Version 3, June 2026

Make it Zero Product Carbon Footprint Guide

Driving best practise, creating consistency

Aligned to the PACT Methodology

Welcome to the MIZ PCF Calculation Guide, developed by Ricardo for Make it Zero Members.

This document is a valuable resource to help Make it Zero Members calculate, share and use Product Carbon Footprints in a robust, consistent way in line with the PACT methodology.

Key Highlights

→ Standardised PCF calculation approach

→ Increase primary data use

→ Ensure transparency and traceability

→ Enable consistent product comparison

→ Support Scope 3 reporting

Contents

Chapter 1

Introduction

1.1 INTRODUCTION TO MAKE IT ZERO

Make it Zero is a global, pre-competitive initiative created to help the DIY sector measure and reduce its greenhouse gas emissions, with a strong focus on Scope 3. The programme brings retailers and suppliers together to share learning, align on standards and develop practical, product-focused decarbonisation solutions.

Decarbonising the DIY sector presents a significant challenge due to the scale and nature of its greenhouse gas emissions. Most emissions sit upstream in the product value chain rather than direct operations, meaning progress depends largely on addressing the carbon impact of materials, manufacturing and supply chains. This complexity is amplified by the sheer diversity of DIY products, which vary widely in composition, sourcing and lifespan. As a result, meaningful emissions reduction requires a comprehensive and consistent understanding of products at a granular level, supported by robust data and shared methodologies across both retailers and suppliers.

Alongside its collaborative purpose, Make it Zero offers members a set of practical advantages that strengthen their ability to decarbonise effectively:

- **Practical support** including guidance, training and direct technical help to build capability across teams.
- **Shared solutions** that create economies of scale and a more consistent approach to product data across the sector.
- **Visible commitment** through a sector-recognised brand that allows members to show their involvement and ambition publicly.
- **Harmonisation of approaches and data**, enabling more consistent methodologies, improved comparability, and economies of scale across the sector.

1.2 PURPOSE AND APPLICATION OF THIS GUIDE

The purpose of this guide is to provide implementable, step-by-step guidance on the use of Product Carbon Footprints, PCFs, in the DIY sector for both suppliers and retailers. For suppliers, the guide is intended to support the development of their own PCF calculation approaches in line with recognised industry standards, providing clarity on data requirements, calculation boundaries and good practice expectations.

For retailers, it explains the key steps involved in calculating a PCF so that they can engage more effectively with suppliers, respond knowledgeably to methodological questions and provide appropriate support where data or capability gaps exist and better understand supplier PCFs they receive. The guidance also sets out how PCFs can be used by retailers to inform and strengthen their corporate carbon inventories, particularly in relation to Scope 3 emissions.

The use of this guide complements the PACT framework by translating its principles into sector-relevant guidance **adhering to the cross sector methodology**. PACT methodology remains the primary standard, with this guide providing additional detail, interpretation and practical tools that reflect the specific characteristics of DIY products and supply chains. In doing so, it aims to give both retailers and suppliers the confidence to apply PACT consistently, improve data quality over time and embed PCFs within routine business decision making.

1.3 CONTEXT AND CHALLENGE

A core challenge in the current PCF landscape is the lack of alignment across cross-sector PCF guidance, leading to inconsistent PCF approaches. Suppliers often work with different assumptions, system boundaries, and allocation choices, which leads to PCF results that are not directly comparable. For DIY retailers and brands managing large, diverse assortments, this variability makes it difficult to assess product impacts reliably or integrate PCFs into decision-making processes and measure progress.

The broader sustainability ecosystem is crowded with overlapping standards, frameworks, and reporting expectations. While each serves a purpose, the lack of clear alignment can be confusing for suppliers, especially smaller manufacturers with limited sustainability resources. The DIY sector's product diversity amplifies this challenge. A sector-specific approach is needed to translate general standards into practical, consistent guidance that suppliers can follow without navigating conflicting requirements

Access to high-quality primary product-level data remains a significant barrier. DIY supply chains are often complex, multi-tiered, and global, making it difficult to obtain upstream emissions data or detailed process-level information. Many suppliers rely on secondary datasets because they lack visibility into upstream raw material extraction, component manufacturing, or energy use further up the chain. This limits accuracy and creates inconsistencies across product categories, underscoring the need for clearer expectations and scalable data-collection pathways.

1.4 CREATING INTEGRITY

Creating integrity in product carbon foot printing relies on quality assurance and transparency, so that the assumptions, data sources and methodological choices behind each footprint are clear and open to scrutiny. When suppliers and retailers understand how a figure has been produced, it becomes easier to trust the outcome and use it with confidence. Shared expectations on system boundaries, data hierarchies and calculation rules help reduce ambiguity and ensure that footprints across the DIY sector are produced in a similar way.

Improved consistency and transparency naturally support better comparability. When PCFs follow aligned principles, they can be used more reliably in procurement decisions, product development and customer communication. This stronger foundation also enhances Scope 3 reporting, as higher quality and more comparable product-level data feeds directly into value chain emissions disclosures.In line with PACT, the integrity of a PCF is assessed through indicators such as Primary Data Share and Data Quality Ratings, which provide transparency on how representative and reliable the underlying data is. Improving these indicators is expected to be an iterative process. Organisations will typically start with a mix of primary and secondary data and progressively increase data quality, traceability, and consistency over time. By focusing on these elements, the sector can build a more dependable and credible approach to carbon accounting to inform the decarbonisation of products.

1.5 WHY PCFS MATTER FOR DECARBONISING DIY

The DIY industry relies heavily on emission-intensive materials (i.e. steel, cement, timber) which carry high embodied emissions from extraction, processing, and manufacturing.

For DIY retailers, these emissions represent a large share of their upstream carbon footprint, making Product Carbon Footprints (PCFs) particularly important for improving the understanding of emissions driving more specific and granular actions to reduce emissions across the product portfolio. For suppliers a PCF allows for greater understanding of emissions across components or materials to similarly inform decarbonisation strategies.

1.6 CONNECTION TO CORPORATE SCOPE 3

The largest Scope 3 emissions category for DIY retailers and suppliers is often Category 1: Purchased Goods and Services, which are the emissions associated with purchasing of products for resale or manufacturing from suppliers. Typically, these emissions are calculated using spend or average quantity type methods to calculate emissions. These methods are useful to understand Scope 3 emissions, but they lack the granularity of specific emission source to create more targeted reduction strategies.

PCFs enable retailers to move beyond spend-based estimates, providing granular and more specific emissions data which therefore allows for better identification of hotspots within product ranges and supply chains (see Table 1 for a comparison between accounting methodologies). This leads to more efficient and accurate prioritisation of carbon-intensive materials and processes, and the targeting of supplier engagement and decarbonisation efforts, strengthening the credibility of the retailer's Scope 3 inventories and reduction tracking over time.

Table 1: PCF accounting comparison to spend-based alternative.

Feature	PCF-Based Accounting	Spend-Based Accounting
Accuracy	Higher - product-specific, activity based	Lower - generalised estimates
Granularity	Detailed, typically breaking down the impacts across multiple life cycle stages and specifying elements - i.e. fossil and biogenic carbon emissions	Aggregated - per spend category
Data collection effort	High - collection of many PCFs from suppliers/ databases	Lower - relies on financial records and published factors
Scalability	Difficult to scale without digital infrastructure	Easy to scale
Usefulness for decarbonisation and measurement	High	Low

1.7 OVERVIEW OF PACT METHODOLOGY V3.0

The Partnership for Carbon Transparency (PACT) methodology was developed as a cross-sector framework to enable consistent, credible calculation and exchange of cradle-to-gate PCFs across global value chains. It is structured around 4 key pillars:

1. **GHG emissions calculation** defining boundaries, allocation, and treatment of emissions.
2. **Data integrity** introducing metrics (i.e. Primary Data Share and Data Quality Rating) to assess robustness.
3. **Verification** setting third-party assurance requirements for data.
4. **Data exchange** enabling interoperable sharing of PCFs between suppliers and customers.

PACT is designed to be used in conjunction with existing standards (i.e. ISO 14067, GHG Protocol Product Standards, PEF). It has been set out to build on these existing frameworks rather than replacing them, helping reduce ambiguity and ensuring PCFs calculated under different schemes can be consistently applied.

1.8 COMPARABILILTY OF PACT WITH OTHER PCF STANDARDS

Some DIY suppliers already calculate PCFs using standard frameworks (Table 2). The PACT guidance builds on the work done by these organisations.

These standards include slight differences, so to identify whether an existing PCF aligns to the PACT methodology, PACT developed a checklist. The PACT Alignment Checklist aids with evaluating conformance and provides a common reference point to assess whether existing PCFs meet key requirements around:

- Cradle-to-gate boundaries
- Use of activity data and emission factors
- Consistent allocation rules
- Transparent treatment of biogenic carbon and land-sector emissions

It also introduces explicit data quality metric including, Primary Data Share and Data Quality Ratings and a clear verification roadmap. Where existing PCFs do not meet the PACT requirements, suppliers are encouraged to adapt their reporting accordingly. The checklist can be **found here**.

> The PACT Alignment Checklist aids with evaluating conformance and provides a common reference point to assess whether existing PCFs meet key requirements.

Table 2: Key existing standards and guidance PACT guidance builds upon (WBCSD, 2025, p90).

Publisher	Geographical focus	Corporate level	Product level	Specific to given sectors	Description
European Comission	EU	Organizational Environment Footprint (OEF)	PEF	OEF Sector Rules (e.g., for retail)	PEFCRs (e.g., for IT equipment)
ISO	Global	ISO 14064	ISO 14067 ISO 14040 ISO 14044	ISO 20915:2018 for steel products	PCRs (e.g., ISO 2256 for biobased plastics)
GHG Protocol (WRI/WBCSD)	Global	Corporate, Scope 2, and Scope 3 standards	Product Life Cycle Standard	E.g., Land Sector and Removals Standard	PCRs (e.g., PCRs for concrete)

Chapter 2

Understanding PCFs

2.1 WHAT IS A PRODUCT CARBON FOOTPRINT

A Product Carbon Footprint (PCF) measures the total greenhouse gas (GHG) emissions generated during the life cycle of a product.

It reflects the climate impact of a product by summing the emissions from all attributable activities within a defined boundary (typically cradle-to-gate) including raw material extraction, processing, manufacturing, energy use, and inbound transport.

