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Balancing Building Conservation with Energy Conservation

Towards differentiated energy renovation strategies in historic building stocks

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Abstract

Balancing building conservation with energy conservation is challenging. The overall aim of this thesis is to bridge the perceived conflict of reaching climate and energy goals on the one hand and the goals of a sustainable management of historic building stocks on the other hand. Historic buildings constitute an important representation of the built heritage, and make up a large part of the total building stock. Within the historic building stock, there are opportunities for energy efficiency improvements that can, and should, be undertaken in order to contribute to climate and energy goals. However, changes due to energy improvement measures need to be made without damaging or destroying the heritage values that are embodied in, and represented by, historic buildings. For this to happen, heritage values need to be identified, acknowledged and articulated in a systematic and transparent manner in order to be balanced with other interests when assessing energy saving potential in relation to building conservation requirements.

Three areas are of importance to move the issue of balancing building conservation with energy conservation from building level to building stock level. These are 1) adapted decision support processes for historic building stocks, 2) methods to integrate aspects of heritage values for decision support processes, and 3) building stock analysis aiming at developing differentiated energy renovation strategies for historic building stocks.

Decision-support processes have been developed and tested for buildings and building stocks. On building level, the proposed process allows for interaction between a quantitative assessment of the techno-economic optimisation and a qualitative assessment of vulnerability and risks. On building stock level, categorisation to produce archetype buildings, restrictions with regard to heritage values and extrapolation of results from the optimisation are added to the process. The building stock analysis visualises the relationship between different segments of a selected historic building stock and thereby shows the need for differentiated energy renovation goals and strategies that reflect the diversity of the building stocks. The results provide not only a method to develop differentiated energy renovation strategies, but also argue for the need for coherent and coordinated information about the historic building stock.

As a conclusion, my thesis has shown how to support informed decisions that balance energy conservation with building conservation for both individual buildings and building stocks. Further development is needed towards standardised decision support processes for historic building stocks that include the trade-off between preservation of heritage values and energy efficiency.