

# **Critical Review Statement**

## **Mondi in-house life cycle-based tool**

**Product carbon footprint of paper-based solutions from pulp and paper mills**

**Product Impact Assessment of flexible packaging, hybrid and paper-based solutions of converting operations**

**Date: 2023.11.30**

**Status: Version 6**

## Type of review and review process

This review statement refers to the documentation of the “Mondi in-house life cycle-based tool” as reported by Mondi in the reporting document v6, October 12th, 2023.

The report was prepared by Nicole Unger, prior to the review and discussed and adapted during the review process. In addition, excerpts from the calculation and examples of results from the tool were provided. Furthermore, the correct presentation in the result output templates was checked. The background calculation approach and method were reviewed – no review of specific products or studies was conducted. The review did not include an examination of the correctness of the calculation or the individual calculation steps and the linking of the emission factors.

The critical review has been performed in form of a single person review by an external, independent reviewer, namely Iris Kral – denkstatt GmbH and Institute of Agricultural Engineering, University of Natural Resources and Life Sciences, Vienna (BOKU) – a life cycle assessment expert with specific experience in agricultural processes and circular economy.

The herein described critical review process took place from Mai-October 2023. Although the examined study is not a traditional life cycle assessment (LCA) or product carbon footprint (PCF) study according to the ISO 14040 and 14044 series [1a+b] or ISO 14067 [2], a critical review process based on the terms of ISO series [1a+b] and ISO 14067 has been established and is also referring to the requirements of the Greenhouse Gas Protocol – Product Life Cycle Accounting and Reporting Standard [3].

The critical review started only after the in-house tool was designed and implemented. The reviewer got a first (draft) report of the accompanying documentation as well as example calculations in MS Excel in May 2023 via e-mail. Within the framework of the review process, personal and online meetings took place.

At the beginning, the focus was on a model introduction of the reviewer by Nicole Unger (life cycle assessment expert), the key contact on Mondi's side. Later a list of comments was shared by the reviewer with Mondi accompanied by discussions and e-mail-exchanges. Mondi answered all questions in a detailed way and revised the model and report where necessary.

The following documents were available for the review (cited in the final version):

- In-house tool documentation by Nicole Unger (v6, October 12<sup>th</sup>, 2023)
- One example of a “PIA – Product Impact Assessment” document
- One example of a “10 Toes Product Carbon Footprint” document
- Several Excel files to show exemplary data collection and calculation steps which are carried out in the in-house tool

## Comments about the report and in-house-tool

Goal and scope: Calculation of streamlined LCAs for the impact categories climate change, water scarcity and land use of pulp and paper mills products and flexible packaging, hybrid and paper-based solutions for sharing with B2B customers.

The criteria for quality assessment were chosen based on the prerequisites mentioned in ISO 14040 [1a] and include the following points:

1. Is the chosen method scientifically sound and appropriate with regard to the objective of the study?
2. Are the data used sufficient and appropriate with regard to the system to be modelled?
3. Are the results robust and the conclusions drawn sufficiently justifiable regarding the goal and scope of the study? Is the report transparent and coherent?

1. Method: This tool did not aim to conduct a full LCA study according to the international ISO standards [1a+b] and the results are therefore not comparable with these. As mentioned at the beginning, this is therefore a study that does not present a full LCA (according to [1a+b]) regarding the impact factors covered but focuses on the impact categories "climate change", "water scarcity" and "land use". As a "streamlined" assessment, it is aimed to present all significant and relevant emission sources. Limitations (see section 2) are communicated transparently in the respective chapter of the documentation. Otherwise, the applied methodology largely follows the LCA approach, which is subsequently used for the quality assessment. In the reviewer's opinion, this has been implemented in a scientifically adequate manner and is comprehensible.