The value of a PCF is expressed as kgCO2e per declared unit in the final PCF inventory. The declared unit is the quantity of a product used as a reference unit in the quantification of a cradle-to-gate PCF and therefore must clearly describe the product that is being assessed (i.e. 1L of paint, 1 timber shelf, or 1 metal tool). This is different from a functional unit, which describes the function of the product in question (i.e. washing 1 kg of fabric with the recommended dosage with hard water). LCA inventory results are given in functional units. PACT has disclosed all accepted declared units (Table 3). The PCF should include the emissions associated with the packaging. It must be noted that for mass or volume based declared units, the declared unit does not include the weight of the packaging.

Table 3: Accepted declared units as listed in the PACT Methodology, version 3 (WBCSD, 2025, p28).

Category	Accepted Declared Unit	Mass information required
Physical goods	Liter (L)	✓
	Kilogram (kg)	✕
	Cubic meter (m3)	✓
	Megajoule (MJ)	✕
	Tonne kilometre (t.km)	✕
	Square meter (m2)	✓
	Piece	✓

2.2 KEY CHARACTERISTICS: ACCURATE, GRANULAR, COMPARABLE

For PCFs to be useful in the industry's decision-making, they must be accurate, granular, complete and comparable. The accuracy of the data will depend on the use of primary activity data and supplier-specific emission factors, which reflect real-world production processes and material choices, rather than the generic secondary averages.

PCFs must apply consistent cradle-to-gate boundaries so that all relevant product-specific activities are included in a transparent, easily repeatable way.

Without consistent boundaries, the differences noted between PCFs could reflect methodological choices rather than emission differences and therefore skew the results. This is also why comparable rules must be ensured. These include, but are not limited to, common boundary definitions and data-quality disclosures. Comparable PCFs therefore allow the industry to fairly benchmark products and identify accurate emissions hotspots for practical decision-making.

2.3 DIFFERENCES BETWEEN PCF, LCA, AND CORPORATE FOOTPRINT

Understanding the differences between a PCF, a Life Cycle Assessment (LCA), and a corporate carbon footprint is essential for applying the right tool at the right decision level. While all three are grounded in life-cycle and GHG accounting, they serve distinct purposes and support different types of decisions.

Table 4: PCF, LCA, and Corporate Footprint differences per definition, scope, granularity, purpose, and calculation standards.

	PCF	LCA	Corporate Footprint
Definition	Measures the GHG emissions associated with a single product.	A boader environmental assessment tool that can cover multiple impact categories.	Measures emissions at the organisational level, covering all 3 Scopes.
Scope	Cradle-to-gate only – use phase and end-of-life are excluded.*	Cradle-to-gate or cradle-to-grave.	Scope 1–3 specific, focussing on emissions across all activities.
Granularity	Product-level, supplier-specific where available. Calculated per declared unit (kg, L, piece etc).	Process and product system level, aggregates unit processes.	Product or company wide, aggregates emissions across products, services, sites, or value chains.
Purpose	Enable consistent, comparable, and credible product-level carbon data.	Provides the methodological foundation for calculating environmental impacts and supports robust modelling.	Supports GHG reporting, target-setting, transition planning, risk management, and regulatory disclosures.
Calculation Standards	PACT Methodology, ISO 14067, ISO 14044/14040, GHG Protocol Product Standard, EU PEF, Product Category Rules (PCRs).	ISO 14040, ISO 14044.	GHG Protocol standards, ISO 14064.

* PACT PCF is cradle-to-gate, as PCFs can be from cradle-to-grave too

2.4 SCOPE AND BOUNDARY

The PACT methodology specifies a cradle-to-gate boundary, capturing all GHG emissions directly attributable to bringing a product to the point where it leaves the reporting company's operational control. The cradle-to-gate boundary includes material acquisition and pre-processing, and production, as well as relevant internal logistics and storage processes up to the production gate.

Distribution activities included within this boundary are limited to those occurring within or between production stages under the reporting company's operational control. Outbound transportation and storage after the production gate are not included in the PCF, but should be calculated and reported separately, up to the point where responsibility transfers to another company (e.g. the customer). The product use phase and end-of-life stages are explicitly excluded, as these emissions depend on downstream consumer behaviour and disposal.

Furthermore, PCFs are time bound and geography specific. The time boundary of a PCF is defined as the period for which the PCF value is considered to be representative. PCFs maximum validity period is up to three years, given that no major changes (variance of 10% or more compared to original PCF) take place within that period. The validity period starts after the reference period- the start date of the earliest activity data used for PCF calculations and the end date of latest activity data. This reference period shall always be disclosed.

Companies are also expected to report on the geographical representation of their PCF. The level of granularity disclosed can be decided by the company (e.g. at a plant or country level), however, specific countries and regions must be referenced using ISO 3166-1 alpha-2 defined country codes. Products produced in various locations can be separated into several PCFs pertaining to respective geography or alternatively reported under a single footprint. In that case a weighted average of the respective product-specific emissions according to each location's production quantity must be calculated and exchanged.

Any outbound transportation occurring after the gate is not included in the PCF total and must instead be calculated and reported separately, depending on which party pays for, or controls, the transport. A clear boundary ensures consistency and no double counting.

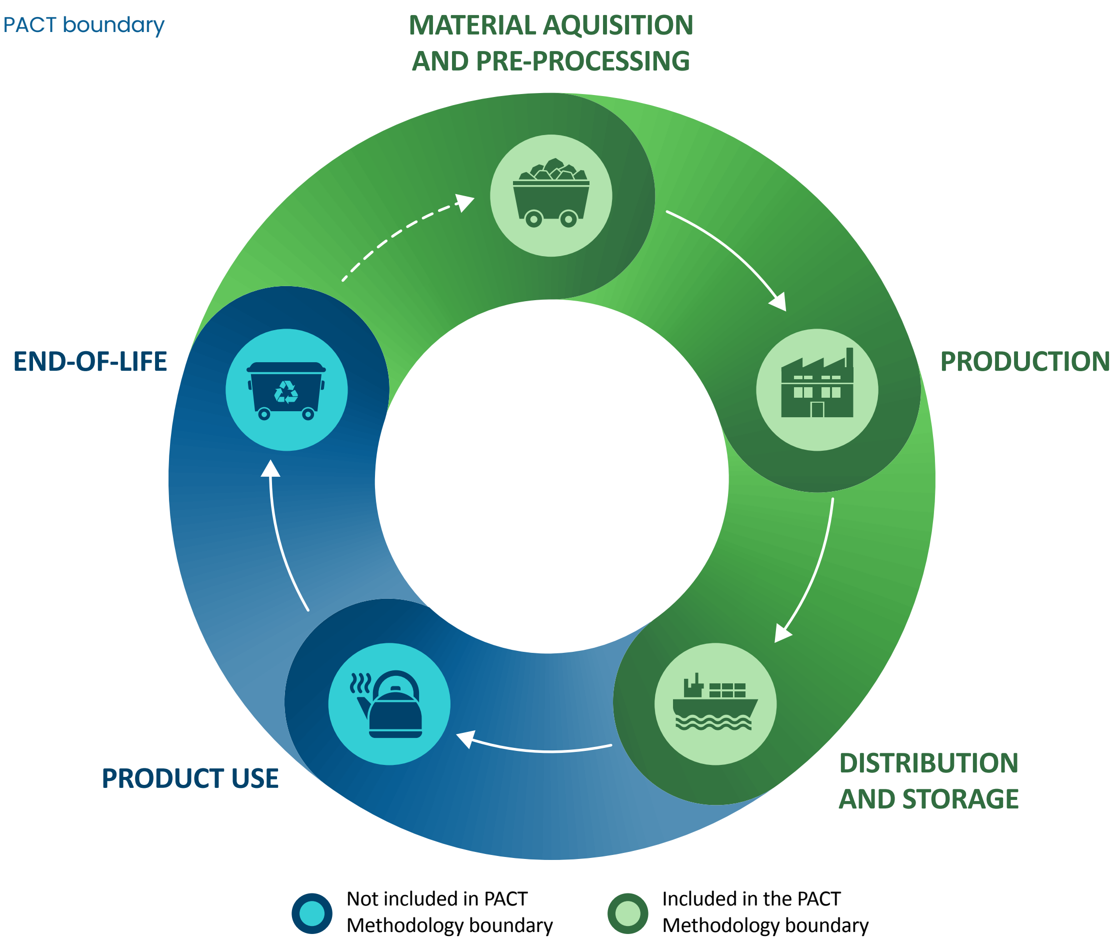
2.5 PCFS ACROSS THE VALUE CHAIN

Accurately calculating Scope 3 emissions is notoriously difficult. PCFs are designed to function as a connective metric across the entire value chain, enabling emissions information to flow consistently from upstream suppliers through manufacturers and retailers to downstream customers. As PCFs can be used by suppliers, retailers, and customers, they end up playing a critical role across the entire DIY value chain.

At each tier, PCFs help identify emissions hotspots, creating a product-level transparency that can be used to drive more informed and targeted decarbonisation decisions in either procurement, lower-carbon product design, or emissions reporting and tracking.

Furthermore, they provide a clear evidence base for marketing claims related to product sustainability. PCFs therefore directly, and more accurately, help inform where intervention will deliver the greatest carbon reductions.

Figure 1: PACT boundary



Chapter 3

PCF Calculation Journey

3.1 OVERVIEW OF EXISTING METHODS AND STANDARDS

When you begin working with Product Carbon Footprints (PCFs), you may encounter a wide range of existing standards and methods. The PACT methodology builds on the existing standards and methods to help you determine which rules to apply and in what order, so that PCFs are produced in a consistent and comparable way across suppliers, sectors, and regions.

PACT is designed to complement the major carbon accounting standards that organisations commonly use, including:

- GHG Protocol Product Standard and Scope 3 Standard
- ISO standards (14040/44 for LCA, 14067 for carbon foot printing, 14025 for EPDs, 14083 for transport)
- EU Product Environmental Footprint (PEF) and PEF Category Rules (PEFCRs)
- Product Category Rules (PCRs) from EPD programmes
- Sector-specific rules (e.g., Together for Sustainability, Catena-X, Global Battery Alliance)

> The PACT builds on the existing standards and methods to help you determine which rules to apply and in what order, so that PCFs are produced in a consistent and comparable way across suppliers, sectors, and regions.

