



INSTITUT FÜR ENERGIE-  
UND UMWELTFORSCHUNG  
HEIDELBERG

---

# Review statement on European database for corrugated board life cycle studies, 2023

Dataset owners: CEPI Containerboard & FEFCO corrugated packaging

Dataset developer: Michael Sturges, RISE - Research Institutes of Sweden

Reviewer: Frank Wellenreuther, ifeu - Institut for Energy and Environmental  
Research

Heidelberg, April 2024

---





# Index

---

## Contents

<b>1 Background and Goal</b>	<b>3</b>
<b>2 Review</b>	<b>4</b>
2.1 Review procedure	4
2.2 Documents provided and reviewed	4
2.3 Review of the database report	4
<b>3 Conclusion</b>	<b>7</b>

# 1 Background and Goal

---

CEPI ContainerBoard (CCB) and the European Federation of Corrugated Board Manufacturers (FEFCO) collected data from the industry to document the environmental impact of corrugated board.

The result is a European database for life cycle studies that includes data for the production of:

- Corrugated base papers from primary fibres: Kraftliner, White Top Kraftliner and Semicheical Fluting (data from CCB)
- Corrugated base papers from recovered papers: Testliner, White Top Testliner and Wellenstoff (data from CCB)
- Corrugated board products (data from FEFCO).

The data is the eleventh edition of the database and represents averages of the inputs and outputs from the production sites per tonne paper and per tonne of corrugated board product for the year 2022.

The database report has been prepared by RISE Bioeconomy.

The updated database was presented to Frank Wellenreuther of ifeu gGmbH for critical review.

The goal of the review presented here is to ensure that:

- the methods used to compile the database are scientifically and technically valid,
- the methods are used consistently within the FEFCO LCA database,
- the data used are appropriate and reasonable in relation to the goal of the LCA Database
- the LCA database report is transparent and consistent.

## 2 Review

---

### 2.1 Review procedure

This review has been commissioned by FEFCO on the 27<sup>th</sup> of November 2023. The review work has been conducted in two steps. For the first step, on the 1<sup>st</sup> of January 2024, the dataset developer provided a first draft report of the LCI study for review. In an online meeting on the 6<sup>th</sup> of January 2024 the data developer presented the results and first comments and questions by the reviewer were discussed. In the second step the final draft database report including an annex with gate-to-gate inventory data for corrugated base papers and corrugated converting processes, together with the excel calculation sheets and the data master file were provided for review on the 25<sup>th</sup> of February 2024. An updated database report including corrections to the energy inputs was sent on the 28<sup>th</sup> of March 2024.

This review statement has been sent to the commissioner and the dataset developer on the 1<sup>st</sup> of April 2024. It refers to the latest version of the database report received on the 28<sup>th</sup> of March 2024.

### 2.2 Documents provided and reviewed

The dataset developer provided the reviewer with several documents relevant for a clear understanding of the data compilation process. Those documents were as follows:

#### Excel data and calculation sheets:

- analysis – papermills 02-11-2023.xlsx
- converting plant averages.xlsx
- gate-to-gate paper plus converting.xlsx
- calculating CO<sub>2</sub> from converting.xlsx
- Master file – All participants data 2023-12-20 – FEFCO – final version.xlsx

#### Report:

- FEFCO environmental database – draft report 15-01-2024.docx

The Excel sheets provided allowed the reviewer a detailed insight into the underlying data and a review of the calculation methods used.

### 2.3 Review of the database report

- The final draft of the database report is named FEFCO environmental database – draft report 15-01-2024.docx. It has been updated twice though since the date in the document name and the latest version has been made available to the reviewer on the 28<sup>th</sup> of March 2024.
- The report contains a single European average inventory dataset covering corrugated board production including the production of the four main paper grades used.

- In an annex to the report the separate gate-to-gate inventory datasets for the four paper grades and the converting process are also included.
- It contains a very detailed section describing the production processes.
- The dataset for the corrugated board is calculated by multiplying the average paper grade composition data from the paper mills with 1.12 (as on average 1.12 tonne of paper is used for 1 tonne corrugated board) and adding the corrugated board data from converting facilities.
  - ⇒ The detailed section describing production processes is well written and very much appreciated as it will help non-professionals to understand and therefore use this dataset correctly.
  - ⇒ This calculation approach is transparently presented in the report and considered suitable for the generating of one average dataset.
- The underlying datasets differ in their representativeness. The data for Semichemical Fluting and Kraftliner represent more than 90% of the total annual production of corrugated base papers from primary fibres in Europe. The data for the production of Testliners and Wellenstoff represent about 62% of the total annual production of corrugated base papers from recovered paper in Europe. The data on corrugated board production represents 56% the total annual production of corrugated board in Europe.
  - ⇒ While the representativity could be improved compared to the previous version (#10) of this database for the base papers from primary fibres, the representativity for base papers from recovered paper and especially for the corrugated board production is now considerably lower (56% instead of an earlier 73%) than for the previous version of this database. Nevertheless, the resulting dataset is considered to be representative of the European production of corrugated board and the reference year 2022.
- Allocation of inputs and outputs was not necessary in all cases of data collection. At some sites only one grade of product is produced, at some the mills were able to assign inputs of raw materials to the different products. In remaining cases allocation between co-products has been done by data providers according to causality.
- Inputs and outputs allocated to other products (not by-products) and sold energy have been excluded from the inventory data.
- No allocation was made to by-products, so the reported inventory includes the production of these by-products.
  - ⇒ The allocation procedure is considered suitable to deliver the most valid results possible.
- The inventory tables include the inputs and outputs per ton net saleable product.
- The list of material inputs does not include packaging material.
- The list of material outputs includes residues.
- Total sums for some material or energy inputs are additionally presented.
- Apart from material and energy flows also transport parameters for wood, recovered paper, pulp and paper to corrugating plants are listed.
- An additional table listing internal fuels, which are not added to the inventory data as their emissions are already accounted for, is presented.

- ⇒ Biogenic and fossil-based CO<sub>2</sub> is reported transparently.
- ⇒ The reviewer appreciates the consideration of peat as fossil fuel regarding the quality of CO<sub>2</sub> emissions.
- ⇒ Water balances have been checked by the reviewer and are found to be sufficiently closed (the difference is also reported in the inventory)
- ⇒ The inclusion of internal fuels for information purposes is appreciated.

# 3 Conclusion

---

The presented documentation of the dataset is considered transparent and correct, clearly describing how the dataset has been built up and what it represents in terms of production, technology, geography and time. This is considered appropriate for the intended application: gate-to-gate LCI dataset for production of corrugated board for use in LCI/LCA studies.

- ⇒ the methods used to compile the database are scientifically and technically valid,
- ⇒ and consistently used within the FEFCO LCA database.
- ⇒ the data used are appropriate and reasonable in relation to the goal of the LCA database.
- ⇒ the LCA database report is transparent and consistent.

The input and output flows have been cross-checked by the reviewer with other paper sector datasets and have been found to have a high level of completeness including all relevant flows of inputs of raw materials and energy.

## Limitations

The data set refers to European industry average. This review does not apply to any individual datasets collected at single mills or corrugated board plants.

Heidelberg, 01.04.2024



Frank Wellenreuther, ifeu gGmbH