

Product Carbon Footprint



Critical Review of environmental impact: filter media change

**MANN +
HUMMEL**

by

 **ClimatePartner**

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1. Review Summary

The Product Carbon Footprint (PCF) calculations by GESSNER are building the cornerstone for the study »Confirmation of environmental impact – filter media change«, which is conducted by Mann+Hummel.

The study uses Life Cycle Assessment (LCA) and carbon footprinting methodologies according to the »Greenhouse Gas Protocol Product Life Cycle Accounting and Reporting Standard« (GHG Protocol) to calculate the carbon footprints of a product line (different filter media) defined by its sales description.

Aim of the study is the Evaluation of positive environmental impact due to change of recipe of impregnation in cellulose-based filter media.

The filter media contains a phenolic impregnation to provide mechanical and chemical stability for automotive applications. The major component (by mass) is phenol, which is usually produced based on fossil resources, coming from crude oil. The new recipe partly contains lignin-based phenol instead of fossil-based phenol.

The aim of the validation is to confirm the associated CO₂e savings, as well as the impact on the resulting crude oil savings in the present review.

As part of their quality assurance, Mann+Hummel commissioned this critical review by an independent external expert to ensure the methodological conformity with the relevant standards and the scientific accuracy of the data and models.

The critical review confirms that the PCF study has been carried out following the GHG Protocol methodology. The life cycle data and models appear appropriate and consistent. Due to the lack of a formal report, the reporting requirements are not completely conformant. The critical review was conducted based on an audit of the calculations.

Based on this review, ClimatePartner has not identified any significant changes needed to Mann+Hummel's statement that Gessner's PCFs are correctly reported and comply with the GHG Protocol Product Life Cycle Accounting and Reporting Standard.

The review led to the following conclusion:

Following an examination of the provided documentation and the resolution of outstanding inquiries by both Mann+Hummel and Gessner, it can be confirmed that the CO₂e savings derived from Gessner's PCF calculation are valid and conform to the requirements of the GHG Protocol. Furthermore, the methodology for calculating crude oil savings is coherent, transparent, and free from objections.

2. Critical Review Report

This critical review report refers to the concept paper »Confirmation of environmental impact – filter media change« as of 12th of February 2025, various Product Carbon Footprint Reports by Gessner on the raw materials used in the products, as well as an Excel document with an overview of the various filter media considered.

While Gessner have followed the methodological requirements of the GHG Protocol in conducting the PCF study, a formal and detailed PCF report containing all mandatory information is missing. The relevant gaps to be publicly reported in order to be in conformance with the GHG Protocol are noted below.

2.1 Purpose of this Critical Review

The critical review process is intended to ensure consistency between the product inventory and the principles and requirements of the GHG Protocol. As per the established practice in LCA, this critical review shall ensure that:

- Methods used to carry out the product inventory are consistent with the GHG Protocol Product Standard;
- Methods used to carry out the product inventory are scientifically and technically valid;
- Data used are appropriate and reasonable for public reporting;
- The inventory report and any conclusions based on the results are appropriate for GHG-only inventories;
- The inventory report is transparent and consistent.

In view of Mann+Hummel's goal to evaluate and communicate the validation of CO₂e savings and the reduction of crude oil as a fossil resource, this objective is considered in this critical review by ClimatePartner.

2.2. General Information and Scope

The results report contains the studied product name and description, unit of analysis and reference flow, specifying a cradle-to-gate inventory. The audit report documents that the PCF study, in addition to CO₂e, also considered the six other Kyoto Protocol greenhouse gases (Global Warming Potential (GWP 100) incl. biogenic carbon).

Some formal items are missing in the report and needs to be appended to the publicly available report:

- Contact information of the PCF calculator
- Contact information of the client;
- A disclaimer stating the limitations of various potential uses of the report including product comparison.

- Separate reporting of CO₂e and biogenic emissions

2.3. Boundary Setting

The PCF reports contain the definitions of the life cycle stages (cradle-to-gate): They include raw material extraction and emissions from production at Gessner. Furthermore, certain life cycle phases are explicitly excluded (cut-of rules). For example, transport (upstream and downstream), the utilisation phase and an end-of-life scenario are not considered. A reference year and period for production are not specified.

- This information should be included in the publicly available report.

2.4. Allocation

For raw materials, auxiliary materials, and packaging no allocation was necessary. An allocation of the general emissions based on an on-going corporate footprint project has not yet been feasible, but was estimated to add insignificantly to the calculated PCF.

- These information items need to be included in the publicly available report.
- Alternatively, it should be explicitly stated that this information is excluded from the analysis, as it does not constitute a significant and thus relevant contribution to the overall result of CO₂e savings.

2.5. Data Collection and Quality

The study '*Confirmation of Environmental Impact – Filter Media Change*' includes a description of data sources, primarily ecoinvent 3.10 and DEFRA 2023, with additional primary data collected from suppliers (e.g., phenolic-based resin, lignin-modified phenolic resins) and the Sphera MLC 2024 database.

However, information regarding data quality and efforts to improve it is not provided. Mann+Hummel conducted iterative quality and plausibility checks. It was noted that the production site had not yet transitioned to green electricity, making the calculation rather conservative.

The study compares two versions of a filter medium. In the new version, based on lignin, the coating of the filter medium was specifically adapted. Additionally, the grammage of the raw material was reduced for certain products (see Excel in the appendix 'Filtertypen'). These adjustments and their effects on the PCF were clearly illustrated in terms of material usage (g/m²).

All other factors, including product components, processes, and origins, remain identical for both versions. Consequently, emission reductions result solely from modifications to the surface treatment of the raw materials or material savings.

2.6.Uncertainty

The review report contains no qualitative statements on inventory uncertainty but methodological choices. The modelling was carried out in Sphera LCA for Experts. The calculation models are held to be robust, based on recipe information ("BOM").

2.7.Inventory Results

The review report specifies the source of the GWP factors used (mainly ecoinvent 3.10 and DEFRA 2023 database). The results report shows the total inventory results in units of CO₂e per unit of analysis.

A transparent PCF declaration would also need to include:

- Cradle-to-grave inventory results separately.
- The negative biogenic CO₂e emissions (binding of the carbons in the wood fiber) are released again at the end of the life cycle through thermal end use to the same extent as they were previously bound in the fiber.

For the purpose of the study and a comparison of the product versions, this life cycle phase can be disregarded.

2.8.Assurance

The critical review and assurance was performed by a third party – ClimatePartner Deutschland GmbH.

Frederik P. Pöschel and Christopher B. Buers are experts in carbon accounting with well over 10 years of practical experience each.

As early as 2014, they developed a successful, freely available carbon accounting software for the German market, which made a significant contribution to carbon accounting in SMEs and is still used today as one of the standard accounting tools in German-speaking countries.

Mann+Hummel commissioned the verification. After a kick-off meeting in which the aim and process of the study were explained, the PCF summary reports from Gessner, an article overview with calculated CO₂e savings and a project description were submitted for review.

ClimatePartner compiled a list of questions based on the GHG protocol in order to conduct an in-depth review. Mann+Hummel was able to answer all the questions posed and provide comprehensible explanations.

The results were randomly checked to validated the calculated savings in CO₂e and crude oil. The answers and additional findings were documented in this audit report.

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