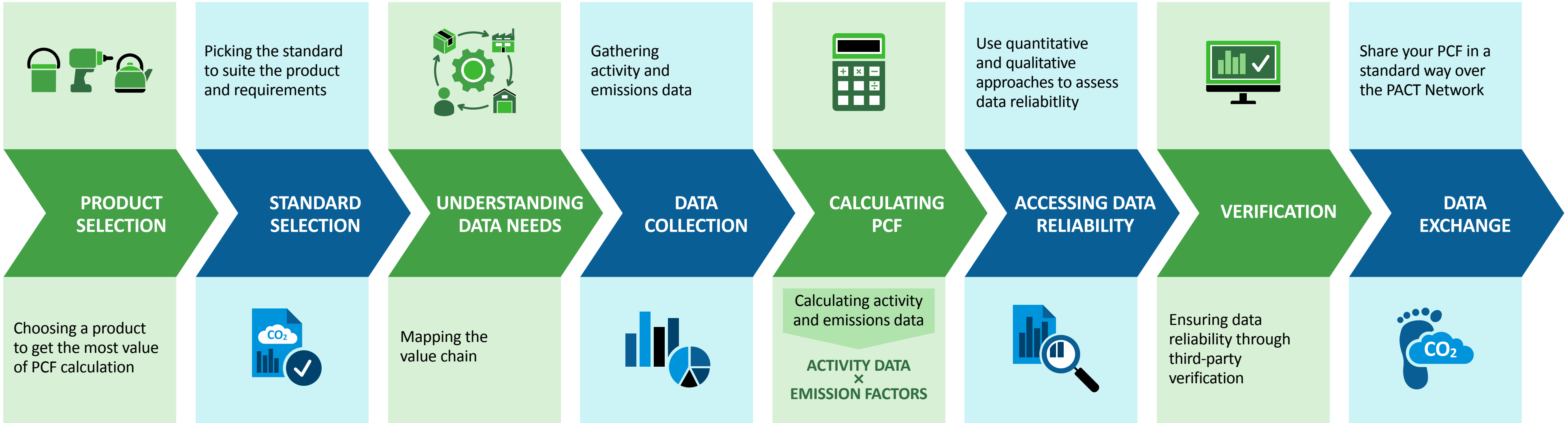


Figure 3: Prioritization of methods and standards (Source: Adapted from PACT Methodology, Version 3.0, Figure 4.)

3.1.1 HIERARCHY OF APPLICATION

To simplify this landscape, PACT classifies existing methods into three levels, which act as a clear hierarchy for you to follow when selecting a calculation method.

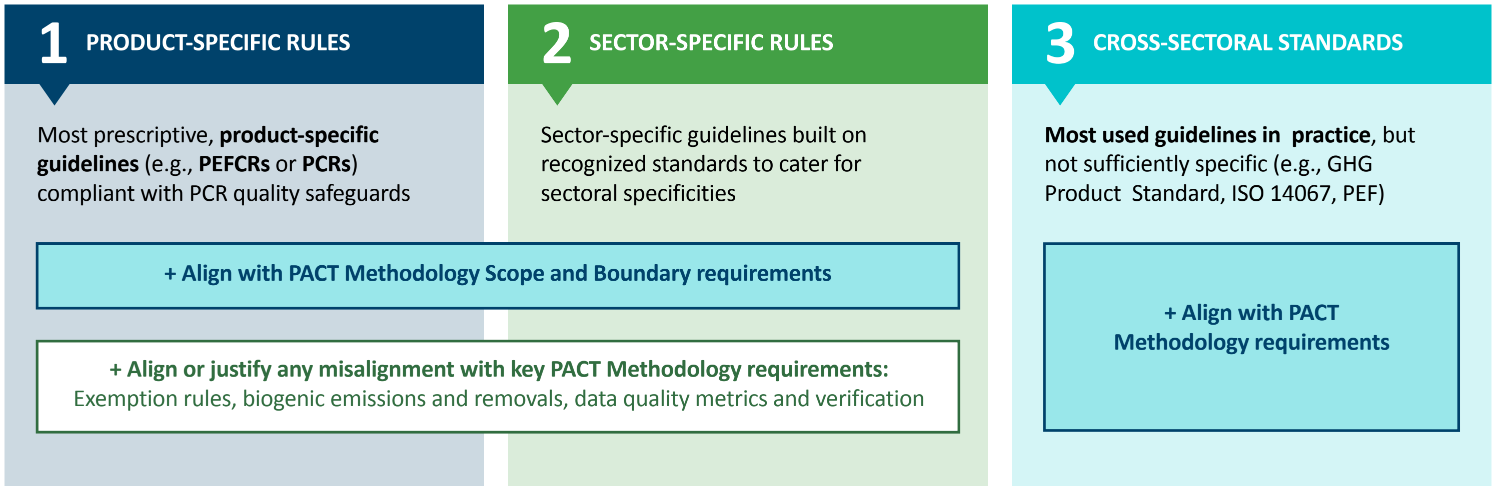


Figure 3: Prioritization of methods and standards (Source: Adapted from PACT Methodology, Version 3.0, Figure 4.)

1. PRODUCT-SPECIFIC RULES
ISO 14067 defines a Product Category Rule (PCR) as a "set of specific rules, requirements and guidelines for carbon footprint of a product or partial carbon footprint of a product quantification and communication for one or more product categories". These product-specific rules provide the most detailed guidance for a particular product type. For example, EN 16485 Wood and Wood-based Products for Use in Construction provides specific allocation rules for multi-output processes which are common in wood processing. These rules typically offer greater precision and comparability than broader frameworks. If a valid PCR exists for your product, you should prioritise it.

For a PCR to be considered "valid", it must:

- be developed under the ISO 14000 family or similar cross sectoral guidance
- involve a multi-stakeholder and independently peer reviewed process
- have been reviewed within the past five years
- be applicable to the geography where your product is manufactured or sold

When you use a valid PCR, it must still align with the PACT Methodology, particularly in relation to cradle-to-gate boundary, exemption rules, biogenic and land sector emissions, data quality metrics and verification requirements. If any part of the PCR diverges from PACT, you should clearly note this when exchanging the PCF.

2. SECTOR-SPECIFIC RULES
If no product-specific rules exist, you should look to sector-specific guidance. These rules build on cross sector standards (such as ISO or the GHG Protocol) but incorporate additional details tailored to the characteristics of a particular industry.

Where relevant sector guidance exists, it should be used and aligned with PACT's boundary and methodological rules.

3. CROSS SECTOR STANDARDS
If neither product-specific nor sector-specific rules are available, you may rely on established cross sectoral standards such as:

- ISO 14067
- the GHG Protocol Product Standard
- the PEF method

In this case, any aspect not explicitly covered by these standards should be addressed using the PACT Methodology, such as allocation, data quality assessment, or verification requirements.

All approaches used, whether product-specific, sector-specific, or cross sectoral, must ultimately comply with ISO 14040 and ISO 14044, which set the fundamental principles for life cycle assessment.

When you look for standard, you may find more than one option for the same type of product. you can follow the hierarchy shown in figure 4.

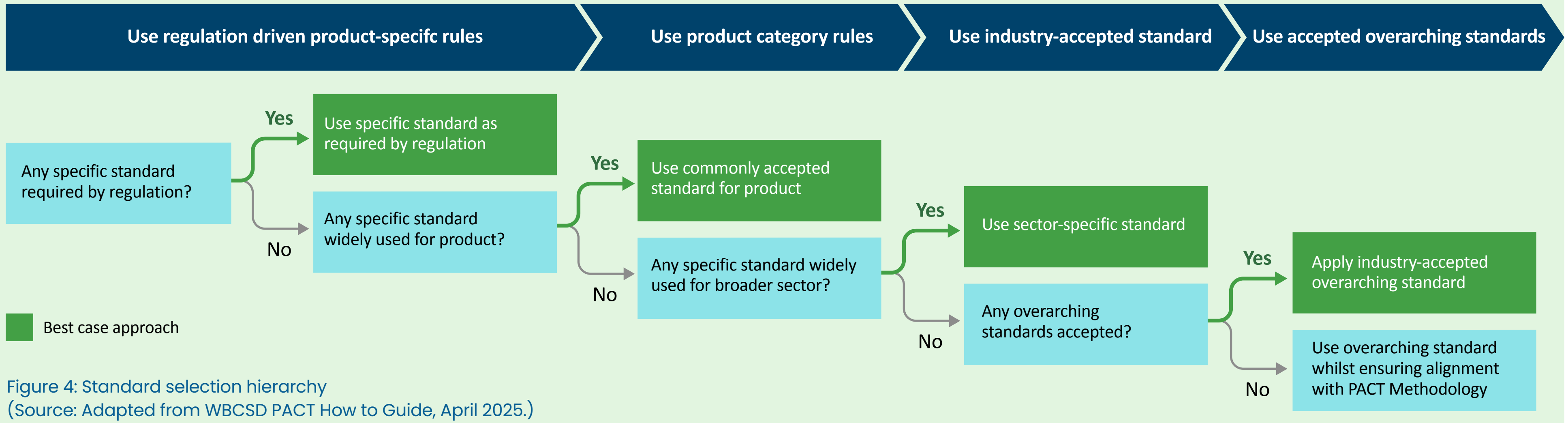


Figure 4: Standard selection hierarchy
(Source: Adapted from WBCSD PACT How to Guide, April 2025.)

3.2 PRODUCT SELECTION

Before you begin calculating Product Carbon Footprints (PCFs), it is important to decide which products to focus on first. Selecting the right products will make your PCF work more efficient, more strategic, and more valuable to your organisation and customers.

You should consider three dimensions together when choosing which products to prioritise, as outlined on the following page:

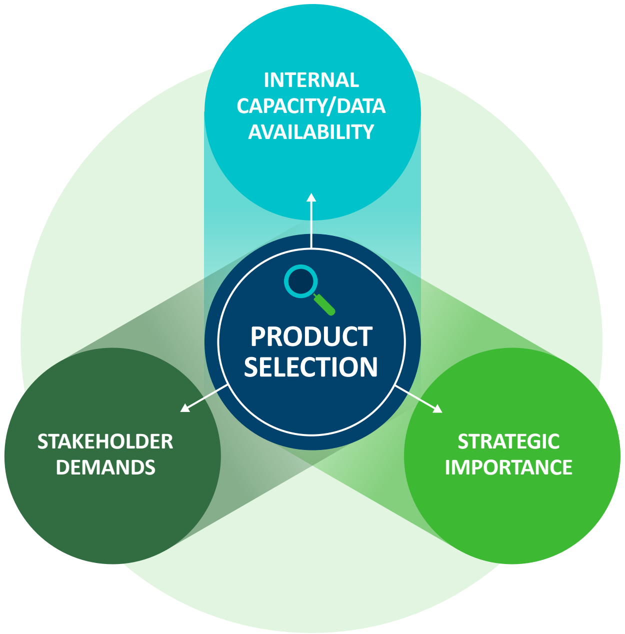


Figure 5: Product selection

> Selecting the right products will make your PCF work more efficient, more strategic, and more valuable to your organisation and customers.

1. STAKEHOLDER NEEDS
Start with products that stakeholders are already asking about. This may include requests from customers, regulators, retailers, or internal teams. If a product is already under scrutiny, it is a strong candidate for early PCF work.

