

Building WUR-WU Database on new biobased materials to facilitate LCA analysis

Researchers

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Focus

In this project we establish a common, structured approach on how data should be collected, upscaled and reported for new biobased processes and biobased materials to be used in (prospective) LCA studies. We apply this approach to viscose production (for textile applications) and isolation material from miscanthus as a first step to build a life cycle inventory database on novel biobased materials.

Innovative idea and objective

Life cycle assessment (LCA) is the recognised method for assessing the environmental impacts of product systems. An essential element of LCA is to gather reliable inventory data, representing commercial production practices. However, for novel biobased products this data is most of the time very limited or not available in life cycle analysis software and databases (e.g., Simapro, Ecoinvent). Therefore, a methodology to facilitate prospective LCA of products and processes with low technological readiness levels is needed.

The main objectives of this projects are:

1. establish a common, structured approach to guide data collection and reporting
2. start building a life cycle inventory database for new biobased processes and biobased materials.

Relevance to the materials transition in textiles and/or building materials?

The bioeconomy transition strives for sustainable biobased feedstocks for a variety of applications. Within WFBR and WU, through various projects, both teams can have access to basic primary data on e.g., novel feedstocks, processing and conceptual process design and together form the basis for performing life cycle inventory analysis for new biobased materials transition.

What did you do?

- Literature review was done to gather the latest insights on data collection standards, templates, prospective LCA and scaling up methods.
- A decision tree and data collection template were built to support the data collection process.
- A temporary research assistant was hired to support the data collection and test the decision tree and data collection template.
- We selected 2 study cases: Miscanthus to produce insulation mats for housing and viscose and lyocell production for textile applications. These study cases were used to reflect on the developed decision tree, to improve our data collection template, and to start building a database for biobased materials.
- We reviewed, discussed and worked on the following topics: Bibliography review on different methodologies, approaches for data collection and Life Cycle Inventory (LCI) formats reported by ISO, PEF, and other current standards.
- We created a first version of a data collection decision tree, a template for data collection and a general overview of relevant aspects to consider for biobased raw materials.

Main result, achievement and highlight

We developed a general methodology for collecting existing data, generating new data, and adjusting data to represent industrial scale production, that will serve as an input for LCA calculations. We created schemes to support the data collection process (a decision tree) and a data collection template to support user with the documentation. The data collection template enables the results to be traced back through the calculations to the collected basic data and process operating conditions of biobased raw materials.

Key message

Formalized data collection activities should be established, adapted to specific circumstances (location, time frame, technology level, production scale), and reviewed periodically as a good practice. Generation of new source data will be limited by the resources available and it is important to report the quality of the data that is being used, as well as the level of maturity or TRL before using this data to create new process in the LCA software (SimaPro).

Visual abstract

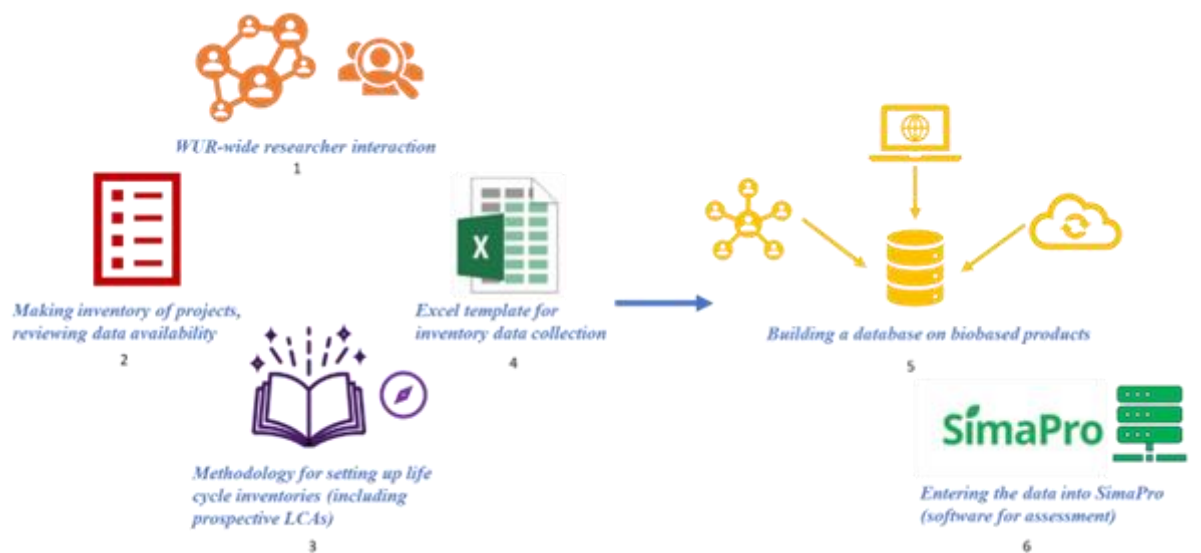


Figure 1: Key activities of project Building WUR-WU Database on new biobased materials to facilitate LCA analysis