Measuring Product Carbon Footprints

SWEEP

GUIDE

What's inside:

- ✓ What a product carbon footprint (PCF) is and how it's measured
- ✓ Why PCFs are important for business strateg and sustainability
- ✓ The difference between PCFs and lifecycle assessments (LCAs)
- ✓ How to calculate a PCF step by step
- ✓ How carbon management software can help

Trusted by

SWEEP

01 Introduction

Why leading brands are doubling down on product-level carbon data

From food to furniture, companies across the world are under mounting pressure to show the real impact of the products they sell. And the smartest brands are already ahead of the curve.

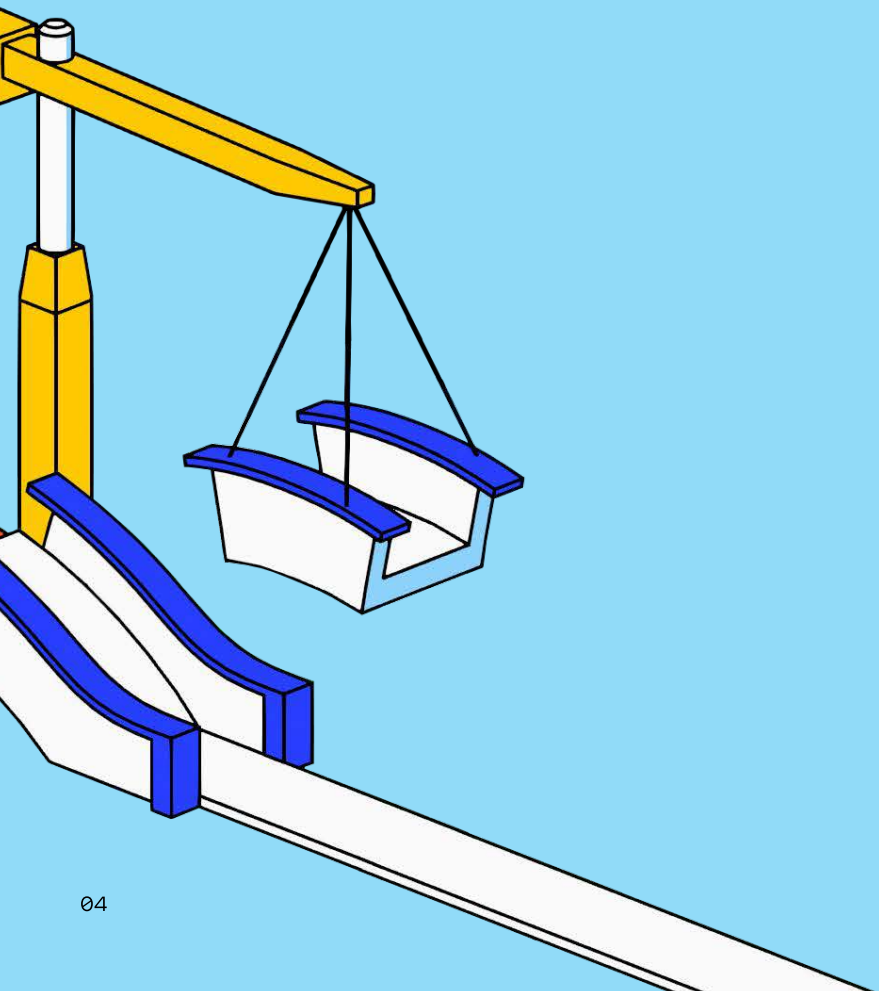
Brands like **Caudalie, Swisscom** and **Wickes** are embracing carbon footprinting to gain visibility across complex supply chains, make more informed decisions, and meet the rising bar of sustainability disclosure.

In this guide, you'll learn what a product carbon footprint really is, why it's essential for today's businesses, and how to get started with confidence.

Whether you're reporting to investors, preparing for CSRD, or future-proofing your portfolio, PCFs are your foundation for action.

“Understanding our Scope 3 footprint is critical to meeting our climate targets – Sweep gives us the tools and transparency to get there.”

Mark Cook
Chief Commercial Officer, Wickes



02 What is a product carbon footprint?

A product carbon footprint (PCF) measures the total greenhouse gas (GHG) emissions linked to a product throughout its life. From raw material extraction to manufacturing, transport, use, and disposal, every stage is accounted for in carbon dioxide equivalent (CO_2e).

Unlike a corporate carbon footprint, which captures company-wide emissions, a PCF focuses on a specific product or product line—whether it's a pair of shoes, a bottle of shampoo, or a building material. It's a precise way for businesses to understand the climate cost of what they make and sell.

PCFs help trace emissions through the value chain and are increasingly used to support carbon labelling, offering customers transparency and helping companies meet stakeholder and regulatory demands.