2. EXISTING CAPABILITIES AND AVAILABLE DATA
It often makes sense to begin with products for which you already have good information. For example, a product that has previously undergone an LCA, or one with reliable supplier data, will be easier and faster to complete.

3. STRATEGIC FOCUS IMPORTANCE
Finally, consider which products matter most to your business. High volume products, items with significant emissions hotspots, or products with commercial or brand relevance may be priorities. Focusing on these ensures your PCF work supports wider decarbonisation and commercial goals.

3.2.1 GROUPING PRODUCTS UNDER A SINGLE PCF

In the DIY sector, you may calculate a representative PCF for a group of similar products where those products serve the same function, fall within the same product category, use the same declared unit, and are made using materially equivalent materials, processes, and technologies within comparable cradle-to-gate boundaries.

You must be able to justify grouping through a simple documented screening showing that differences in materials, energy use, sourcing locations, or manufacturing steps do not lead to material differences in the PCF, taking PACT's 3% exemption rule and PCF validity thresholds (10%) into account.

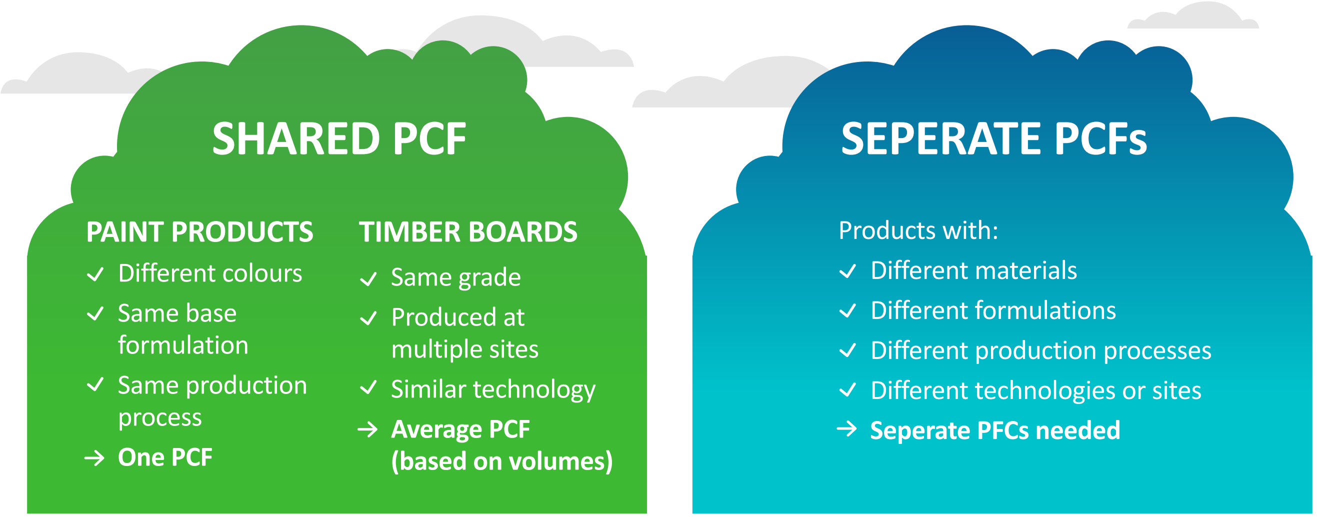


Figure 6: Grouping and separating products example

Where products cover multiple SKUs or are manufactured at more than one site, the representative PCF should be based on production volume weighted averages and must comply with any applicable PCRs or sector-specific rules.

The resulting PCF must remain representative of the technology, geography, and period, and support transparent reporting of Primary Data Share, Data Quality Ratings, and verification in line with PACT. Separate PCFs are needed when differences in formulation, materials, suppliers, or manufacturing sites would meaningfully affect the result.

By combining stakeholder needs, data availability, and strategic importance, you can create a clear and practical product list to start your PCF journey. This ensures your efforts are focused, achievable, and valuable from the outset.

3.3 STANDARD SELECTION

Once you have selected your product, the next step is to decide which calculation standard you will use. Standards help ensure that your PCF is consistent, comparable, and credible across the value chain.

As outlined in *Section 3.1*, you should prioritise between existing standards with the following order:

1. Use a Product Category Rule (PCR), if available
If a valid PCR exists for your product, you should prioritise it. PCRs offer detailed, product-specific instructions and therefore improve accuracy and comparability. When more than one PCR applies, you should follow the hierarchy explained in *Section 3.1.1.*

When applying a PCR, you still need to ensure it aligns with the PACT Methodology, particularly with respect to the cradle-to-gate boundary, exemption rules, biogenic and land-sector treatment, data quality, and verification. Any differences should be noted when sharing the PCF.

2. Use sector-specific rules when no PCR exists
If no PCR is available, the next option is sector-specific guidance that builds on cross-sector standards such as ISO 14067 or the GHG Product Standard. For the DIY sector, these **Make It Zero PCF Guidelines act as a sector-specific standard,** offering a consistent approach for common DIY product categories.

3. Use cross-sector standards as a fallback
Where neither PCRs nor sector-specific rules apply, you may follow cross-sectoral standards (e.g., ISO 14067, the GHG Product Standard, or the PEF method). In this case, PACT requirements should be applied for aspects such as allocation, data quality scoring, and cradle-to-gate boundaries. Table 5 summarises standards used for DIY products and highlights their typical areas of application.

3.4 UNDERSTANDING DATA NEEDS

Before you begin collecting data for a PCF, it is essential to understand which processes, materials and activities contribute to the footprint and how they should be mapped. This step helps you make sure that the information you gather is complete, relevant and aligned with the PACT Methodology.

3.4.1 MAPPING YOUR PRODUCT'S VALUE CHAIN

You should start by mapping all material inputs, production processes and logistics steps involved in creating the product. PACT groups these into three cradle-to-gate life cycle stages:

1. MATERIAL ACQUISITION AND PREPROCESSING
This covers raw materials, intermediates and any preparation steps before manufacturing begins. For example: drying timber, grinding pigments, or preparing metal stock.

Table 5: Standards and Product Category Rules Relevant to DIY Products

Standard	Relevant DIY Products	Notes
Wood and wood-based products for use in construction (EN 16485) (1.0.0)	Timber, plywood, wooden worktops	Product-specific European standard for wood-based construction products; relevant where EN standards or construction-related reporting is required. Must be aligned with PACT cradle-to-gate boundary and reporting rules.
ACP PCR-6 (2024) – Architectural Coatings	Decorative paints, floor coating, wood coating	Product-specific PCR for paints and coatings, developed by the American Coatings Association; particularly relevant for products sold or manufactured in North America. Must be applied in alignment with PACT cradle-to-gate boundary and reporting requirements.
Furniture and components of furniture (c-PCR to PCR 2019:14) (adopted from EPD Norway)	Furniture panels, shelving units, flat-pack components	Product-specific PCR for furniture and furniture components; relevant for indoor DIY furniture products. Must be applied in alignment with PACT scope, boundary and reporting rules.
Fabricated Metal Products, Except Construction Products (UN CPC 412, 414, 416, 42)	Nails, screws, bolts, brackets, metal hardware	Product-specific PCR for fabricated metal products; well suited for DIY fasteners and hardware. Must follow PACT cradle-to-gate boundary and allocation rules.

2. PRODUCTION
This includes all activities required to manufacture the final product, such as energy use, chemical reactions, machining, assembly or packaging.

3. DISTRIBUTION AND STORAGE
This includes transportation between suppliers and your factory, movement between your own sites, and any storage that you pay for. Outbound transport after the product leaves your control ("the gate") is only included if you pay for it. Otherwise, it is excluded and should be reported separately. More guidance on transportation emissions' calculation is provided on Section 3.6.1.

Any activity within these stages that contributes to the environmental impact of the product is called an attributable process and should be identified clearly. Production of a resin as material input, electricity used for mixing or machining and fuel used to transport raw materials from a supplier to your factory are all examples of attributable processes.

The examples below illustrate the difference between good and poor data mapping when identifying attributable processes across the cradle-to-gate life cycle. Figure 6 illustrates the difference between good and poor data mapping when identifying attributable processes and linking activity data to emission factors.

3.4.2 KNOWING WHAT TO EXCLUDE

Some items do not belong in the PCF boundary. You should exclude:

- capital goods and production equipment
- buildings and other long lived assets
- business travel and commuting
- research and development
- marketing and administrative activities

These are part of a company's operational footprint, not the product's PCF. In line with PACT guidance, these activities may still fall within the broader system boundary but are usually excluded on the basis of materiality, unless they are shown to contribute significantly to the product-level emissions
PACT also allows certain small contributions to be excluded if they meet the exemption rules:

- the combined impact of all exclusions must be less than 3 percent of the total PCF
- exclusions must be reasonable and justified, and
- excluded emissions must still be reported separately

Figure 8 illustrates how minor components can be excluded from the PCF when their combined impact is below 3%, provided this is justified and reported transparently.

If your calculation depends on supplier-specific PCFs, you should consider any exclusions the supplier has applied. PACT recognises that, at present, some upstream exclusions may be unknown and accepts this uncertainty if the overall 3% rule is respected and clearly stated.

