TECHEM RESEARCH INSTITUTE ON SUSTAINABILITY (TRIOS)

Analysis of cold and hot water consumption and Costs in the German Multi-Family Housing Stock

Holger Hallmen and Dr. Arne Kähler
Stand: 22.01.2025

Final energy consumption for space heating in German multi-family housing stock has fallen in recent years, as the Techem Atlas for Energy, Heat and Water shows in its 2023 edition.
We attribute this to the increased energy prices and the resulting adjustment of users' consumption behaviour.

However, have consumers also adjusted their hot water consumption to the rising costs?
Was more cold water used instead of hot water?

This will be examined below. For this purpose, consumption data from the German multi-family housing stock from 2012 to 2023 were evaluated. In each year, the sample size was around 200k properties with around 1.4 million units.

analysis of water consumption

The consumption trend for cold water and hot water in German multi-family housing stock is shown in Figure 1. Between 2012 and 2019, the consumption of hot water remained almost the same at just under 0.25 m^3 per m^2 of living space. In 2020, there was an increase in hot water consumption to 0.26 m^3/m^2. This is most likely due to Corona and the associated measures, which meant that many people stayed at home more often.

In the following years, there will be a significant drop in domestic hot water consumption to 0.22m^3/m^2 in 2023, which can probably be explained by the war in Ukraine and the related German energy crisis.

Cold water consumption, on the other hand, rose steadily between 2012 and 2019. Starting in 2012 with 0.47 m^3/m^2, it rose to 0.5 m^3/m^2 by 2019. Here, too, there was a disproportionate increase to 0.53 m^3/m^2 in 2020 due to the corona measures, before falling to 0.5 m^3/m^2 in 2023.

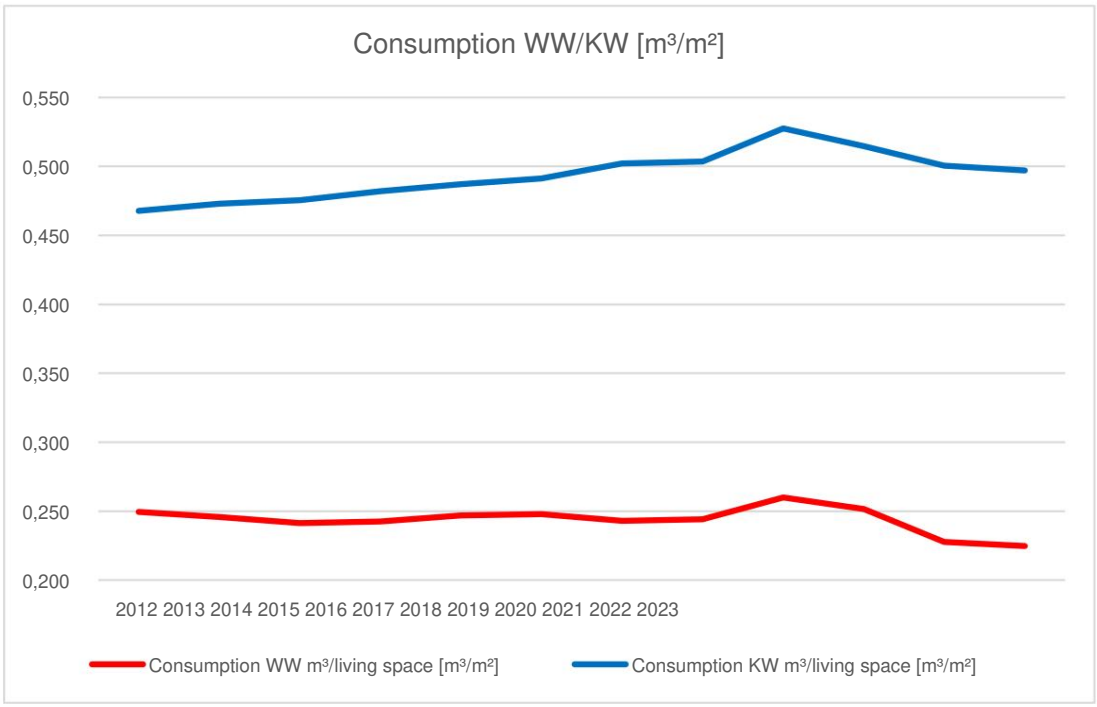

Fig. 1: Trend of cold and hot water consumption from 2012 to 2023

Analysis of the costs for cold water and domestic hot water preparation

We find that, despite falling water consumption, the costs for domestic hot water will increase significantly from 2021 onwards (Fig. 2). We attribute this to the declining efficiency of domestic hot water preparation as a result of falling domestic hot water consumption. This effect is illustrated in Figure 3.