03 Why product carbon footprint matter

PCFs are powerful tools that:

- **Validate net-zero claims:** Back up sustainability targets with credible, science-aligned data
- **Inform decarbonization efforts:** Identify carbon hotspots and reduction opportunities
- **Support market decisions:** Help buyers, investors, and procurement teams make low-carbon choices

1. Validate net-zero claims

Net-zero targets are only as strong as the data behind them. PCFs provide reliable, detailed emissions data that allow companies to confidently report on carbon-neutral products or supply chain impacts. They're increasingly essential for meeting disclosure rules and avoiding greenwashing risks.

2. Inform decarbonization strategies

PCFs break down emissions by lifecycle stage, spotlighting the highest-impact areas for intervention. For example, knowing whether more emissions come from raw materials or manufacturing lets businesses act with precision.

3. Support business and market decisions

More buyers and lenders now expect emissions data at the product level. PCFs help demonstrate climate performance, support supplier comparisons, and improve access to green finance and preferred partnerships.

04 PCF vs LCA: What's the difference?

A product carbon footprint (PCF) is a focused type of life cycle assessment (LCA) that deals only with GHG emissions.

	PCF	LCA
Focus	GHG emissions only	Broader environmental impacts
Metric	CO_2e	Water, land use, toxicity, etc.
Complexity	Simpler, quicker	More comprehensive and detailed
Use case	Carbon labelling, net-zero plans	Policy-making, full environmental profiling

05 How are product carbon footprint calculated?

Calculating a product carbon footprint involves a series of clear, structured steps. From defining boundaries to collecting lifecycle data and applying emissions factors, each stage plays a vital role in producing accurate, credible results. Here's how the process works.

1. Define your goals and scope of analysis

Before starting, clarify why you're calculating a product carbon footprint. This will shape your data collection process and determine how you use the results. **Common goals include:**

- Understanding where most emissions come from in a product's lifecycle
- Comparing emissions between product versions, suppliers, or markets
- Supporting claims such as "carbon neutral" or "net zero"
- Meeting customer, investor, or regulatory demands for product-level emissions data
- Preparing to introduce carbon labelling on packaging or listings

The clearer your questions, the more focused and useful your PCF will be.

2. Define your product boundary: cradle-to-gate or cradle-to-grave?

You'll need to determine how much of the product's lifecycle your carbon footprint will cover.

Be sure to clearly document which boundary you've selected, as it affects comparability with other PCFs.

BOUNDARY TYPE	WHAT'S INCLUDED	BEST FOR
Cradle-to-gate	Emissions from raw materials through to manufacturing and transport to the factory gate	B2B products, where downstream use is outside your control
Cradle-to-grave	All cradle-to-gate stages plus product use, disposal, and end-of-life treatment	Consumer goods, or when you influence or control the product's entire lifecycle

A cradle-to-gate analysis may be sufficient if you're a supplier selling to other manufacturers. But if you're making consumer-facing products, a cradle-to-grave boundary provides a fuller picture of environmental impact—especially where usage or disposal emissions are significant.

3. Collect data across the product lifecycle

Data collection is the most time-consuming stage—but also the most critical. You'll need to gather inputs for each step of the product lifecycle. **These should include:**

- **Raw material extraction and processing:** quantities and sources of inputs like steel, plastic, or chemicals
- **Manufacturing and assembly:** electricity, gas, water use, waste generated, and on-site emissions
- **Packaging:** material composition, weight, and end-of-life fate
- **Distribution and transport:** distance travelled, fuel type, and vehicle mode (air, sea, rail, road)
- **Use phase (if applicable):** energy consumption during product use, maintenance needs, or emissions from operation
- **End-of-life treatment:** landfill, recycling, composting, or incineration pathways

Primary data (e.g. kWh of electricity used, km transported) is the most accurate and should be used wherever possible. When unavailable, secondary data (from emissions databases or industry averages) can be substituted but must be flagged in your final results.

4. Calculate emissions using emissions factors

Once you have your activity data, emissions are calculated using the following formula:

Activity data		Emissions factor		GHG emissions (CO_2e)
Measured units of resource use or process activity (e.g. 500 kWh of electricity, 20 km truck journey)	×	Average emissions per unit of activity (e.g. 0.233 kg CO_2e per kWh for UK electricity)	=	CO_2e (carbon dioxide equivalent) is the standard unit for expressing the impact of all greenhouse gases

Emissions factors vary by country, energy source, transport method, and material type. They are published by trusted sources such as:

- IPCC (Intergovernmental Panel on Climate Change)
- DEFRA (UK Department for Environment, Food & Rural Affairs)
- US EPA
- ecoinvent and other lifecycle inventory databases

CO_2e (carbon dioxide equivalent) is the standard unit for expressing the impact of all greenhouse gases—like methane and nitrous oxide—based on their global warming potential (GWP). This allows all GHGs to be reported using a single comparable metric.

