

# PRODUCT CARBON FOOTPRINT (PCF) CALCULATION CHECKLIST

Corrugated Board Packaging

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# PURPOSE

This document provides a **practical checklist for calculating the Product Carbon Footprint (PCF)** of corrugated cardboard packaging.

In an industry where similar products are made by multiple manufacturers, having a harmonised approach to PCF calculation is essential to **ensure comparability, credibility, and transparency.**



A PCF quantifies the **total greenhouse gas (GHG) emissions** associated with a product throughout its life cycle or defined stages, typically expressed in CO<sub>2</sub>-equivalents.

This checklist sets out a **minimum standard** for methodology, data sources, and customer communication, enabling companies to speak a common language on climate impact and support **meaningful emissions reductions for their products and plants.**

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# MINIMUM STANDARD FOR PCF CALCULATION



## System Boundary

Cradle-to-Gate (raw material extraction to factory gate):

- Biomass
- Fibres
  - Mill
- Corrugator
- Transport



## Calculation

The PCF consists of four separate figures:

- Fossil origin emissions
- Biomass origin emissions
  - Biogenic removal
- Emissions and removals of biogenic CO<sub>2</sub> due to direct land use change (dLUC)



## Cut-off Criteria

Include all flows contributing **>1%** of mass, energy, or environmental impact



## Functional Unit

**1 kg** of corrugated cardboard (*in most cases*)  
or  
**1 m<sup>2</sup>** depending on customer/product type



## Allocation Rules

Follow **ISO 14044**  
– Prefer physical allocation (e.g., mass/energy), then economic



## Units & Consistency

Report in **g CO<sub>2</sub>e / net saleable product**

# METHODOLOGY GUIDANCE

There are plenty of methodologies available on the market. To ensure product-level emissions are calculated in a compatible and consistent manner, we suggest relying on the following **framework** when opting for a specific methodology:



## PACT – The Partnership for Carbon Transparency

A global standard developed to calculate and exchange Scope 3 emissions data across value chains. Based on existing standard and sector specific hierarchy (GHG, ISO, PEF,...) it provides guidance on calculation and data integrity, assurance and verification, exchange of cradle-to-gate PCFs, and creating more and consistent emission data.



## GHG Protocol Product Standard

Product Life Cycle GHG accounting a subset of LCA (life cycle assessment) from GHG protocol and the World Resource Institute (WRI) and World Business Council for Sustainable Development (WBCSD), can be used to understand the full life cycle emissions of a product.



## PEF Category Rules

The European Commission Product Environmental (PEF) Category Rule (PEFCR) for Intermediate Paper Product provides a unique set of requirements for developing PCF in compliance with EF standard of EU.



## ISO Standards

- **ISO 14067 (PCF):** Greenhouse gases – Carbon footprint of products – Requirements and guidelines for quantification and communication.
- **ISO 14040/14044 (LCA Principles):** Environmental management – Life cycle assessment – Requirements and guidelines.



## Paper and board industry framework

- **CEPI's** Framework for Carbon Footprints for Paper & Board Products (2017)
- **CITPA** Guidelines for calculating carbon footprints for paper-based packaging (2018)

In addition, we advise to consider:

### Life Cycle Inventory (LCI)

- **Primary data:** Energy, material, waste, and transport data from own operations.
- **Secondary data:** Use consistent databases (e.g., ecoinvent, USLCI, GaBi, or other recognised).

### Key Impact Categories

Focus on **Climate Change (CO<sub>2</sub>e)**; optionally mention water, land use, etc.

# SECONDARY DATA FRAMEWORK



## Sources

Use regionally relevant, up-to-date databases (max 5 years old) such as:

ELCD<sup>1</sup>   Ecoinvent<sup>2</sup>   USLCI<sup>3</sup>

Sphera's LCA for Experts (formerly GaBi)<sup>4</sup>



## Quality Requirements

**Temporal:** ≤5 years old

**Geographical:** Regionally representative

**Technological:** Match production technology



## Data Gaps

Justify and document assumptions for missing data

Use industry averages where primary is not available (*clearly disclosed*)

1. European Reference Life Cycle Data System: <http://lca.jrc.ec.europa.eu>
2. Ecoinvent Centre, known as the Swiss Centre for LCA: <http://www.ecoinvent.org/>
3. The National Renewable Energy Laboratory (NREL): <https://www.nrel.gov/analysis/lci>
4. Sphera (GaBi): <https://lca-software.org/sphera-gabi/>

# CUSTOMER COMMUNICATION



## Reporting Format

Provide a PCF value per functional unit with breakdown (*materials, energy, transport, etc.*)

Indicate methodological standards and data quality levels



## Claims & Comparisons

No comparative assertions unless verified under ISO rules

Be transparent about uncertainty and system boundaries



## Support

Provide a short interpretation summary

Offer to share methodology and data sources on request

PCF provides **transparency for customers**, offering **real-time data** to help them make informed and sustainable choices.

# CHECKLIST FOR FEFCO PRODUCT CARBON FOOTPRINT (PCF)

## Calculations for Paper-based Packaging

S. NO.	CRITERIA	TICK OPT.	REMARK
1	Are you calculating PCF as per CEPI ten TOE's defined in CITPA Guidelines for calculating Carbon footprints for paper-based packaging?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Optional
2	Does your system boundary include all the major components & activities related to – Biomass, Fibres, Mills, Corrugator, and transport?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Mandatory
3	Do you calculate all four kinds of emissions from the above components & activities – fossil, biogenic emissions, biogenic removals, and biogenic emissions associated with dLUC (direct land use change)?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Mandatory
4	Have you defined your functional unit (i.e. 1 kg Corrugated cardboard or board box)?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Mandatory
5	Does the cut-off criteria include all the activities in calculation, which contributes to >1% of mass, energy, or environmental impact?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Minimum required. But all the activities can be included even if their share is less than 1% of mass, energy, or environmental impact
6	Physical allocation method is chosen for mass/energy and byproducts?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Mandatory - System expansion is also an alternative but then the scope will change
7	Report the calculated emissions in gm or Kg or ton CO <sub>2</sub> Eq. /net saleable product?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Mandatory
8	The Data collected for calculations comes from Primary data (i.e. activity data in mass, volume, tons, meters, km., GJ, MWh, etc.)?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Mandatory - More data from primary sources is preferred
9	Have you use a reliable data source for secondary data (emission factors, allocation factors, etc.)?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Mandatory - Reliable data sources lead to accurate calculations
10	Have you conducted Data quality assessment – on temporal, geographical, and technological aspects?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Optional - It is recommended for both internal/ external communications
11	Have you use reliable/verifiable data sources for missing data (i.e. peer reviewed documents, industry averages, etc.)?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Optional - Recommended to use verifiable data sources
12	Are you making any comparative assertions based on the calculations?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Optional - But if conducted - set minimum standard of transparency of method and data used



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