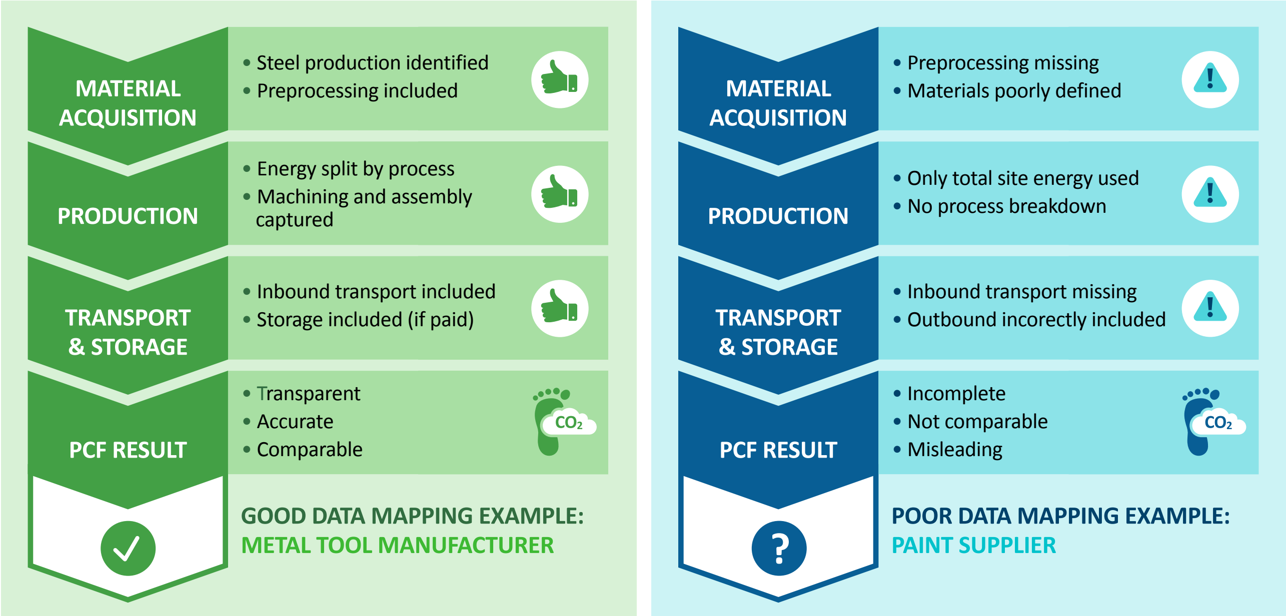


Figure 7: Comparison of good and poor data mapping across cradle-to-gate processes

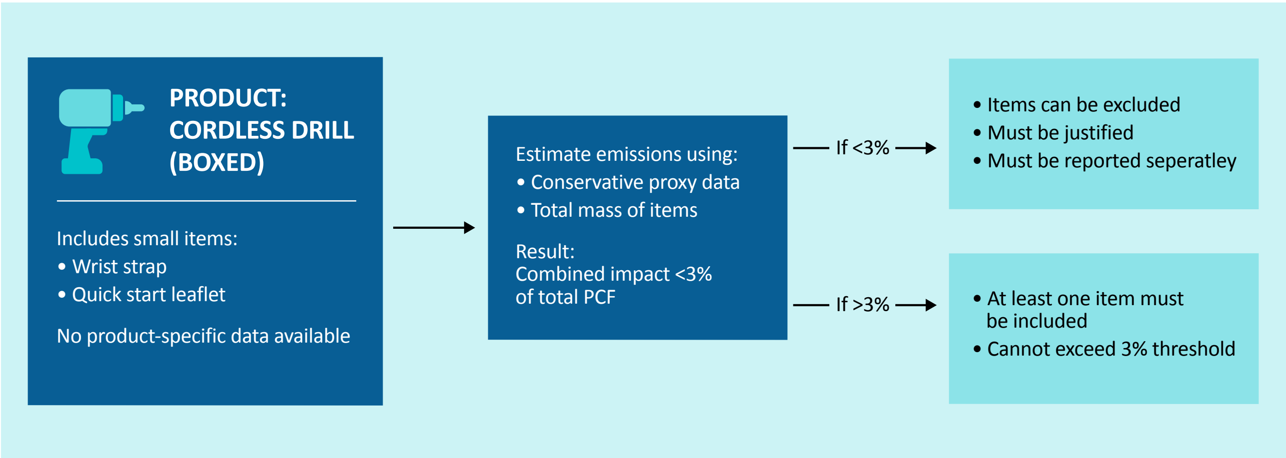


Figure 8: Example of applying the 3% exemption rule in PCF calculation

3.4.3 HIERARCHY OF DATA SOURCES

Once you have mapped your processes, you can decide what data you need. When collecting data for a PCF, it is important to understand the difference between primary and secondary data. PACT uses a clear hierarchy:

1. PRIMARY DATA

Data measured or collected directly from your operations or suppliers. This mainly refers to primary activity data (e.g. kWh used in mixing paint, kg of steel purchased, litres of resin), and may also include supplier-specific emission factors where available.

2. SECONDARY DATA

Credible industry averages or LCA databases, used only when primary data is unavailable. This can include secondary activity data and/or secondary emission factors. Common sources of secondary emission factors include recognised LCA databases and industry datasets, such as:

- Ecoinvent database
- GaBi database
- Environmental Product Declarations (EPDs)
- Product Category Rules (PCRs) and associated datasets
- UK Government GHG Conversion Factors (DEFRA emissions factors)
- International Energy Agency (IEA) datasets
- Sector-specific databases (e.g. TfS for chemicals, GLEC for logistics)

3. PROXY DATA

Reasonable stand-ins used only when primary and secondary data are not available. Proxy data should be applied conservatively, for example using data from a similar material with higher emissions, such as generic plastic for an unknown additive, or average transport factors when routes are unknown. All proxy use must be justified and replaced when better data becomes available.

The aim is to use as much high-quality primary data as possible, especially for the processes with the highest emissions.

Once activity data is identified, each item must be matched with an appropriate emission factor (EF).

For example:

- electricity use → grid EF (kg CO_2e per kWh)
- solvent purchase → supplier specific EF or database EF (kg CO_2e per kg or litre)
- transport distance → km x mode specific EF (kg CO_2e per km)
- purchased plasterboard → supplier PCF (kg CO_2e per m^2)

This ensures that all activities are translated into emissions in a consistent and transparent way.

To help assess data reliability, PACT uses Data Quality Metrics based on time, geography and technology. These metrics are explained later in *Section 3.8*. When identifying your data needs, it is useful to note where data may be weak, outdated or incomplete so you can plan improvements over time.

3.5 DATA COLLECTION

Once you understand your product's processes and data needs, the next step is to begin collecting the information required for the PCF. This starts with identifying all attributable processes across the life cycle stages included in PACT: material acquisition and preprocessing, production, and distribution and storage. Each of these processes should be broken down into clear, granular data points so that activity data and emission factors can be matched accurately.

When collecting data, you should follow the rules of the chosen calculation standard. Under the PACT Methodology, the PCF boundary is cradle-to-gate, which means you do not need data for the use phase or end of life of the product. You should also confirm which processes to include or exclude, making sure any exclusions meet the exemption rules described on *Section 3.4.2*.

As not all data will sit within your direct control, it is important to identify who holds the required information. For example, preprocessing of raw materials such as timber drying, metal pre treatment or pigment grinding is part of the material acquisition stage and must be captured either through primary or well selected secondary data.

For each attributable process, you will need two types of information:

- Activity data, which describes what physically happens (for example, quantities of materials, energy use or transport distances)
- Emission data, which is the emission factor used to convert activity data into CO_2e

As outlined in the hierarchy of data sources, primary data should be used wherever possible. Secondary data can be used when primary data is not available, provided it is representative of the relevant technology, region and period. Finally, every process must be paired with a suitable emission factor, ensuring that activity data and emission data are aligned and consistent with the chosen standard.

This structured approach to data collection ensures that your PCF is robust, transparent and ready for calculation and verification.

3.5.1 DIFFERENT DATA COLLECTION SCENARIOS

In practice, there are several ways to collect and manage the data needed for a PCF. The approach you use will depend on your organisation's size, data maturity, and available systems. All approaches are acceptable under PACT, provided the data is accurate, traceable, and aligned with the methodology. In many cases, organisations will use a combination of these approaches to gather data from different sources.

1. COLLECTING DATA IN EXCEL

Many organisations start PCF data collection using spreadsheets. Excel can be used to list attributable processes, record activity data (such as material quantities, energy use and transport distances), and link these to emission factors. This approach is flexible and accessible but requires clear version control, careful documentation of assumptions, and structured checks to ensure consistency and auditability.

2. USING PCF TOOLS (SOFTWARE)

Dedicated PCF or LCA software tools can support structured data collection and calculation. These tools typically guide you through value chain mapping, source and apply consistent emission factors, and automate parts of the calculation and reporting. They are particularly useful when managing multiple products, suppliers or sites, and can support easier data exchange and future verification.

3. USING BUILT IN ERP SYSTEMS

Where available, existing enterprise or production systems (such as ERP, MES or energy management systems) can be used as data sources. These systems often already contain reliable activity data on material inputs, production volumes, energy use and logistics. PCF relevant data can be extracted from these systems and combined with appropriate emission factors, either manually or through integration with PCF tools.

Regardless of the approach used, the key requirement is that the data collected is complete for all attributable processes, follows the PACT data hierarchy, and is clearly documented so that the resulting PCF can be reviewed, verified and updated over time.

3.6 CALCULATING PCF

Once you have identified all attributable processes and gathered the relevant data, calculating the PCF follows a defined calculation step. For each activity, you simply multiply the activity data by the appropriate emission factor, convert all results to CO_2e, and then sum the emissions across all cradle-to-gate processes.

Emission per activity = Activity data × Emission factor

Sum of all activities' emissions = Total PCF

If your product involves shared processes or multiple outputs, you should apply the **allocation approach** selected earlier and document any assumptions made. Depending on the product system, this may involve a single allocation of total emissions or multiple allocations across discrete contributions (e.g. electricity use, transport, or scrap/waste processing). You must also check that any exclusions applied remain within the 3 percent exemption limit.

For products that contain biogenic carbon, PACT requires you to report two results:

- the PCF **excluding** biogenic CO_2 uptake, and
- the PCF **including** biogenic CO_2 uptake.

These two results are required because there are two recognised approaches for accounting for biogenic CO_2 in products, and they lead to different outcomes within a cradle-to-gate boundary. Under the neutral approach, biogenic CO_2 uptake during biomass growth is assumed to be balanced by CO_2 release at end of life and is therefore treated as zero within the PCF. Under the −1/+1 approach, biogenic CO_2 uptake is treated as a removal during the product's life, with an equivalent emission assumed at end of life. While both approaches produce the same result when a full cradle-to-grave life cycle is assessed, they differ at the cradle-to-gate stage used by PACT. Reporting both the PCF excluding and including biogenic CO_2 uptake therefore ensures transparency, allows consistent interpretation of results, and enables users to compare products regardless of which accounting approach they are familiar with and supports downstream companies in correctly accounting for biogenic emissions (e.g. reporting the +1 emission at end of life).

The final PCF should be presented clearly enough that the calculation steps can be reviewed or verified if needed.

3.6.1 ALLOCATION

Allocation is required when a process produces more than one output, for example co products from a shared manufacturing or processing step. Before allocating emissions, you must first determine whether an output is a co product or a waste. Figure 9. shows a decision tree to determine waste and co-product.

PACT follows a clear allocation hierarchy, which you must apply in the order shown in Figure 10.

STEP 1: AVOID ALLOCATION WHERE POSSIBLE

You should first try to avoid allocation altogether by separating the process into sub-processes (process subdivision). If you can clearly identify which inputs and emissions relate to each product, no allocation is needed. Allocation should only be used when subdivision is not technically or practically feasible or when system expansion via substitution is not possible.

