

Use of LCSA for analysing potential sustainability impacts related to circular use of wood

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Introduction

The aim of the study was to provide a critical understanding of the potential environmental, economic and social impacts and benefits related to the deployment of circularity measures in the manufacturing of **industrial wood-based products**. In addition, the aim was to consider how life cycle sustainability assessment (LCSA) can support decision-making in the wood industry, and what are the practical challenges in its implementation.

Case studies

Each case study included a **circular-oriented innovation**:

- A window based on 100% recovered wood
- A versatile modular glue and nail free construction system allowing reuse of solid wood elements (WLT)
- Kraft paper produced from sawdust and recycled fibre integrating benefits of heat recovery
- Particle board based on waste wood and a highly optimized production of resins
- Particle board manufactured from regionally collected post-consumer wood waste.

Altogether three LCSAs (consisting of an environmental LCA, a social-LCA and a life cycle costing study) were conducted. For the two particle board cases, only env-LCA was made. Some high quality primary data was acquired, but Ecoinvent and SHDB were necessary complementary data sources.

Applied methods

Applied goal and scope and the implementation of the methods varied between the case studies. Some differences occurred also between the different assessments in individual case studies.

For **environmental LCA**, the PEF method and the guidelines from the ISO14040-44 and the ILCD Handbook were applied.

Social LCA studies applied the methodology presented within the Handbook for Product Social Impact Assessment (2018). Social assessment included both quantitative and qualitative data and results.

For **life cycle costing**, ISO15686 was applied and the total life cycle cost (TLCC) evaluated. Analysis had to rely on several estimations.

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Main findings

Complex scenario analysis was needed in order to evaluate potential trade-offs between material and energy uses of wood. In most cases, **environmental and economic benefits** related to recycling and re-use of wood and material uses of wood-based side streams were identified. **Social impacts and benefits** could be recognised but their analysis was more relevant on the level of the whole company, rather than product level.

The case companies were familiar with environmental LCA. Social-LCA and LCC were new methods. In general, the case companies considered the LCSA results to be interesting and useful.



Figure 1. One of the assessed case products. Stack of pre-assembled WLT elements (left) and a detail from an element's end (right). Red arrow points to a duct for threaded rods that tie the boards and elements as a WLT wall structure. Pictures: Tarmo Rätty

Background: WoodCircus project

The goal of the project is to identify, evaluate and disseminate good practices in the woodworking value chains in Europe, with a focus on wood construction.

During the project, over 60 potential good practices in process efficiency, wood recycling and waste management have been identified based on interviews, fact finding & state-of-the-art- studies and an open call for SMEs. After further evaluations, 5 cases were selected for detailed sustainability assessment.

Findings from the sustainability assessments will become available at: www.woodcircus.eu

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