

How can the energy retrofitting of historic and traditional residential buildings be supported, based on the reflective process of the standard EN 16883?

Decision-making tools provided by the “P-Renewal” research project.



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KEYWORDS

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ABSTRACT (481 words)

Wallonia, like many other European regions, is characterized by an existing residential built environment, both urban and rural [1,2], primarily comprised of single-family houses [2,3]. This building stock is considered as energy intensive [3,4]. In fact, half of Walloon dwellings [5] and more than 40% within the existing European stock [3] are built before the 1960s with low insulation levels and old, inefficient technical systems (heating and ventilation). This building stock must undergo energy renovation by 2050 to meet both European and Walloon objectives regarding building energy efficiency [6,7,8]. However, this residential building stock is also made up of historic and traditional buildings [9,10] for which insulation measures and commonly used technical systems are often more difficult to apply.

Energy renovation of historic and traditional buildings with heritage specificities, protected by conservation measures or not, has thus become a major challenge for Wallonia and Europe. This is why, over the past two decades, numerous research projects and scientific articles have focused on the energy renovation of historic housing stock, particularly pre-war dwelling stock [11-13].

These research projects have significantly advanced scientific knowledge in this field, but it has not yet been widely adopted in professional practice, despite the development of specific decision-making tools and guidelines across Europe [14]. In 2017, the standard EN 16883 on conservation and energy renovation performance of cultural heritage [15] was adopted with the aim to facilitate energy performance improvements in historic buildings while respecting their cultural significance. It provides a systematic procedure to support the selection and the assessment of appropriate energy improvement measures. Although the standard has existed for several years, scientific studies [16,17] have shown that it is rarely used by practitioners. This is primarily due to a lack of identification of real benefits, insufficient resources and time, and misalignment with project planning.

With the same objective as the standard, the P-Renewal project [18,19] focuses on the energy retrofit of pre-war Walloon housing with heritage value and provides valuable support through a reflective process and decision-making tools. This work is based on five Walloon study cases and developed with the support of professional's actors, both in the field of heritage and energy renovation. While the project offers advanced scientific and technical information on traditional buildings, it primarily provides building owners and professionals with

decision-making tools, including documentation templates, cross-tabulations, and decision trees. These tools enable the selection of renovation strategies that effectively combine preservation of heritage value with improvements in internal comfort, energy efficiency, and environmental performance. These diverse inputs can be regarded as a significant contribution towards the evolution of energy performance standards for the renovation of historic buildings.

This contribution will first briefly describe the reflexive process of the project. It will then present the different decision-making tools while discussing their practical and technical support. Finally, it will discuss the contribution of these tools in enhancing the usability of the standard EN16883.

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