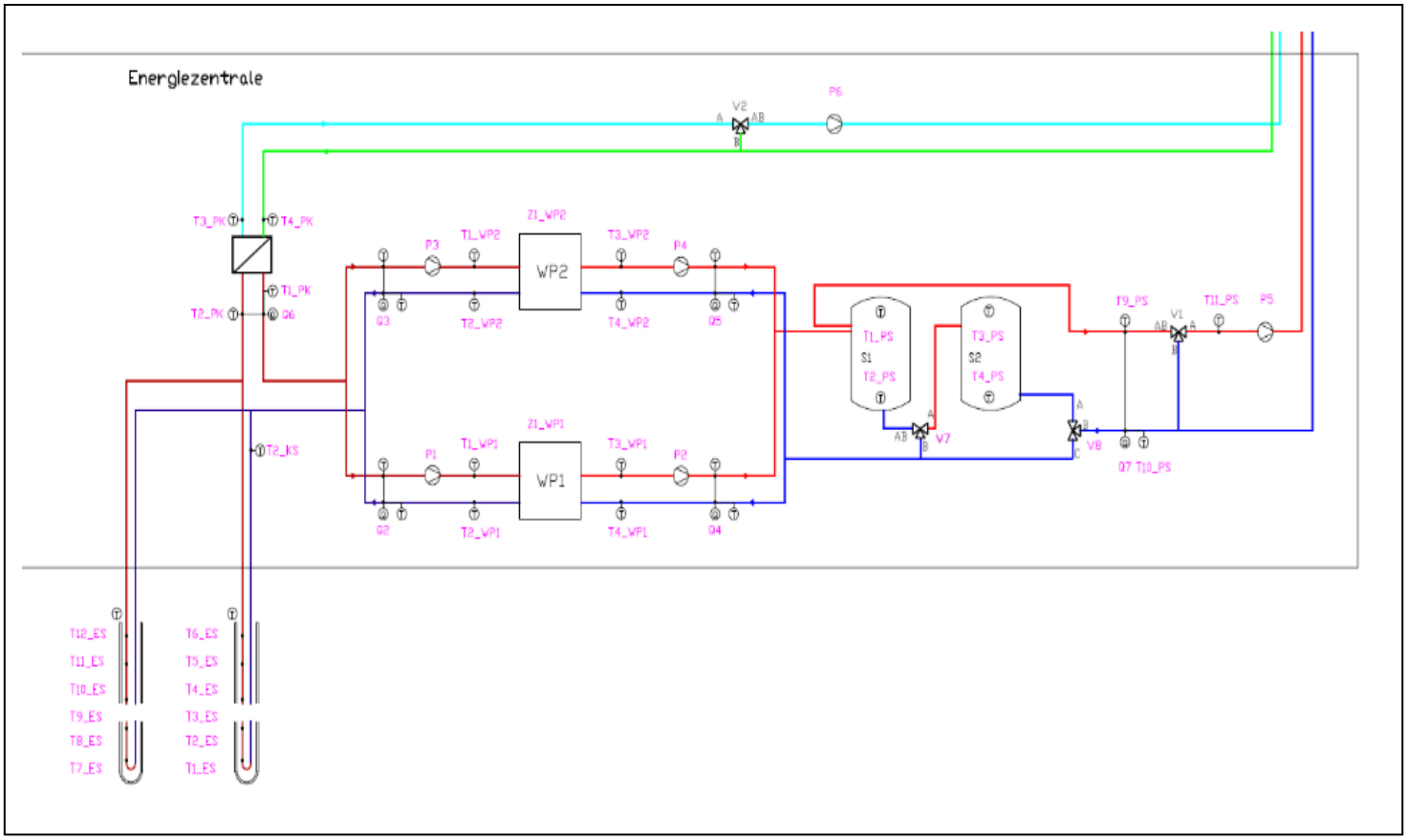
Link to video

In Herzogenaurach in the new Herzo Base II development area, an apartment block consisting of eight terraced houses in the KfW Efficiency House 40 Plus standard with highly heat-insulating Poroton bricks was built as part of a research project by the Technical University of Nuremberg in 2017.

Two geothermal, modulating heat pumps with seven vertical, almost 100 meter deep geothermal probes are used to generate energy. The east and west sides of the roof are equipped with a photovoltaic system. The aim of the energy concept is to optimize the control of the heat pumps in order to increase the self-consumption of the photovoltaic generation through a targeted load shift. For this purpose, the heat pumps are adapted to the currently available PV power. Excess electricity is fed to the central storage in the basement and controlled via an energy management system. In this common energy centre of all eight houses is also the thermal buffer storage, which is designed as an energy cascade. The degree of self-sufficiency of the entire building is forecast at 65 percent without taking electromobility into account.

The technical installation consists of two modulating GS-HP with storage, with a low temperature distribution grid for space heating. Each individual house has a booster heat pump for DHW and a storage tank of 200 litres. A solar PV installation (98 kWp, 66 MWh/a) and batteries designed for plus energy. Control concept of heat pumps and storage to increase self-consumption and reduce grid interaction by grid-supportive operation.

Herzo Base, Herzogenaurach, Germany, Technical details



Description of the technical concept

System control in simulation

Central space heating system connected to decentral floor heating

- Temperatures of central buffer storage at 35 °C in wintertime, at 25 °C in summertime
- In summertime, thermal grid delivers heat source for DHW booster heat pumps at 25 °C

Decentralised DHW storages of 200 l in the single family houses with booster heat pumps

- Capacity Booster heat pumps 2 kW
- DHW storage charging temperature 50 °C, use temperature at 45 °C
- In case of PV surplus over-charging of DHW storage to temperatures up to 60 °C

One of the most important factors was the highly heat-insulating building envelope, which was built in solid brick. Pearlite-filled Poroton T7 bricks with wall thicknesses of up to 42.5 centimeters were used. Their thermal conductivity is λ = 0.07 W / (mK). Depending on the wall thickness and wall structure, the calculated U-values deliver between U = 0.15 W / (m2K) and 0.18 W / (m2K).

The focus of the Herzo Base project in the area of passive components is on testing new types of wall building materials. For the first time, these newly developed products will be used in the project and compared with conventional products.