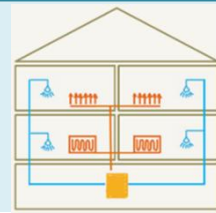


## Multi-family home in Adorf, Germany



A.3

A five-unit apartment building was provided by the Adorf Housing Association, and a comprehensive renovation was carried out.

### Key facts

#### Buildings

Location	Adorf, Germany
Construction	1962
Renovation	2021
Project type	Retrofit
Heat distribution	Radiators
Heated space	250 m <sup>2</sup>
No. of apartments	5
Level of insulation	Very good

#### Heat pump and source

Number of	One 3-11 kWth
Operation mode	Hybrid, Monovalent
Heat source	Outside air
HP only/ Hybrid	Hybrid; space heating by HP, water by gas boiler

#### Heating system

Heat demand	35 kWh/(m <sup>2</sup> a)
Installed power	3-11 kWth
Heating temperature	55/45°C

#### Elements demonstrated

- A heat pump/boiler hybrid system
- New windows in the insulating frame at the insulation level
- Decentralized ventilation units with heat recovery and air ducts integrated into prefabricated ETICS insulation elements.

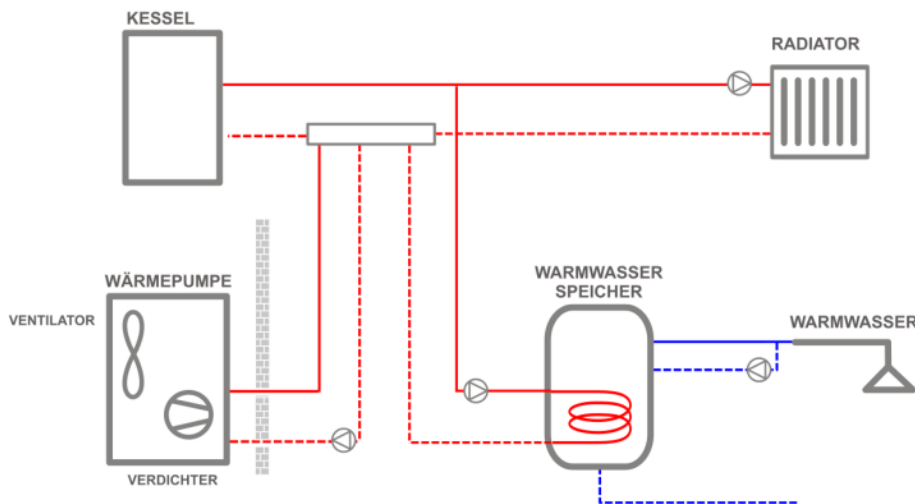


The Adorf im Vogtland housing association sought to reposition itself as an innovative and modern landlord. Furthermore, the building was in a dilapidated condition, with several apartments vacant. By participating in the research project on sustainable heating of multi-family buildings (LowEx in Existing Buildings), the aim was to implement innovative solutions for heat supply. The housing association received support from federal funding for the future project "Adorf Anders."

It is an apartment building with five apartments in a two-family house. It was built in 1963 using prefabricated components from the WBS series. Before the renovation, it was supplied with a central gas heating system without condensing technology, installed in 1993, with a heat consumption of 216 kWh/m<sup>2</sup> per year. There was no ventilation system. It was renovated in two stages:

- 1) Conversion to a heat pump system;
- 2) Building envelope renovation with roof insulation, ETICS with integrated ventilation, and new triple-glazed windows.

## Multi-family home in Adorf, Germany



### Description of the technical concept

Heat pump system

- o 3-11 kW modulating
- o Gas condensing boiler 4-28 kW
- o Control: Heat pump partially parallel with boiler
- o CO2 emission control
- o Hot water boiler only
- Ambient heat:
  - o Outside air
- Monovalent system as a hybrid system with gas condensing technology for DHW supply
- Combined buffer and DHW storage
- Heat pump with remote diagnostic system

LowEx measures:

- Heat distribution and transfer:
  - o Use of existing radiators
  - o Reduction of flow temperatures to 55/45°C
  - o Hydraulic balancing
- Domestic hot water:
  - o Circulation
  - o Gas condensing boiler for domestic hot water heating
  - o Decentralized room-by-room ventilation units with heat recovery
  - o Installation in the building base at the insulation level, easy to maintain
  - o Room-by-room demand-based control