

**Product Carbon Footprint Calculation
Supplier Guideline**

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Heidenheim

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1. Introduction

To drive its climate protection strategy effectively, Voith joined the Science Based Targets Initiative (SBTi) in January 2024. By doing so, Voith has become one of more than 7,000 companies worldwide that have set themselves scientifically recognized climate targets. To meet the ambitious carbon emission reduction goals and to support customers in achieving theirs, Voith aims to develop and produce sustainable and low-carbon products. Therefore, Voith strives to achieve transparency concerning the carbon footprint of its products (Product Carbon Footprint - PCF). Calculating product carbon footprint is one of the methods to assess product sustainability. The PCF focuses on the ecological dimension of sustainability. It is based on a life cycle assessment (LCA) using the single impact category of climate change.



As a supplier of industry and automotive products the product carbon footprints of our products portfolio will help to provide data for the carbon footprint calculation of our customers' purchased materials (Scope 3.1 emissions of customers). This transparency is crucial for our customers who are targeting GHG Scope 3 tracking and reduction, but also important to our investors and the authorities. Furthermore, the results of the calculation will be used at different departments within Voith to drive product sustainability. For example, the results can support R&D department in designing new products or purchasing department in selecting raw materials supplier.

In November 2022, Voith started asking its suppliers to deliver the PCF of their products. The following document provides background information and guidance for suppliers of Voith in calculating the product carbon footprint (PCF).

2. Methodological principles and requirements

2.1 Scope

Declared unit

The declared unit is a specific quantity of the product used as a reference to quantify its carbon footprint. The **declared unit** to which the PCF refers **must be specified in the reporting template**. Unless specified otherwise, the declared unit should refer to the unit and denomination defined in the order (e.g. per pcs., per 1kg etc.) of the product at the factory gate. If a specific declared unit is required, the definition of the declared unit will be provided in the reporting template.

System Boundary

The PCF should be calculated in a **cradle-to-gate product system**. It is defined from the extraction of raw materials up to production of the final product. It includes all product related direct GHG emissions, from Scopes 1, 2 and Scope 3 (upstream) (Figure 1). Any significant exclusions should be stated in the reporting template.

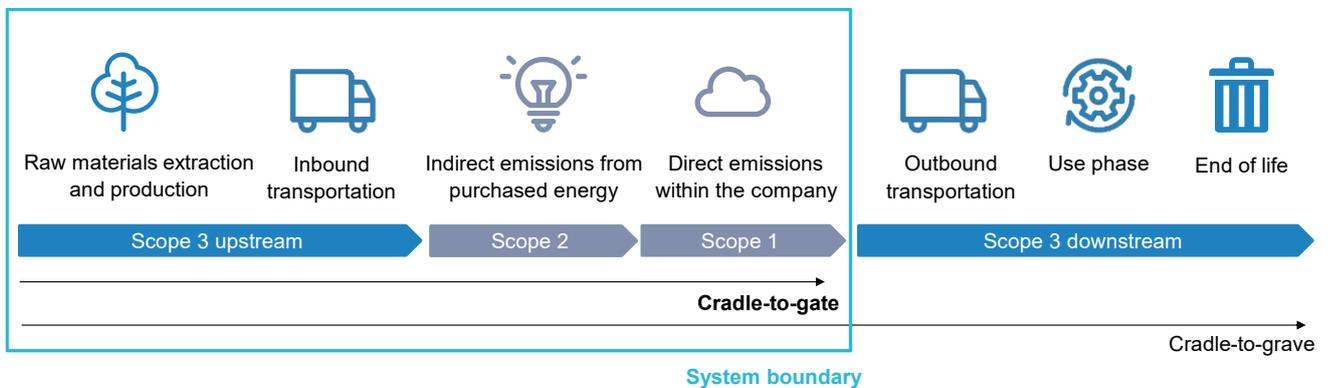


Figure 1. System boundary definition according to GHG Protocol

- **Scope 1** emissions are direct emissions from the company's own operations, e.g. gas consumption.
- **Scope 2** emissions are released by the generation of energy outside the company's own operations, e.g. purchased electricity.
- **Scope 3 (upstream)** emissions include indirect emissions from purchased raw materials, generation and extraction of fuels consumed by the manufacturing sites and transportation of raw materials.

