

# Living and Sustainability: An Environmental Critique of Design and Building Practices, Locally and Globally

**1. Paper / Proposal Title:** An alternative design approach for current energy-efficient housing concepts: a dynamic way of living throughout the seasonal changes

**2. Format:** Verbal presentation + written paper

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**4. University or Company Affiliation:** Hasselt University

**5. Abstract (300 words):**

Due to environmental, economic and social developments, many sustainable housing concepts (e.g. passive house) have been implemented in practice with a strong focus on energy-efficiency. However, this induces new challenges such as an increase in material consumption, higher building costs and inefficient occupant behaviour due to a static built environment. Therefore, the research aims at an alternative dwelling concept that enables a more dynamic use of the indoor living environment for more resource-efficient housing concepts.

By means of a literature review, more insights were gained in dynamic architecture and the design approach of energy-efficient housing concepts. First, the review explores the different interpretations of dynamic building and its response to the constantly changing resident and climate. Secondly, the paper reviews the interaction between resident, climate and the controlled and constant and static environments of energy-efficient buildings.

As a result, the paper instigates that an effective user interaction between building, resident and climate is needed when creating a dynamic living environment. In addition, the paper elaborates on the object-centred design approach in energy-efficient housing

concepts causing lack of user interaction between resident, building and climate. First, the lack of knowledge of the resident about the operation of the complex systems induces inefficient occupant behaviour. Secondly, the highly insulated building skin generates a constant indoor climate that is isolated from the varying outdoor climate. Third, the static structure of the built environment does not respond to the diversified occupation pattern of the resident.

To conclude, the paper proposes an alternative, user-centred dwelling concept: a dynamic way of living throughout the seasons. The concept promotes more efficient occupant behaviour and focuses less on optimizing the building envelope with additional materials and active systems. The review is presented by means of a conceptual framework containing three main design criteria and additional design support.

#### **6. Author(s) Biography (200 words each):**

Ann Bosserez is a PhD-student at the Faculty of Architecture and Arts at Hasselt University. She studied a professional Bachelor in Interior design in Mechelen, where she specialized in Furniture design and found a growing interest for ecological design and interior design theory. Afterwards She went to Antwerp for a Master in Interior architecture where the interest for ecological design explored towards a passion for sustainability and social sciences. Her master thesis focusses on energy-efficiency in a tropical climate and was nominated for a FidiAs-Award. Additionally, she developed an ecological furniture design "Roku", that got published in the design magazine Kwintessens. Currently she develops a dwelling concept which enables a dynamic way of living throughout the seasonal changes in view of resource-efficiency. The research project has a focus on more (energy)-efficient occupant behaviour when living in renovated sustainable traditional Flemish detached dwellings.

Prof. Griet Verbeeck is a civil engineer with a specialization in architecture. After her studies at KU Leuven, she became a researcher at the Laboratory of Building Physics of KU Leuven where she participated in a wide range of research projects in the domain of energy, thermal comfort, costs and life cycle analysis. She made a PhD on life cycle optimization of extremely low energy houses. She stayed for almost 15 years at the Laboratory of Building Physics with in-between a short stay at the Energy Division of the Administration of the Brussels Capital Region. In 2007 she became an assistant professor at the Department of Architecture at the PHL University College in Limburg, Belgium where she started her own research group on sustainable architecture. Since 2013 she is associate professor at the Faculty of Architecture & Arts of Hasselt University and responsible for the research and education on sustainable architecture. The focus of the research is on sustainability assessment of buildings, policy support for energy renovation

and sustainable material use, and development of tools and concepts for design support for architects and decision support for home owners towards more sustainable houses.

Dr. Jasmien Herssens is an architect and currently in a ZAP-track position at the Faculty of Architecture and Arts of Hasselt University (Belgium). She studied architecture at the university college of Ghent, WENK, Sint-Lucas where she graduated in 2001. Afterwards she went to the Catholic University of Louvain (KULeuven) to take a MAMA in architectural sciences. She started her internship at Ante-architecten in Saint-Nicolas. After 6 months she started to work at Wim Goes Architectuur in Ghent where she had worked for 3 years. In 2005 Jasmien began teaching architectural design at the University College of Hasselt. In 2005 she started her Phd: *“Designing Architecture for More a framework of haptic design parameters with the expertise of people born blind”*, she conducted research together with people born blind in order to find design parameters supporting multisensory experiences. Her research focus is put on design methodology with a huge focus and interest on Design for All or Universal Design /Inclusive Design. For her research she won several best paper awards and the Cera senior award in 2012. She currently lectures design methodology, a master seminar “Designing for more” and she coaches Master students in Universal Designing at Hasselt University. Jasmien is research coordinator at the UD living lab in Hasselt and she represents Belgium in the European Institute for Design and disability (EIDD-Design for All Europe). She is a representative for EIDD-DfA Europe in the European Disability Forum (EDF).