

Benchmarks for student accommodation in renovation and new building measures

The goal of the research project was to establish benchmarks for student accommodation in Germany. An analysis of renovation and new building measures was conducted according to energy-relevant and economic criteria. The consumption of resources (heating energy, water, electricity) and the production and resulting costs, also called the building and building usage costs, were analysed. Examples of energy demand were calculated as a basis for comparative prediction data.

The project entitled “Benchmarks for student halls of residence” compares a selection of 21 student halls of residence (8 newly built and 13 renovation projects) at 16 locations in Germany. The documentation of the building-specific conditions extends from cost-specific and consumption-specific data acquisition and processing to the calculation of coefficients and a cross-sectional analysis of the investigated buildings. The results lead, as far as possible, to recommendations for implementation in newly built and renovation projects.

The average annual primary energy consumption (heat and electricity) is about 5829 kWh per residential unit (newly built) or 6513 kWh per residential unit (renovation). Heat and electricity are each responsible for about half of the primary energy consumption.

The average annual electricity consumption of a student is on the order of 1230 kWh per residential unit (equal values for newly built and renovation). This is in agreement with the results of other investigations on student accommodation.

The investigated halls of residence thus emit an annual average CO₂ equivalent of 1521 kg per residential unit (newly built) or 1760 kg per residential unit (renovation).

The average annual water consumption amounts to 42.3 m³ per residential unit.

Average combined prices (consumption price per kWh or m³ plus the relevant proportion of the base price) for heating energy are about 0.08 €/kWh (newly built and renovation projects), for electricity about 0.17 €/kWh (newly built) or 0.15 €/kWh (renovation) and for water about 2.98 €/m³ (newly built) or 3.08 €/m³ (renovation).

To summarise, the following energy and water consumption cost indicators for each place of residence (for one person) were determined for the newly built projects: heating energy 255.71 €/residence place, electricity 175.76 €/residence place, water 117.74 €/residence place. The following values apply for the renovation projects: heating energy 296.72 €/residence place, electricity 179.13 €/residence place, water 127.68 €/residence place. The matter of how the energy consumption could be correlated more exactly with the actual presence of the student residents is still an open question. It is typical of student accommodation that the number of persons present can fluctuate strongly. Analysis of the data bank of tenants is only the first step, and always takes second place to preservation of anonymity.

Often a considerable range of accommodation types is offered in residential complexes for students. There is also a need here for further investigation to

correlate a larger number of well-defined types of accommodation with the energy consumption. The low sample number in the investigation reported here does not allow any clear conclusions to be drawn.

The relatively small sample size of the investigation should be extended to a larger, statistically relevant number of residential complexes, so that – particularly with regard to building costs and building usage costs – conclusions with greater general relevance can be drawn.

Essential pre-conditions for deriving general recommendations on the application of certain technology were met by the available data either only partly or not at all. For instance, the raw data did not meet the requirements for analysing complete maintenance costs, such that coefficients for the “total annual costs” could not be calculated. Addition of the cost coefficients that could be reported is left to the reader, together with comments on the restrictions mentioned.

Drawing on the results and the structure of this investigation, consistent benchmarking on site is recommended, which operates at the levels of costs, end-use and primary energy, and emissions, and which aims for documentation in an energy and environmental report. The values should be reported with respect to consistent and well-defined units (residence place, $m^2_{\text{net floor area}}$, $m^2_{\text{total floor area}}$). It is conceivable that this could result in a new, consistent platform of summarised data suitable for preparation of a national annual report of the German Student Services Association (Deutsches Studentenwerk).

The presentations – at the local and national level – provide a suitable basis for identifying successes in reducing resource consumption and emissions of student accommodation and form a suitable platform for defining goals.