“Spatial use patterns in Flemish dwellings: analysis and impact on energy consumption.”

In Belgium, dwellings are relatively large in comparison to other countries and research shows that the effective occupancy rate of living spaces is quite low. However, the effective space use might have a crucial impact on the actual energy consumption, since currently, rooms are often fully acclimatized, while only a part of them is used effectively. The hypothesis of this research is that the energy efficiency of dwellings could be increased if the design of the house as well as the systems for heating, ventilation and lightning, are better adapted to the actual use patterns within the dwelling. Occupant behavioural patterns describe the effective use of a dwelling in relation to the indoor climate and the energy consumption. The occupant behavioural patterns consist of spatial use patterns and actions, each having a specific impact on indoor climate and energy consumption:

- the Spatial use patterns can be subdivided in occupancy patterns, circulation patterns and activity patterns.
- the Actions describe the interactions of the occupant with the building and with the systems.

This research focuses mainly on the analysis of circulation patterns of occupants throughout a dwelling, since this is an under-examined part of occupant behaviour in dwellings. It is expected that insights into circulation patterns can be used to provide local and personal comfort for the occupants and as input for the design of dwellings, which can results in more energy or space efficient dwellings.

This research consists of three main parts. Firstly, a methodology to monitor circulation patterns inside buildings will be developed. Secondly, knowledge on and insights into the occupant behavioural patterns in Flemish dwellings and other buildings will be developed from case studies. Thirdly, these patterns will be implemented into applications and techniques to increase the energy and space efficiency.

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