2. Data: Where possible, primary data, which is collected and updated annually for the Product Carbon Footprints of paper-based solutions from pulp and paper mills, or on demand for Product Impact Assessments of solutions from converters, are used. In the case of data gaps, justified assumptions are made and the limitations are presented transparently. The databases used (Ecoinvent and IEA datasets, in regularly updated versions) are up-to-date and of adequate quality.

Overall, the embedded data on raw materials and processing used is described sufficiently and transparently; however, it was not the object of this review process to validate product specifications, bill of materials and recipes, but only to review the methodology applied.

- Emissions from manufacturing at Mondi sites are based on Scope 1 and 2 emissions and are not calculated in the life cycle-based tool but taken from the

internal SIM system (reporting system of environmental parameters) – not part of this review. GHG emissions data are externally assured each year as part of Mondi's annual sustainability reporting. The scope of assurance is as follows:

- Reasonable assurance: Total energy usage, total scope 1 and total scope 2 GHG emissions for Mondi's pulp and paper mills.
  - Limited assurance: Total Scope 1 and total scope 2 GHG emissions for Mondi's converting operations, and scope 3. (For details see Mondi Sustainable Development Report: [mondigroup.com/SD22](http://mondigroup.com/SD22))
- Scope 3.3 emissions were additionally calculated and included based on Ecoinvent data to ensure completeness.
  - Collected input data and recipes (via Excel datasheets) are being verified and reviewed by Mondi-LCA-experts.
  - In this streamlined approach purchased biofuels, tall oil and saw dust are calculated without burden; the disposal of manufacturing waste is not included.
  - The methodological choice to communicate biogenic carbon stored in the product but not taking it into the calculation is entirely valid and transparently documented.
  - Two full LCAs (incl. panel review) were conducted for Mondi products and results compared to results of the in-house tool. Differences were within a reasonable range and justifiable (deviations mostly due to assumptions; results were not significantly higher or lower).
3. Results and documentation: The detailed documentation of Mondi's in-house life cycle-based tool was only available to the reviewer but there is a PDF-documentary shared with the Product Impact Assessment result created by the in-house-tool including not only a description of the applied method and interpretation of results (individually written by Mondi-LCA-experts) but also the following disclaimer to prevent mishandling: "Valid for 2 years. These results are to be kept confidential and not to be disclosed to third parties nor publicly communicated without prior approval by Mondi."

The review of single results or specific results documents was not part of this review but the overall structure, content and graphical display of the exemplary results document was found to be presented in a comprehensible and transparent manner, also for non-LCA-experts. The communication document is logically designed and clearly structured - with all essential parts included. Some inventory data like composition details cannot be displayed due to disclosure reasons but can be made available for external reviewers in case of a critical review. Results are reported objectively and in a standardized way and interpreted by Mondi-LCA-experts to be easily understandable for non-LCA-experts.

## Conclusion

The method and calculation approach for "Mondi in-house life cycle-based tool" fulfils the described requirements for methodology (with the limitations mentioned), data quality, results/interpretation and transparency. Considering the limitations regarding the methodology (no complete conformity with the ISO 14040 series due to a streamlined LCA approach and only calculation of selected impact categories) and the interpretation of results (statement valid only for the method/approach used, not for each result produced with it), the streamlined-LCA-approach of the in-house tool can be considered methodologically compliant with the requirements of ISO 14040/44 and ISO 14067 as well as the Greenhouse Gas Protocol – Product Life Cycle Accounting and Reporting Standard.



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## References

[1a] International Standard (ISO): Environmental management - Life cycle assessment - Principles and framework. Standard ISO 14040:2006 (2006).

[1b] International Standard (ISO): Environmental management - Life cycle assessment – Requirements and Guidelines. Standard ISO 14044:2006 (2006).

[2] International Standard (ISO): Greenhouse gases – Carbon footprint of products – Requirements and guidelines for quantification. Standard ISO 14067:2018 (2018).

[3] World Business Council for Sustainable Development (WBCSD): The Greenhouse Gas Protocol – Product Life Cycle Accounting and Reporting Standard. GHG-Protocol (2011).