Life Cycle Assessment of Steel Framing Wall Systems: Hotspots for Environmental Improvements and Possible Trade-offs

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Abstract

Purpose: Identify the processes with the highest contribution to potential environmental impacts in the life cycle of steel framing wall systems by evaluating their main emissions contributing to impact categories, and identifying hotspots for environmental improvements and the possible trade-offs.

Methods: The research is based on the Life Cycle Assessment (LCA) study of steel framing wall systems performed by the authors. The processes that have demonstrated higher contribution to environmental impacts were identified in the Life Cycle Impact Assessment (LCIA) phase using the methodology ReCiPe and a detailed analysis was carried out on the mitigation strategies and possibilities of trade-offs.

Results and Conclusions: The highest potential impacts in the life cycle of the steel framing wall systems can be attributed mainly to emissions coming from the production of steel and fiber cement in most part of the categories. However the highest contributions have shown to come also from fiber wood production for the categories Agricultural Land Occupation and from gypsum fiber board production for the category Particulate Matter Formation. The results of this LCA study are part of a major research on the comparative analysis of different typologies of external wall systems, which aims to contribute to the creation of a life cycle database of major building systems, to be used by the environmental certification of buildings.

Keywords: Life Cycle Assessment, Steel Framing Wall Systems, Contribution Analysis, Sensitivity Analysis.