STEP 2: DETERMINE THE ECONOMIC VALUE RATIO

If allocation cannot be avoided, you must assess the economic value of the outputs. Calculate the ratio between the highest-value and lowest-value co-product using stable market prices.

This ratio determines which allocation method is applied:

if the value ratio is greater than 5, economic allocation is required.

if the value ratio is 5 or less, physical allocation should be used where possible.

STEP 3: SELECT THE APPROPRIATE ALLOCATION METHOD

If the economic value ratio is 5 or less, allocate emissions using the most relevant physical relationship, such as mass, volume, or energy content. This is the preferred approach for most DIY manufacturing processes.

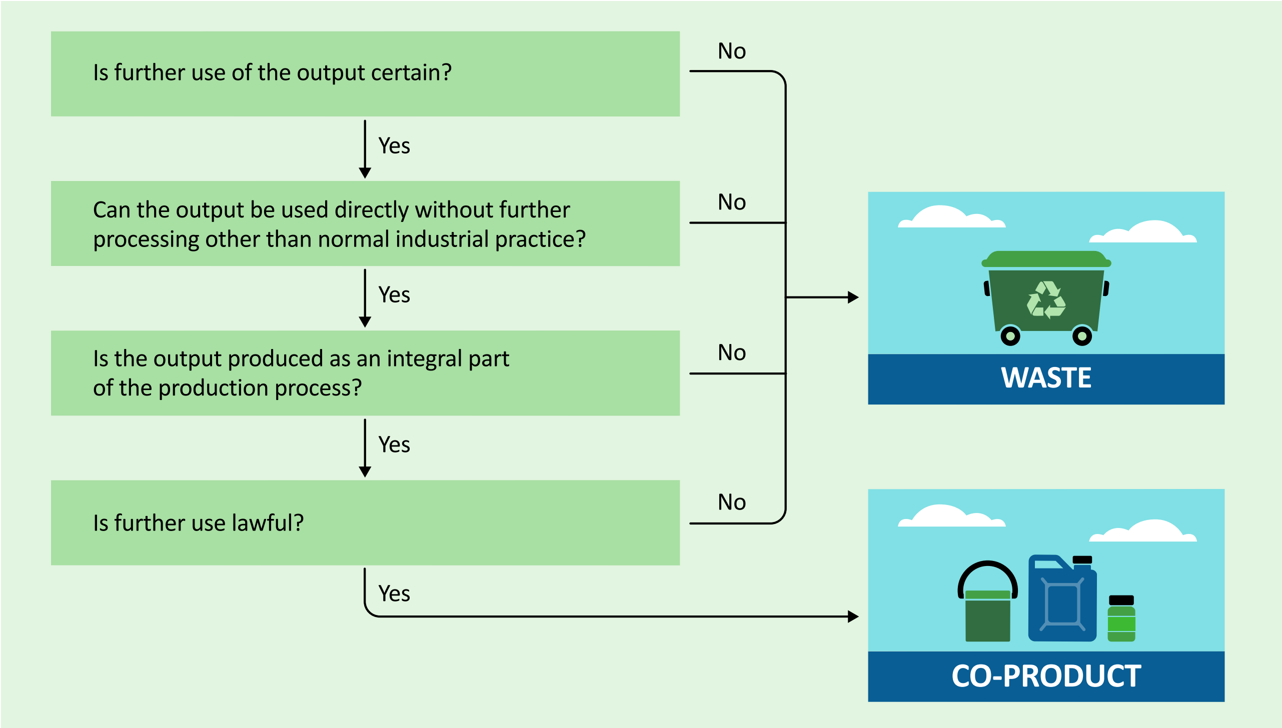


Figure 9: Decision tree to determine whether an output is a co-product or waste (Source: Adapted from PACT Methodology, Version 3.0, Figure 8)

If no meaningful physical relationship exists, or if the economic value ratio is greater than 5, allocate emissions based on economic value.

Only one allocation method should be used consistently within a PCF, and the method must reflect how the process is driven in practice.

The following examples illustrate how physical and economic allocation methods are applied in typical DIY manufacturing processes.

EXAMPLE 1: PHYSICAL ALLOCATION – PANEL PRODUCTION

A manufacturer produces 0.8 t structural plywood panels and 0.2 t thinner backing boards in the same hot pressing process. Process subdivision is not technically feasible because inputs and emissions cannot be separated between the two outputs.

The process generates a total of 10 tCO_2e. Based on stable market prices, the total economic value of the plywood panels is €400, and the backing boards have a total value of €120, resulting in an economic value ratio below 5.

Since allocation cannot be avoided and the economic value ratio does not exceed the threshold, physical allocation is applied.

Economic value ratio = 400 ÷ 120 ≈ 3.3

Mass allocation:

Plywood panels: (0.8 ÷ 1) × 10 = 8 tCO_2e

Backing boards: 0.2 ÷ 1 × 10 = 2 tCO_2e

EXAMPLE 2: ECONOMIC ALLOCATION – METAL PROCESSING
A manufacturer produces 900 kg of aluminium extruded profiles for shelving systems together with 100 kg of decorative aluminium trim in the same extrusion process. Process subdivision is not feasible because energy and material inputs cannot be directly attributed to each output. The total emissions from the extrusion process amount to 10 tCO_2e. The aluminium profiles have a total economic value of €10,000, while the decorative trim has a value of €1,000.

Economic value ratio = 10,000 ÷ 1,000 = 10

The economic value ratio exceeds 5, so economic allocation is required. Emissions are therefore allocated according to the relative economic value of the two products, reflecting that the extrusion process is primarily driven by the production of the higher value product rather than by physical output alone.

Economic allocation:

Aluminium profiles: 10,000 ÷ 11,000 = 9.1 tCO_2e

Decorative trim: 1,000 ÷ 11,000 = 0.9 tCO_2e

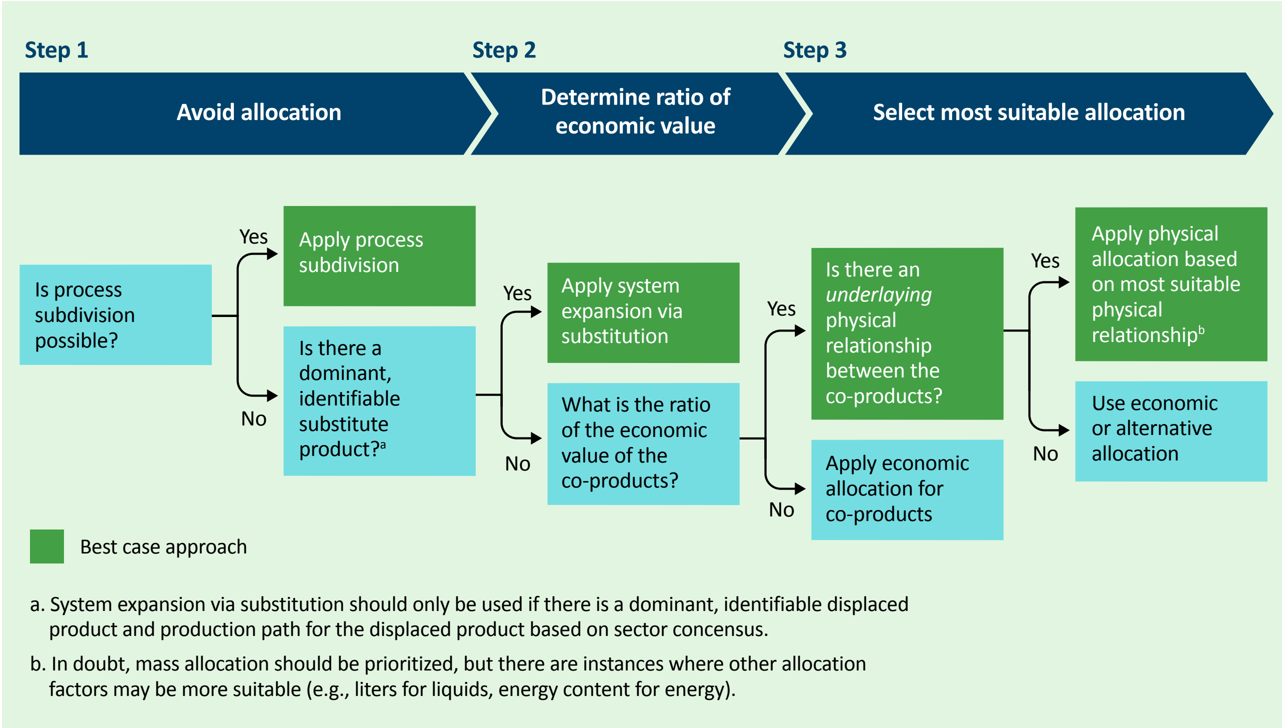


Figure 10: PACT Methodology decision-making tree to consistently implement ISO and GHG (Source: Adapted from PACT Methodology, Version 3.0, Figure 9)

For most DIY products allocation is commonly required in panel production, metal processing, and chemical manufacturing. Waste offcuts, scrap, and rejects are treated as waste and do not receive emissions and emissions from production waste treatment are allocated to the **main product**, not the waste.

All allocation choices must be clearly documented and disclosed when exchanging the PCF.

3.6.2 ADDITIONAL GUIDANCE

3.6.2.1 TRANSPORTATION AND DISTRIBUTION

Transportation and distribution can be significant contributors to a product's cradle-to-gate emissions, especially in DIY supply chains where materials often move across multiple sites before reaching the final manufacturer. Under the PACT Methodology, you should include all transportation and storage activities that occur before the product leaves your operational control.

It is important to note that GHG emissions from outbound storage and outbound transportation are not included in the PCF itself. However, these emissions must still be calculated and reported separately up to the point at which another company, such as a customer or logistics provider, takes responsibility for the product. Outbound transport and storage paid for by the customer are excluded entirely. This ensures transparency while maintaining the correct cradle-to-gate boundary.

3.6.2.2 TRANSPORTATION EMISSIONS

This includes transport between your suppliers and your manufacturing site, any internal movements between your own facilities, and any storage activities that you pay for. For each transport activity, you should record the transport mode, distance, and weight of goods transported, and then apply the appropriate emission factor.

3.6.2.3 STORAGE EMISSIONS

Under the PACT Methodology, storage emissions should be included **only when the material is within the system boundary** and when the storage facility is under your responsibility (i.e., you own or pays for it.)

To calculate storage emissions, you estimate the proportion of the storage facility used by the product and apply this share to the total energy consumption of the facility. This value is then multiplied by the appropriate emission factors for the energy sources used on site. If total energy data for the facility is not available, you may use industry benchmarks based on typical energy use per square metre of storage area.

