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Heating and cooling with environmental energy

Optimising thermo-active building systems and heat pumps

Environmental energy provides an efficient way to supply energy to non-residential buildings such as office and administration buildings, educational and recreational facilities as well as industrial sheds. The buildings can be efficiently heated and cooled using the combined use of thermo-active building systems and heat pumps. Across 24 pages, the new BINE-Themeninfo brochure entitled "Efficiently heating & cooling non-residential buildings" (II/2016) presents low-exergy concepts for these buildings. In these concepts, the environmental heat sources, heating and cooling technology in the building and the comfort requirements of the users are matched as closely as possible with each other right from the beginning of the planning. This enables considerable energy efficiency.

In contrast to the current assessment of the energy consumed in buildings, which is purely quantitative, low-exergy concepts also take qualitative aspects of the energy conversion into consideration. The large surfaces of the thermally active components mean that moderate temperature differences between the heating system and indoor temperature are sufficient to heat and cool buildings. The temperature changes that transform environmental heat into usable heat are also correspondingly low – providing ideal conditions for the efficient operation of heat pumps. The more the temperature level of the heat source corresponds to the use, the lower the exergy utilisation.

In addition to the requirements for optimised building services technology, the BINE Themeninfo brochure also focusses on the planning, regulation, operational management and control. The content is rounded off with a look at the experiences gained from three research and demonstration buildings where low-exergy concepts have been implemented and measured over several years of operation. The authors are Professor Roland Koenigsdorff from the Institute for Building and Energy Systems (IGE) at Biberach University of Applied Sciences and Dr Doreen Kalz from the Fraunhofer Institute for Solar Energy Systems. She coordinated the LowEx:Monitor research project, in which 25 non-residential buildings were evaluated and measured in detail based on a model. The BINE Projektinfo brochure, which can be obtained free of charge from the BINE Information Service at FIZ Karlsruhe, is available online at www.bine.info or by calling +49 (0)228 92379-0. The brochure cover and an additional image can also be downloaded from the press section in this web portal.

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