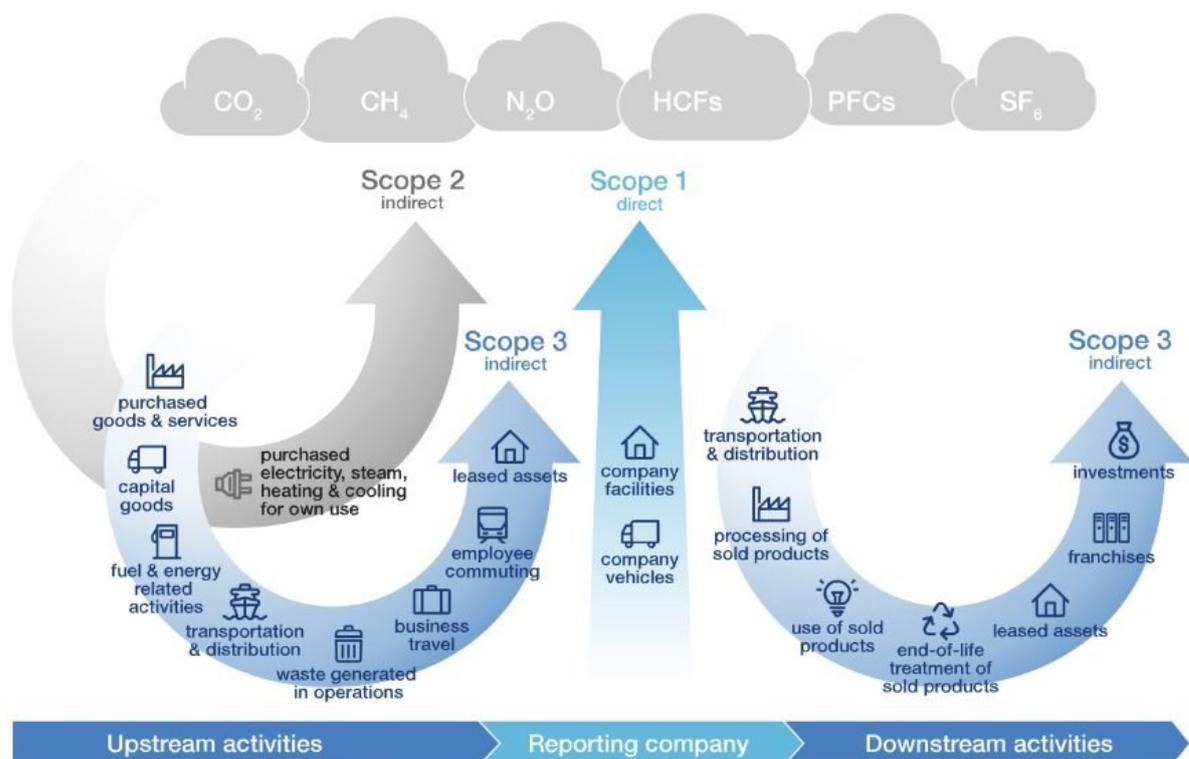


Figure 2. Emission scopes according to the Greenhouse Gas Protocol

Included	Excluded
<ul style="list-style-type: none"> • Raw materials extraction and production • Transport of raw materials to production site • Transportation between production sites (if applicable) • Production (operation materials, energy and fuel use) • <i>Optional: Treatment of production waste (distinguished between on- and off-site)</i> 	<ul style="list-style-type: none"> • Outbound transportation

Packaging may be relevant for certain products. If so, this requirement will be specified in the reporting template. In any case, it must be reported if packaging is included or excluded.

Table 1. System boundary of cradle-to-gate product system

Cut-off criteria

Cut-off criteria are a specification of the amount of material or energy flows or GHG emissions excluded from the PCF calculation. Cut-offs may become necessary in cases where no data are available, where elementary flows are very small (below quantification limit), or where the level of effort required to close data gaps and to achieve an acceptable result becomes prohibitive.

Materials or energy inputs that account for less than 1% of the total input can be cut off respectively, however, only up to **a maximum of 5% of the total input** (e.g. for a component weighing 100kg, all materials weighing less than 1kg may be cut off, but at least 95 kg of the component must be considered for the calculation). **The selected cut-off criteria must be specified in the reporting template.**

In cases where no suitable life cycle inventories are available to represent a raw material or where inputs or outputs are very small (below quantification limit), proxy data should be applied.

Included GHGs Emissions and Selected Characterization Factors

The characterization method focuses on greenhouse gas (GHG) emissions. The impact of greenhouse gas emissions – such as carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) is assessed over a fixed period of 100 years according to the Bern carbon cycle model. The product carbon footprint, expressed in kg CO₂ equivalents (CO₂e), reflects the climate change impact of air emissions of greenhouse gases (GHGs). Increased GHGs in the troposphere result in warming of the earth’s surface.

