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// Heat Pump in an Old Building in a HOA

Berlin | Germany

Short description of the measure

A homeowner association (HOA) with 25 residential units and 2 offices in an old building in Berlin-Schöneberg installs a brine-to-water heat pump in order to reduce the natural gas consumption by 50% and the resulting costs.

A particular hurdle is the limited space available in the inner courtyard, which is needed to maintain the necessary distances between the boreholes.

Period // Duration

In 2016, an initial energy concept is drawn up. In 2021, the brine-water heat pump is installed, providing 50% of the required heat. It will then be examined whether other parts can be replaced by regenerative technologies such as solar or air heat.

Objective

Preservation of the building's functions (heating) and compliance with guidelines (fire protection). Use of renewable energies instead of fossil fuels for heating the building.

Reduction of natural gas consumption by 50% and thus reduction of energy costs.

Baseline

The multi-family house is an old building from 1890 with 2300m² heated area. The building is heated by a condensing gas central heating system with standard radiators. The hot water is supplied electrically. The natural gas consumption amounts to 220MWh/a on average.
CO2 consumption can be reduced by two levers: by increasing efficiency (e.g. by insulating the façade, replacing windows or boilers, changing user behaviour) or by using renewable energies (e.g. heat pump, PV system).
Therefore, an energy concept was drawn up in 2016 that explored the possibilities for reducing CO2 emissions from the building. Components of the concept were the replacement of the boiler, the renovation of the south façade and the optimisation of geothermal energy.

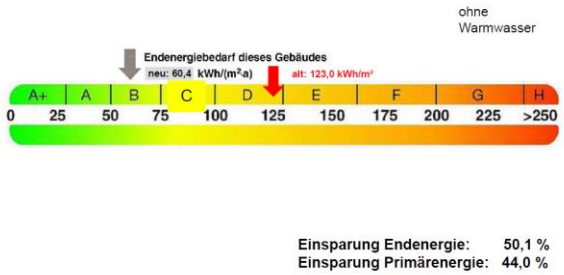
Implementation & measures

Due to dilapidation there was no alternative to replacing the boiler and renovating the south façade.

The boiler was replaced in 2018, the south façade was renovated in summer 2019, and the boreholes were drilled and the geothermal heat pump installed in 2020. Commissioning took place in the spring of 2021. Radiators were not replaced. Nevertheless, an annual performance factor of 3.8 was achieved. The operating data is recorded digitally and online, making it easy to view and track.
The insulation of the 120-year-old fire wall facing the neighbouring property according to the EnEV regulation cost 70k € and provided 7% of the calculated savings.
The resolutions of the homeowners on these measures were unproblematic due to their own motivation to protect the environment by reducing CO2 consumption in their own building. About four owners were against or abstained. The important thing here was the step-by-step procedure with gradual decision-making: first came the concept with economic viability (20a), then the examination of approvability, then the first borehole with geothermal response test (GRT) and exit option, then there were further boreholes, and then the resolution for the heat pump was decided.

Results

Final energy savings of 50%, primary energy savings of 44% (without hot water). The energy costs have decreased from 37k €/a by 7.2k € annually (price basis 2022, i.e. high gas price).



Groups involved

Homeowners' association, advisory board, property manager as moderator, planner, drilling company, installers.

Beneficiary groups

All owners and tenants benefit from the new facility and the cost savings. The owners also benefit from the increase in the value of the property.

Financing // Subsidies

The total costs of the project, including drilling, heat pump, installation, electricity and redesign of the courtyard, amounted to 97.4k €, whereby the project was subsidised by BAFA with 35%. The investment pays for itself after about 13.5 years. A special feature here is that the costs for the planning were lower, as this was mainly carried out by one of the homeowners. He received a reduced fee as compensation for his efforts.

Lessons learned

Renewable energies are feasible in old buildings. Geothermal energy, solar/PV and air can be exploited and used to heat a building. Heat pumps can also be used effectively in existing buildings. Without hot water 65% and with hot water 75% of the heat can be covered by renewable energies.
Implementation with simple and available means due to low system complexity.
A good concept meets with the owners' approval and quickly leads to a decision. Confidence in the results and feasibility is needed.
Select the most sensible investment for the property. Investments in the building envelope (façade, windows) are significantly higher and the effect "investment versus CO2 savings" is lower.
Cost-effectiveness should be a given: cost-benefit calculations and short payback periods promote the approval of all parties involved.