Example:
1 kg of methane = 25 kg CO_2e (using a GWP of 25)

Make sure to use the most recent and geographically relevant factors available.

5. Allocate emissions for co-products (if applicable)

If your process produces more than one product or output (e.g. cheese and whey, petrol and diesel), you must fairly distribute emissions among them. The GHG Protocol offers several acceptable methods:

ALLOCATION METHOD	HOW IT WORKS	BEST USED WHEN...
Mass-based	Emissions divided according to weight of each output	Products are similar in function or value
Economic	Emissions divided by market value of each output	Co-products vary greatly in price
System expansion	Credits assigned for avoided impacts of co-products	Outputs substitute other products or processes

The method used can significantly affect results, so document your choice and reasoning.

6. Report and interpret results

Once emissions are calculated, prepare to report the final PCF. This will usually include:

- **Total emissions per functional unit** (e.g. per item, per kg, per use)
- **Breakdown of emissions by lifecycle stage** (e.g. raw materials, packaging, transport)
- **Percentage of emissions from primary vs secondary data**
- **Disclosure of system boundary** (cradle-to-gate or cradle-to-grave)
- **Allocation method** (if relevant)
- **Assumptions and limitations** (e.g. estimated data, average values used)

Results can feed into a carbon label, internal decision-making, product redesign, or investor disclosures. Many companies also benchmark PCF data across suppliers or against industry standards.

"We talk about climate data, emissions data—but in reality, we're talking about pieces of information that help us navigate a changing world."

David Carlin
Global ESG expert

06 How a carbon management software can support your PCF calculation

Conducting product carbon footprint calculations manually is time-consuming, especially across multiple product lines, geographies, or suppliers. This is where carbon management software plays a transformative role.

Centralized data collection and integration

Modern platforms integrate with ERP, procurement, and manufacturing systems to automate data collection. This reduces errors, increases data granularity, and allows companies to capture more primary data from across the product life cycle.

Automated emissions calculations

These tools include pre-loaded databases of emissions factors and apply them accurately to input data. The result is faster, more consistent, and audit-ready PCF results that align with standards like ISO 14067 and the GHG Protocol.

Scenario modeling

Many tools allow companies to run simulations to see how design or supply chain changes would affect the product carbon footprint. For example, switching from virgin plastic to recycled material, or changing a supplier's energy mix, can be modelled and compared directly.

This allows businesses to weigh the carbon benefit of potential changes before implementation, supporting more strategic decarbonization decisions.

Audit-ready reporting and verification

Carbon management tools store detailed records of inputs, assumptions, and calculations. This makes it easier to verify results for internal use, investor confidence, or third-party certification.

They also support the creation of standardized outputs such as:

- Product Carbon Footprint reports
- GHG Protocol-aligned disclosures
- Carbon footprint labels for packaging or online listings

Scalable insights

Once PCF models are developed, businesses can scale their methodology across hundreds of SKUs, suppliers, or locations. This capability is essential for large manufacturers or retailers seeking portfolio-wide carbon insights.

With Sweep you can:

Make R&D count by focusing on high-impact products

Track product emissions at granular level, from components to processes, with corporate, supplier data, and sectoral estimates.

Identify top emitters and drill down by lifecycle, supplier, or material – so R&D targets redesigns that deliver real carbon savings, fast.

Scale your product carbon program without extra work

Manage thousands of SKUs, components, and suppliers from day one.

Sweep's platform grows with you, making it easy to expand your catalog, onboard new partners, and import data without rework or system overhauls.

Link every product decision to your net-zero goals

Connect product-level changes directly to your corporate carbon targets.

Sweep gives you end-to-end traceability, so you can prove how each decision moves the needle for auditors, execs, and customers.

Prioritize projects that cut both carbon and cost

Use Sweep's Decision Engine to model emissions and impact across scenarios.

Quickly see which design, supplier, or process change offers the best return, so you invest where it matters most.

Collaborate with suppliers and unlock real emissions data

Engage suppliers at scale with campaigns,, direct data uploads, or a connected, simpler version of Sweep so they can start tracking too.

Sweep helps you replace estimates with real Scope 3 numbers, making collaboration measurable and impactful.

Stay audit-ready and show progress from day one

Start with the data that you have, complete it with Sweep, add sophistication over time, and keep a clear audit trail as you go.

Sweep adapts as your data and regulations evolve, so you're always compliant and ready to report.

Book a demo →