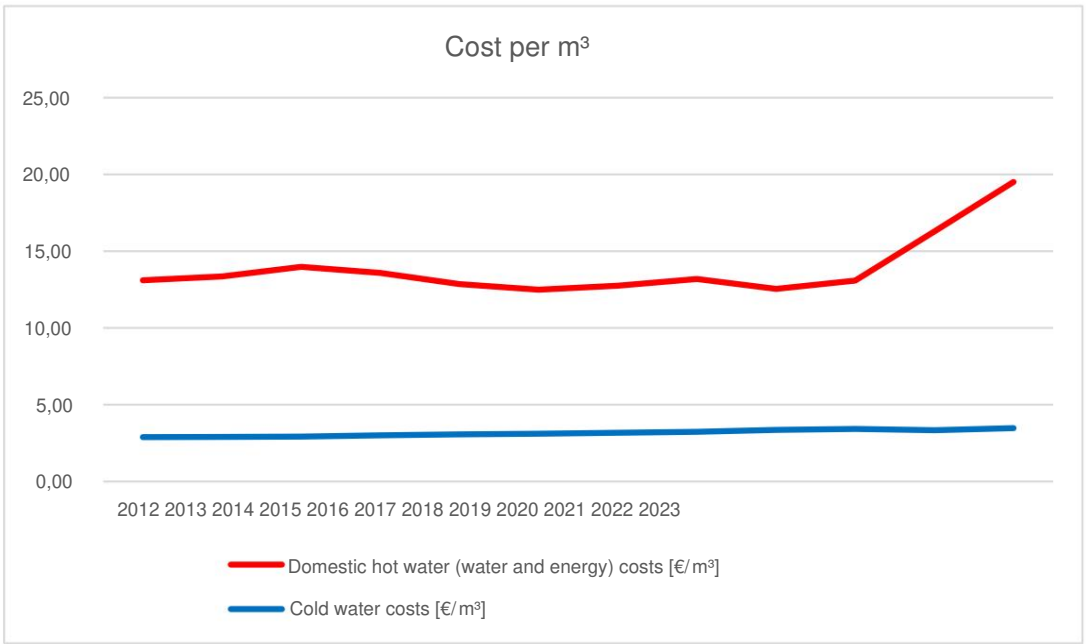

Fig. 2: Cost development of water consumption and energy costs for domestic hot water preparation in €/m³

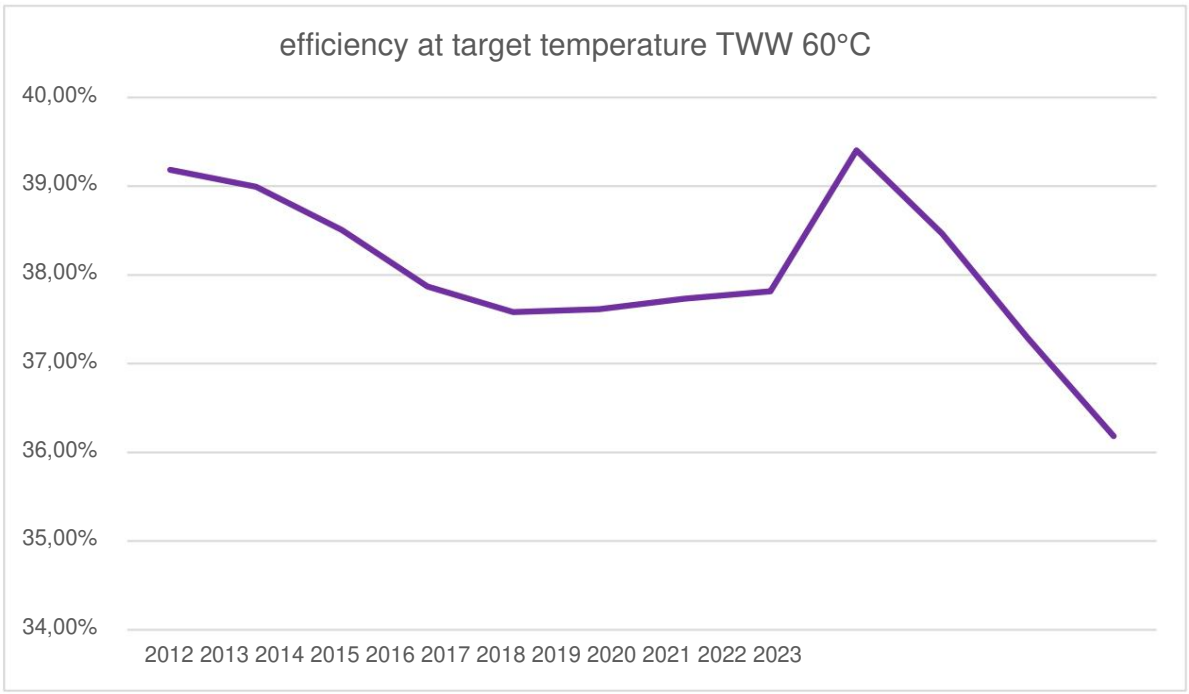

Fig. 3: Utilization rates for DHW preparation at a target temperature of 60°C

As a result, the total water costs are increasing on average for consumers in German multi-family houses, as Figure 4 shows.

