



Scientific study proves: Infrared heaters - the most efficient way of heating!

As part of a project by the renowned Konstanz University of Applied Sciences - for technology, business and design (HTWG Konstanz for short) - in cooperation with Redwell Manufaktur GmbH from Austria, the effects of infrared heating compared to the heat pump were examined for 30 months.

The impressive result: Infrared heating systems are - in well insulated houses and in combination with a photovoltaic system - the most ecological and economic efficient heating solution!

Within the scope of the project a working group of the HTWG Konstanz researched the following question „Are infrared heating systems an ecologically and economically good alternative to a heat pump?“

Three scientific methods were used to clarify this question: A housing project in Darmstadt (Germany) was scientifically supported, as well as measurements in four identical rooms and a simulation model.

Housing project K76 in Darmstadt

In the summer of 2017, an apartment building with a living space of 1,360m² was completed for 40 residents. The house offers 15 residential units between 50-120 m².

It was planned to build a residential building with a heating system that requires little material and space and should be decentralized, low-maintenance, flexible and durable. Depending on the size of the room, infrared heating panels were installed on the ceiling, which are controlled directly by a thermostat. The hot water is processed via a continuous flow heater and a 36 kWp PV system ensures the electricity generation.

It was impressive that the specific total energy requirement - for ventilation, hot water and infrared heating - is significantly below the calculated EnEV (German Energy Saving Regulation) value, which could be reduced even further in the second heating period by optimizing the ventilation and heating control.

The project is supported by



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The most important results at a glance:

	EnEV-calculation	Heating period 2017/18	Heating period 2018/19
Final energy requirement	36,9kWh/m ² a	32,3kWh/m ² a	28,6kWh/m ² a

(weather adjusted)

A final survey of the residents confirmed that the indoor climate was felt to be very comfortable and the control was easy to use.

Laboratory measurements

The following four different heating systems were installed and tested in four identical rooms each with a size of 32.8 m²:

- Room 1: water-based underfloor heating (with 7.6 kW output)
- Room 2: electric underfloor heating (with 2.8 kW output)
- Room 3: Redwell infrared heating / ceiling mounting (2 panels with 1.3 kW power)
- Room 4: Redwell infrared heating / wall mounting (2 panels with 1.3 kW power)

One thing is certain, the heat consumption of the ceiling-mounted infrared heating is always below the value the underfloor heating.

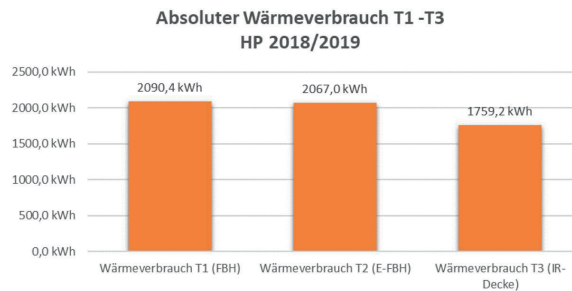


Abb. 68 Wärmeverbrauch Raum T1-T3, Messphase 1-4, Heizperiode 2018/2019

In terms of room surface temperatures, there are hardly any differences between the various heating methods. However, the room temperature of the infrared heater can be reduced, which saves energy but with the same comfort.

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Simulation of the laboratory rooms

To validate the laboratory measurements the four rooms were digitised and simulated as a simulation model, without external influences.

It was demonstrated that underfloor heating systems have a transfer loss of about 50%. A clear advantage of infrared heating can be traced back to the quick reactivity and the low thermal inertia.

Furthermore, the infrared heating system was able to score in terms of the overall ecological life cycle over 50 years - including the manufacturing, maintenance and disposal costs. The heat pump has lower consumption costs, but it is more expensive to buy and maintain a heat pump.

In combination with a PV system, the operating costs of the infrared heating systems can be significantly reduced and are therefore lower than those of a heat pump system. The simulations show that an infrared heating system in a well-insulated building in combination with a PV system is an efficient option for heating the home.

In Summary

Space-saving, visually appealing and easy to integrate, mould prevention, low operating costs and, in addition, sustainable in combination with a photovoltaic system - Redwell infrared heaters have basically only advantages for building owners and renovators and have experienced a comprehensible upswing as an all-house heating system in the last years.

This study, which was published by the Federal Ministry in April 2020, shows that infrared heating is a future-oriented and sustainable system in the heating sector and can make a major contribution to the energy transition in combination with a PV system.

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