Hygrothermal conditions and pollutant emissions from zero waste materials and their effects on humans and indoor environment quality

The PhD project *Hygrothermal conditions and pollutant emissions from zero waste materials and their effects on humans and indoor environment quality* is part of the interdisciplinary ZeroWaste BYG project, which deals with utilization of recycled materials and industrial by-products as secondary resources for construction materials. This activity supports waste minimization in the society and contributes to sustainability of building constructions

New and innovative building materials have been continuously introduced on the market due to the energy saving strategies and requirements on lower CO_2 footprint. However, besides the potential benefits in terms of cost and performance, it may be linked to a higher risk outside the field of the basic scope of building industry. New EU regulation relates to the information regarding hazardous substances - it points out that information on hazardous content in construction products should be further investigated.

With this respect, the effect on indoor air quality is one of a major concern. It impacts the health, comfort, well-being, and productivity of building occupants. However, human exposure to indoor air pollutants is difficult to quantify due to the fact that it is largely determined by micro-environmental characteristics and individual perceptiveness. Building products with large surfaces are major contributors to the pollution of the indoor environment with volatile organic compounds (VOCs) and other compounds. The effect of materials on indoor air quality can be investigated in terms of sensory and/or chemical characterization. However, one without the other never provides complex understanding of the investigated effect.

We have performed characterizations with the support of COWIfonden. One part of the study has investigated sensory assessment of the studied materials evaluated by human subjects. Different loadings of the studied materials and their interaction with typical indoor pollutants such as linoleum and carpet have been in focus. This activity was supported by COWIfonden in 2014.

In order to corroborate previously gained results and to contribute to appropriate explanation of our observations based on the sensory assessment, chemical analyses of the emissions released from the studied materials were proposed. The present grant enabled the performance of chemical determination of VOC pollutants, which contributed to better understanding of emitting processes related to building materials and material interactions with typical indoor pollution sources. Such processes help to make a substantial step in sustainable material development.