The climate change category considers that different gases have different climate change impacts on global warming. The total impact is described in CO₂ equivalents. The product carbon footprint should be calculated considering all six gases from Kyoto Protocol (Carbon dioxide (CO₂), Methane (CH₄), Nitrous oxide (N₂O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulphur hexafluoride (SF₆), plus Nitrogen trifluoride (NF₃), measured by mass and converted into CO₂ equivalents using the 100-year global warming potential (GWP) coefficients of the current version of the Assessment Report of the United Nations (UN) Intergovernmental Panel on Climate Change (IPCC) with climate carbon feedbacks. This includes CO₂ from land use and land use change.

In case of using the Software “LCA for Experts” by Sphera Solutions GmbH, we recommend using following characterization method: “ISO14067 GWP100 (based on IPCC AR6), Fossil GHG emissions [kg CO₂e.]” or the current equivalent.

2.2 Data requirements for calculation

Primary data corresponds to values from a direct measurement, or a calculation based on direct measurements at the original source. Secondary data does not fulfil the requirements for primary data, e.g. generic data from emission factor databases (derived from ISO 14067:2018).

Calculation should encompass primary data from reporting company and high-quality secondary average data from databases (e.g. MLC Databases 2023 Edition by Sphera Solutions GmbH, Ecoinvent, IDEMAT) or from third parties for purchased energy and raw materials.

Minimum criteria on data quality of **primary data** collection are shown in Table 2.

Data quality criteria	Requirement
Geographical representativeness	Data from all sites must be relevant for the product under study.
Temporal representativeness	The data considered must refer to the most recent annual administration period, is not older than 5 years, covers at least 12 calendar months to avoid seasonal changes.
Consistency	To ensure consistency, data should show no more than a 15% deviation from the previous year's primary data. If the deviation is larger, practitioners must provide a justifying comment.
Reliability	Data must be based on measurements or qualified estimates by product experts of actual and site-specific internal production data.
Precision	Data must be internally verified; it is advised to check plausibility by an external reviewer.

Table 2. Minimum criteria on data quality of primary data

The selection of **secondary data** shall be applied as follows:

For electricity, the market-based approach is recommended, meaning that emission factors specific to the electricity mix provided by the respective supplier should be utilized. This approach includes renewable energy purchased by the company. If the specific mix is not available, the national electricity mix (location-based) should be used.

For Scope 3 processes, the hierarchy below shall be applied:

1. If the production origin (region or country) of the supplied raw material and fuel is known choose a regional or country-specific production mix.
2. If the production origin is not known choose a regional or country-specific production mix based on the location of tier-1 supplier.
3. If there is no regional or country-specific dataset available choose the same raw material or fuel from another country or region which is the most appropriate in terms of GHG emissions.
4. If the specific raw material or fuel is not available choose an appropriate proxy e.g., a chemical substance from the same chemical group

2.3 Methodology

Allocation

Allocation refers to the process of distributing the total greenhouse gas emissions generated by a production system or facility among the various products that are produced. Since multiple products often share common resources and processes, it is necessary to assign a portion of the total emissions to each product. Different allocation methods can be used, such as physical allocation (emissions are distributed based on the mass of each product or energy consumed in producing each product), economic allocation (emissions are distributed based on the economic value of each product).

Allocation should be avoided, and data should be **specific to the system under study**. If allocation methods are applied, the selected methods should be briefly explained in the reporting template.

Norms and Sector-specific Guidelines

Calculation of a product carbon footprint should follow the requirements and guidance of ISO 14067:2018, which builds on the principles and requirements of the ISO standards 14040:2006 and 14044:2006 for life cycle assessment.

Update

The data on product carbon footprint should be updated annually for the corresponding calendar year. If there have been no changes, a notification stating that no updates have occurred must be submitted.

2.4 Reporting requirements

When reporting product carbon footprint, a supplier must provide following information:

- Company
- Contact Person(s)
- Name of product
- Declared unit
- System boundaries
- Location of production
- Cut-off criteria
- Sources of secondary data
- Time-related scope
- Geographical scope
- Technological scope
- Allocation methods
- Life Cycle Impact Assessment method used
- Used standard for calculation

The Voith PCF Emission Reporting Template should be used for reporting the data.

3. Checklist

Following steps shall help validate product carbon footprint calculation.

- Check the overall mass balance (raw material inputs, waste)
- Check the appropriateness of the secondary datasets selected for Scope 3 and see if supplier data is available to replace secondary datasets
- Compare your results against own calculations, same product from other sites, publicly available LCA data
- Check why there are significant deviations from LCA benchmark data
- Submit data for internal verification
- Prepare the reporting template to report the data to Voith

For more information on PCF calculation, please refer to DIN EN ISO 14067:2018. If there are any questions regarding the methodology, do not hesitate to contact Voith.