In our opinion, this effect could have been reduced if the operation of domestic hot water preparation had been optimized in German multi-family housing. In this way, circulation losses could be reduced by adjusting circulation times and overheating of the hot water tank could be prevented, within the framework of the necessary hygiene requirements. A long-term consideration could also be to adjust the size of the hot water tank to reduce hot water consumption.

Optimizing the operation of the domestic hot water and space heating would be possible, for example, with Techem's Digital Heating Cellar, which enables continuous monitoring of the operating status.

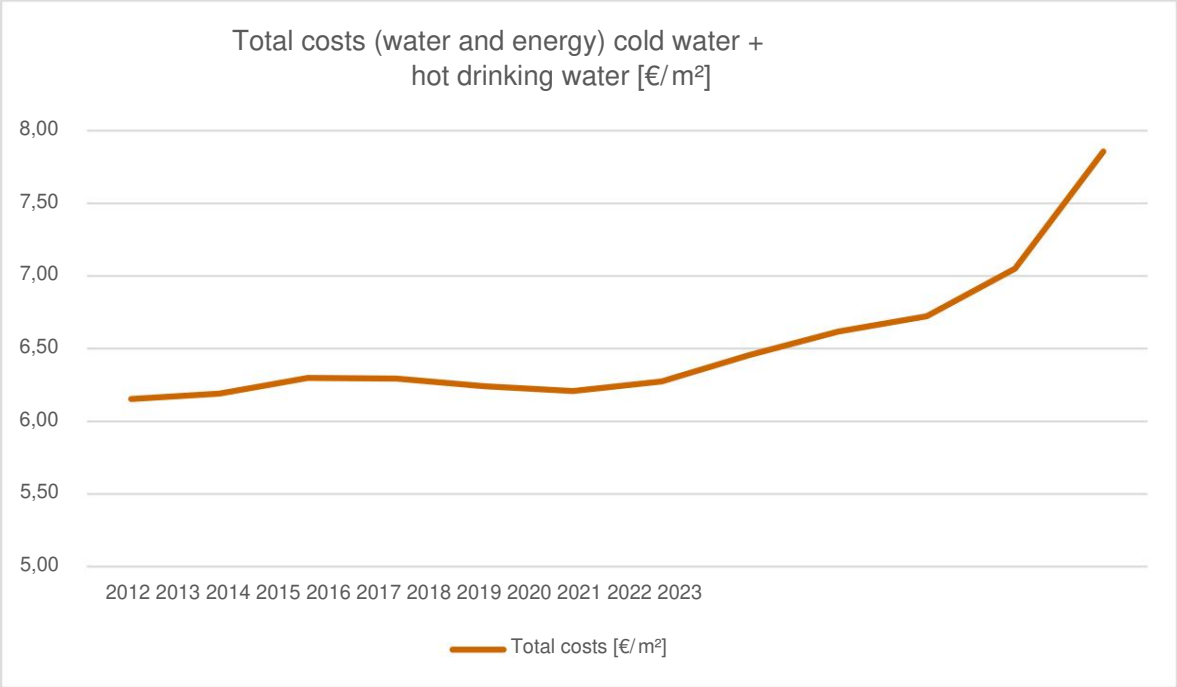

Fig. 4: Total cost development for domestic hot water (energy and water consumption)

About Techem

Techem is a leading service provider for smart and sustainable buildings. The company's services cover the topics of energy management and resource protection, healthy living and process efficiency in real estate. The company was founded in 1952 and now has over 4,000 employees in 18 countries, servicing more than 13 million apartments.

Techem offers efficiency improvements along the entire value chain of heat and water in real estate as well as renewable supply concepts and solutions. As the market leader in the wireless remote recording of energy consumption in homes, Techem is driving forward networking and digital processes in real estate. Modern multi-sensor devices as well as wireless smoke alarms with remote inspection, a measuring point operation, charging infrastructure for electromobility and services related to improving the quality of drinking water in real estate complement the solution portfolio for the residential and commercial real estate industry. You can find more information at www.techem.com.

The **Techem Research Institute on Sustainability (TRIOS)** contributes to the identification and reduction of Techem's operational emissions and also conducts data analysis and applied research in the field of energy efficiency improvement and decarbonization of residential buildings.