ENVIRONMENTAL LIFE CYCLE ASSESSMENT OF PREFABRICATED TIMBER FRAME SYSTEMS FOR ROOFTOP EXTENSIONS

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ABSTRACT

As urban sprawl is becoming an issue of increasing concern, Flanders is facing some key challenges in the near future. Firstly, the density measured within the built-up fraction is too low despite a high Flemish population density. Secondly, additional housing is currently required due to the growing Flemish population and decreasing household size. Densification of the built-up fraction by means of compact building design offers a solution to address these current housing needs and to avoid further fragmentation of remaining valuable open space. The emphasis in this PhD research is on designing and evaluating prefabricated timber frame systems for rooftop extensions on existing residential buildings. A previous research step identified the timber and timber-based parts in a timber frame wall applied in rooftop extensions as hotspots. The results furthermore indicated the wood treatment as an important environmental aspect. Therefore, this paper focuses on environmental impact calculations of treated and untreated timber frame. Different treatment methods for wood are described. An environmental impact assessment of the most common wood preservative in Belgium is made and compared with the generic datasets in the MMG database (based on generic datasets from Ecoinvent). The calculations are made by the use of three versions of the Ecoinvent database (version 3.1, 3.2 and 3.3) in order to reveal the importance of the choice of database on the assessment results.

Keywords: *Environmental impact, timber frame, wood preservatives*

INTRODUCTION

In a previous research step (Wijnants, Allacker, & De Troyer, 2016) a Belgian rooftop extension in timber frame has been analysed over a lifespan of 60 year. The timber and timber-based parts in the timber frame wall were identified as the work sections with the highest environmental impact. This high impact is mainly due to the end-of-life (EOL) processes of these work sections. Analysis of the generic datasets in the MMG database for the end-of-life processes of treated wood learned that it includes chromium. However, chromium is no longer used in Belgium for the preservation of construction wood. As untreated wood had a 50% lower environmental impact than treated wood, further research on the current wood preservation in Belgium is needed.