

Life cycle assessment of bio-based façades during and after service life: maintenance planning and re-use

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ABSTRACT

New developments in the field of wood protection, coupled with the European political will to lower the environmental impact of the building sector, designates wood and bio-based materials as an excellent option for building façades. Despite that, the share of wood in the European wood construction market is low, with the exception of some North European countries. For that reason, it is necessary to increase a confidence in bio-based façades by demonstrating their environmental performances during and after the service life by means of solid scientific tools and experimental evidences. As a pilot study, we investigated the interactive LCA in two maintenance scenarios (high and low intensity), assuming two diverse cladding bio-materials (untreated sawn wood and chemically modified wood). A dedicated software tool was developed for the needs of these analysis allowing dynamic simulation of environmental impact and immediate visualization of the LCA contributions. The end-of-life options were assessed with a different approach. Firstly, several alternative scenarios for re-use that are available on the market were identified and listed. Secondly, we established a weight-based expert system expressing importance/advantage of each scenario in order to classify each end-of-life option according to its provision of environmental benefit. Finally, we assessed the suitability of each defined end-of-life option for all evaluated bio-based materials.

The interactive LCA system that we propose allows rational choice of material and maintenance operation during service life. In fact, based on the location it will be possible to forecast a realistic maintenance plan, which will be customized according to the aesthetical expectation of the user.