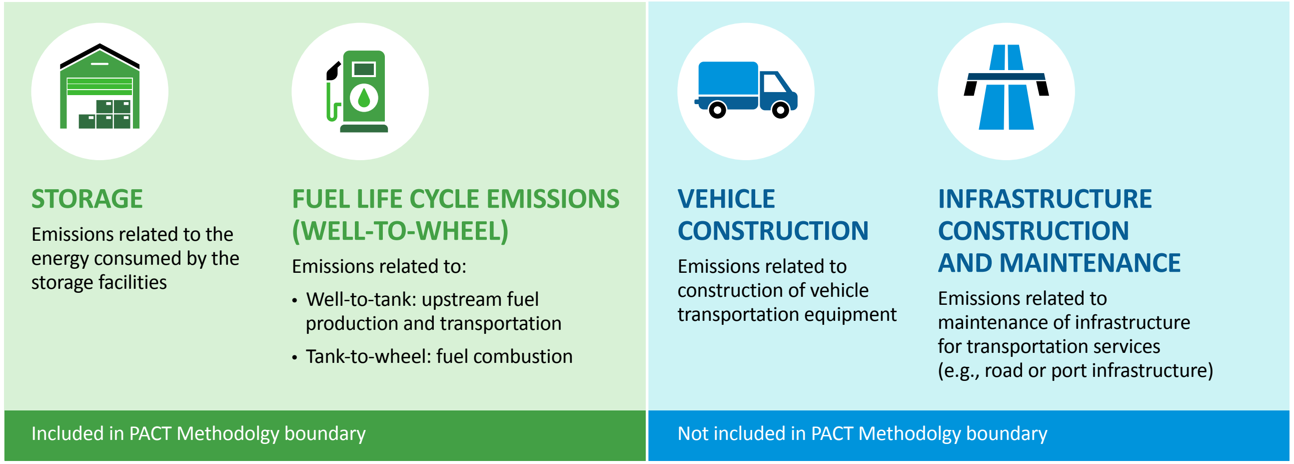


Figure 11: Transportation emissions accounted for within the transportation boundary of the PACT Methodology (Source: Adapted from PACT Methodology, Version 3.0, Figure 13)

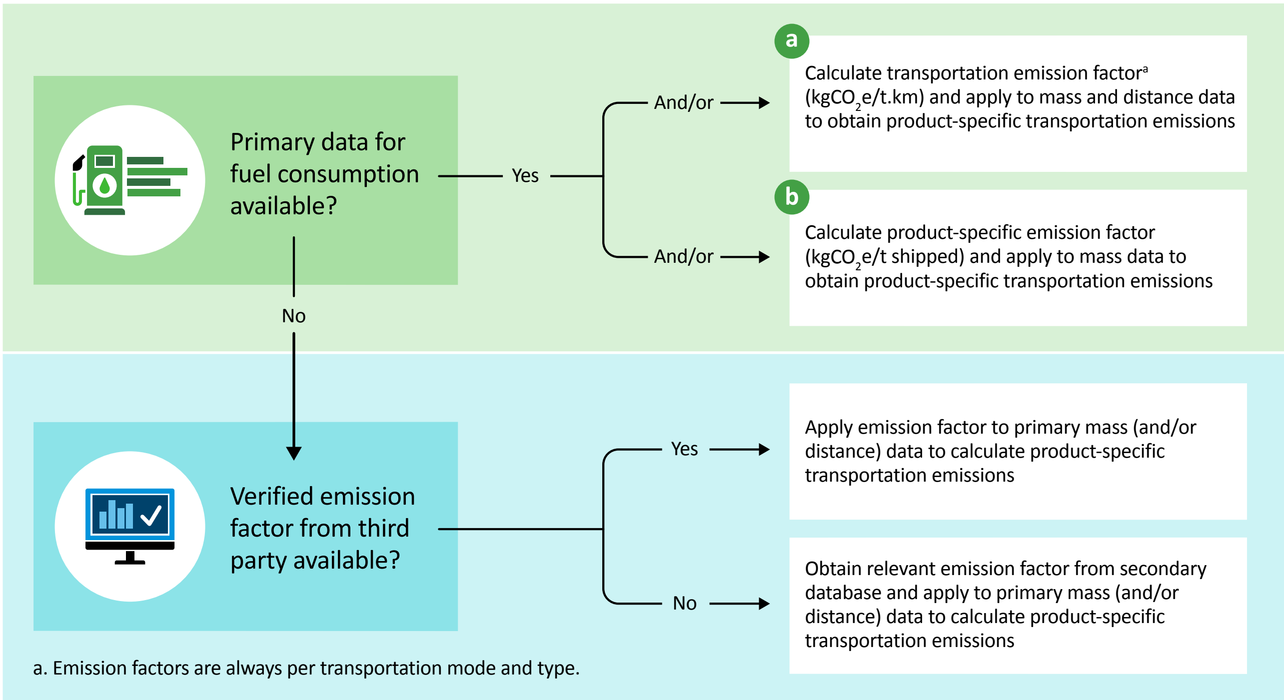


Figure 12: Steps for calculating product transportation emissions based on data availability (Source: Adapted from PACT Methodology, Version 3.0, Figure 14)

3.6.2.4 WASTE TREATMENT AND RECYCLING

Waste generated during manufacturing can contribute to a product's cradle-to-gate emissions, and PACT requires you to include these emissions whenever the waste treatment process is **attributable to your product**. This applies to any waste streams created during material preprocessing, production, or storage, if they fall within the system boundary and do not qualify for exemption.

To account for these emissions, you should identify the type of waste produced, how it is treated, and who is responsible for the treatment. If the waste is processed on your site, you will need data on the energy and materials used for treatment. If the waste is sent to an external facility, you should apply an appropriate emission factor that reflects the correct treatment method, such as recycling, incineration, or landfill. For recycling specifically, only the emissions associated with **your company's waste management activities** are included in the PCF. Any downstream benefits or avoided burdens (such as the use of recycled material in a different system) are not **counted** within the cradle-to-gate footprint.

Waste may be excluded only if it meets the exemption rules described earlier, meaning its total contribution is clearly demonstrated to be less than 3 percent of the PCF. If exclusions are applied, you must disclose them and explain your justification.

3.6.2.5 ELECTRICITY & CONTRACTUAL INSTRUMENTS

Emissions from electricity (and, where relevant, heating and cooling) shall be calculated in alignment with the GHG Protocol Scope 2 Guidance and Scope 3, Category 3 (fuel and energy related activities). The assessment shall include all life cycle emissions of the electricity supply system, covering upstream energy extraction and processing, electricity generation, transmission and distribution losses, and downstream waste treatment from power generation.

Electricity emissions shall be calculated using the market based method. Market based emission factors shall be derived from contractual instruments that convey attributes of electricity generation, such as energy attribute certificates (e.g. (Renewable Energy Certificates (RECs), Guarantees of Origin (GOs)), supplier specific emission rates, or direct supply contracts.

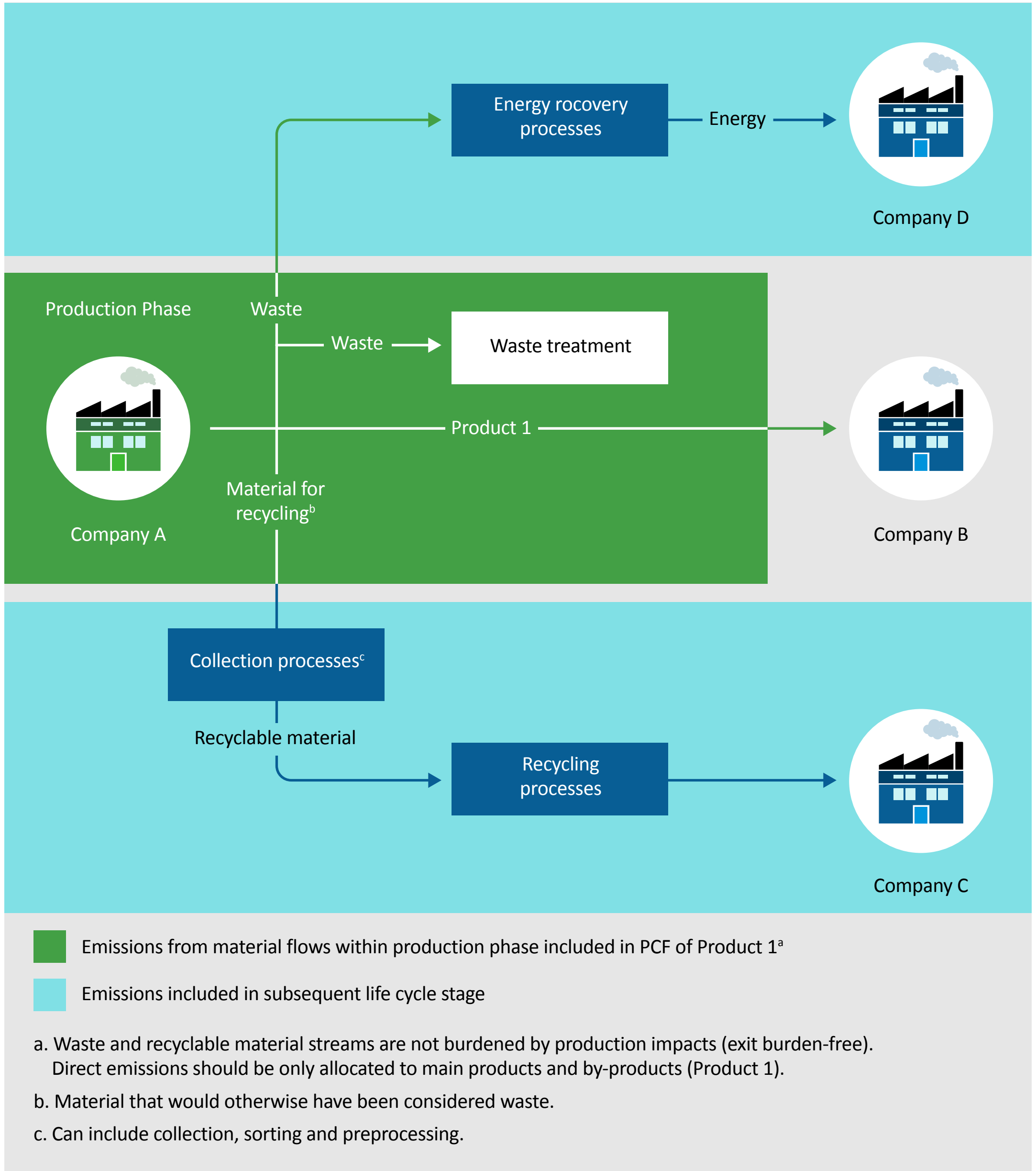


Figure 13: Allocation of waste treatment and recycling emissions (Source: Adapted from PACT Methodology, Version 3.0, Figure 15)

Where contractual instruments are unavailable or do not meet the Scope 2 Quality Criteria, emission factors representing untracked or unclaimed electricity (the residual mix) shall be applied, prioritising the most geographically specific data available.

