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Abstract: Re-Learning to Dwell: Educating Users of Low-Energy Residential Units
Re-Learning to Dwell: Educating Users of Low-Energy Residential Units    Ralph E. Hammann    University of Illinois at Urbana-Champaign    College of Fine and Applied Arts
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Abstract: In order to achieve the low levels of energy consumption for residential buildings required by the new German Energy Savings Law and other similar standards in various member countries of the European Union, users of highly energy efficient residential buildings are confronted with mechanical systems that need to be operated consciously. Window ventilation should be limited or avoided altogether to reduce heat energy loss in cold seasons and solar energy gains in summer. Sophisticated mechanical systems should be installed used instead to provide the necessary ventilation. The mechanical system in return exhausts the stale interior air to the outside to provide a high degree of comfort while also recapturing the contained heat energy of that air. Energy for heating and hot water are gained from solar collectors. Very low energy consumption per year and a surface area of 20 kWh/m²a are hence achievable, compared with the average European value for residences of 60–80 kWh/m²a. As a case study, the 289-unit, 21,500-m² residential complex of Wohnen am Lohbach, Innsbruck, Austria, will be presented, which has a total energy savings equal to 86,000 liters of crude oil or 240 tons of carbon dioxide per year—the equivalent of consumption and green house gas emissions of 120 regular single-family residences. Interesting in this regard are also varying user habits ranging from “extreme savers” to “squanderers” and how the Austrian real estate management company Neue Heimat uses video and lecture presentations for incoming residents to foster energy awareness and proper operation.

Bio: Ralph E. Hammann is an Associate Professor of Architecture at the School of Architecture at the University of Illinois, Urbana-Champaign. He is a registered architect in Germany and the US, and a professional consultant for “Leadership in Energy and Environmental Design” (LEED®), accredited by the U.S. Green Building Council. His current research focuses on energy-efficient building envelope designs, building-integrated renewable energy generation, shading systems, and climate responsive technologies mainly focusing on building envelopes. He received a Diplom-Ingenieur (Master of Architecture) in Architecture from the Technische Universität Darmstadt in Germany. As a Fulbright Scholar he continued his studies in architecture with an emphasis on environmental building systems at the Virginia Polytechnic Institute & State University in Blacksburg, Virginia (VirginiaTech). He received a Master of Architecture from that school in 1982. He received a Doktor der Ingenieurwissenschaften (Dr.-Ing.) from the Technical University Darmstadt for his dissertation (1985) "Changes in Technology and Design of Curtain Walls in Office Buildings". Dr. Hammann’s design of a thermal heavy-mass, non-air-conditioned
office building for the HeizungLüftung Aktiengesellschaft (HL AG) in München, Germany, was published as an exemplary energy-efficient project in: Daniels, Klaus (1998) "Technology of Environmental Building", Birkhaeuser Basel-Boston in 1996. In his teaching at the University of Illinois at Urbana-Champaign, College of Fine and Applied Arts, Dr. Hammann focuses on sustainable and climate-responsive practices and technologies, both in upper-level design studio courses, elective courses, and supporting technology courses for undergraduates and graduate students. Recent graduate level design studios were concerned with potential part-time hybrid, natural and stack ventilation strategies in tall mixed-used high-rise buildings on sites in Chicago, Illinois and Seoul, Korea; undergraduate studio work includes the Systems Integration Design Studio for 4th year students (Capstone), a comprehensive project with full integration of systems technology such as ventilation, air-conditioning and modern systems of air distribution, natural lighting and vertical transportation. Dr. Hammann serves on the school’s Ph.D. program. His current work regarding the development of new construction methods and practices for efficient shells and settlement units that will satisfy the urgent housing needs of people affected by ecological, social, or political crisis was submitted to the 2007 Union Internationale des Architectes (UIA) Work Programme on Architecture and Renewable Energy Sources (ARES), administered by the Technical Chamber of Greece. The proposed development is sponsored by the Illinois Board of Trustees and the Office of Technology Management of the University of Illinois (OTM) as a international patent (2008). He is co-author of Daniels, K., Hammann, Energy Design for Tomorrow, Edition Menges, Stuttgart (forthcoming, January 2009), R. Hindrichs, Dirk, Heusler, Winfried (2007) Plusminus 20/40 Latitude: Sustainable Building Design in Tropical and Subtropical Regions, which he also translated into the English language. He is co-author in San Martin, Ignacio (2007) Arid Regions Urbanism: Selected Essays from the University of Arizona Conference and numerous papers. Additional information: (http://www.arch.uiuc.edu/people/faculty/rhammann)