Where multiple electricity sources are used, companies shall calculate a weighted average emission factor based on the proportion of electricity consumed from each source. If a contractual instrument covers only part of the electricity consumption, the residual grid mix emission factor shall be applied to the uncovered share.

Companies are encouraged to procure contractual instruments that support additional renewable energy generation; however, only contractual instruments that meet the Scope 2 Quality Criteria may be reflected in the quantified PCF result.

3.6.2.6 BIOGENIC AND LAND SECTOR RELATED EMISSIONS AND REMOVALS

Biogenic and land sector related emissions and removals shall be accounted for in PCF calculations for products that rely on agriculture, forestry, or other land use activities within their value chain. This approach builds on the GHG Protocol Land Sector and Removals Standard (LSRS) and is intended to ensure accurate and transparent accounting for land based products. In DIY products, common examples are wood and wood-based panels such as chipboard or MDF, natural fibres and bio-based polymers or resins.

Biogenic and land sector related emissions include different types of emissions and removals which are shown in Figure 3.

Table 6: Selection of emissions factors from electricity (Source: Adapted from PACT Methodology, Version 3.0, Table 6)

	Primary	Secondary
Internally generated electricity (e.g., company owns solar panels)	Emissions calculated based on energy generated and consumed	If renewable energy certificates are sold to 3rd party but energy is consumed, refer to market-based hierachy (GHG Protocol Scope 2 Guidance Table 6.3) to calculate emissions
Direct-line (e.g., company receives power directly from generator)	Use specific emissions source, supplier-specific emissions factor or supplier-specific electricity mix from contractural instruments	Cradle-to-gate or cradle-to-grave.
Grid-distributed	Use of supplier-specific emission factor or supplier-specific electricity mix from contractural instruments	Use of residual mix, sub-national or national grid-mix. For more information, please refer to market-based hierachy (GHG Protocol Scope 2 Guidance Table 6.3)

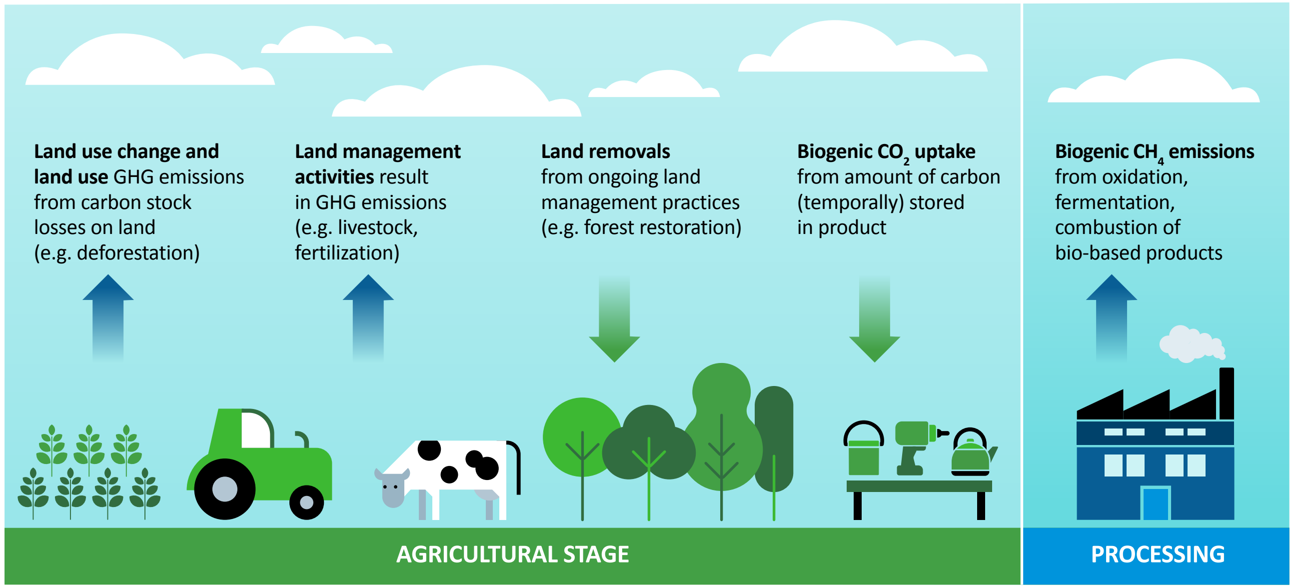


Figure 14: Emissions and removals covered in biogenic and land emissions & removals section (Source: Adapted from PACT Methodology, Version 3.0, Figure 16.)

You may exclude biogenic and land sector emissions if the product contains less than 5% biogenic carbon by mass, or if these emissions fall below the 3% exemption threshold set out elsewhere in this guide.

There are exceptions. Products that are fossil- or mineral-based may still require land sector accounting where land use impacts are significant, and biofuels used in processing may also carry material land-related emissions.

Where applicable, companies shall calculate and report biogenic and land sector emissions and removals across six categories shown in Table 7, following consistent and transparent methodologies.

You can quantify biogenic and land sector emissions using a range of methods and data sources. You should aim to increase traceability and primary data use over time, but where supply chains are not fully tracable, these emissions are more likely to rely on secondary data for estimation.

Table 7: Overview of calculation categories in biogenic and land sector related emissions and removals (Source: Adapted from PACT Methodology, Version 3.0, Table 7.)

Category	Sub-category	Unit	Shall/ Should/ May	Part of PCF	Short description	Examples
A. Land use and land use change emissions	LUC emissions	$kgCO_2e$	Shall	Yes	GHG emissions due to change in land use type	GHG and biogenic CO_2 emissions due to conversion of forest to cropland (deforestation)
	Land management CO_2 emissions	$kgCO_2e$.	Shall-2027	Yes	Biogenic CO_2 emissions due to recurring management actions on land in the same land use category	Biogenic CO_2 emissions from carbon stock losses due to management practices such as fertilization, pest control and fire
B. Biogenic non-CO_2 emissions	Biogenic non-CO_2 emissions	$kgCO_2e$	Shall	Yes	CH_4 emissions from land management practices and the oxidation and transformation or degradation of biomass	Livestock CH_4 emissions, manure, CH_4 emissions; CH_4 emissions from rice cultivation
C. Fossil emissions	Fossil emissions – total	$kgCO_2e$	Shall	Yes	Fossil emissions resulting from stationery/ mobile combustion, industrial processes and fugitive emissions. Includes land management and all other industrial emissions	CO_2 from combustion of fossil fuels from industrial processes
	Fossil emissions – land management	$kgCO_2e$	Shall-2027	Yes	Seperately reported Fossil CO_2 and N_2O emissions due to land management practices. These values are also reported in Fossil emissions – total	CO_2 and N_2O emissions from fertilization and liming
D. Land removals	Land management CO_2 removals	$kgCO_2e$	May	Yes	CO_2 removals from a net increase in carbon stored in land-based carbon pools. Subject to reporting requirements	Soil carbon sequestration, reforestation, afforestation
E. Biogenic product CO_2 uptake	Biogenic product CO_2 uptake	$kgCO_2e$	Shall	Yes/ No	Net biogenic CO_2 uptake of biomass in the product	Biogenic CO2 uptake from photosynthesis in wood product
	Biogenic carbon content	kgC	Shall	No	The amount of biogenic carbon contained contained within the product	Amount of biogenic carbon in bio-plastic
F. Land tracking	Land occupation	M^2.yr	Should	No	Amount of agricultural land occupied in a land use category	Amount of cropland occupied by wheat

* Biogenic product CO_2 uptake is excluded in PCF excluding biogenic CO_2 uptake and included in PCF including biogenic CO_2 uptake

3.6.2.6.1 BIOGENIC AND LAND SECTOR EMISSIONS COMMON IN THE DIY SECTOR.

Biogenic and land sector related emissions are particularly relevant for the DIY sector, especially for wood-based products such as timber, plywood, MDF, chipboard, and wood-based furniture components. These products differ from most other DIY materials because they contain carbon that has been removed from the atmosphere during the growth of biomass.

As a result, Product Carbon Footprints (PCFs) for wood-based products must account for:

- The storage of biogenic carbon within the product, and
- Any emissions associated with forestry, land management, and land use change

BIOGENIC CARBON IN WOOD-BASED PRODUCTS

Wood-based products contain biogenic carbon, which originates from atmospheric CO_2 absorbed by trees during growth and stored in the biomass. At the cradle-to-gate stage, this carbon remains embedded within the product and must be quantified and reported.

For all relevant products, companies shall:

- Calculate the biogenic carbon content of the product, based on the mass of wood or biomass materials
- Convert this carbon content into biogenic CO_2 uptake using standard conversion factors (Biogenic product CO_2 uptake = kg Biogenic carbon × (44/12))
- Report both values alongside the PCF

LAND USE CHANGE (LUC)

Land use change emissions arise when land is converted from one use to another, such as from forest to agricultural land or from natural forest to plantation. These changes can lead to significant releases of stored carbon and must be considered where relevant.

For DIY wood products, land use change is most associated with timber sourcing. The need to include LUC emissions depends primarily on the level of traceability and sourcing practices.

In practice:

- LUC emissions may be assumed to be zero where timber is sourced from certified sustainable forestry systems (e.g. FSC or PEFC), or where suppliers can demonstrate that no land conversion has occurred within the past 20 years.
- LUC emissions must be included where sourcing regions are associated with deforestation risk, or where traceability is limited and land history cannot be confirmed.

Where LUC must be accounted for, companies should apply the most appropriate available data, prioritising, supplier-specific forestry data, regional or country-level datasets, secondary LCA database values.

Forestry and Land Management Emissions In addition to land use change, emissions may arise from ongoing forestry and land management activities. These include:

- Fuel use in harvesting and forestry operations
- Emissions from machinery and equipment
- Processing steps prior to manufacturing (e.g. log preparation)

For most DIY wood products, these emissions are typically captured within upstream datasets or supplier PCFs and do not require separate calculation at the product level; however, they should still be reported separately where relevant.

3.7 ASSESSING DATA RELIABILITY

3.7.1 PRIMARY DATA SHARE (PDS)

Primary Data Share (PDS) is used to show how much of your PCF is based on primary data rather than secondary or proxy data. It provides transparency on data quality and helps users understand how representative the PCF result is.

PDS is calculated as the percentage of total cradle to gate emissions that are derived from primary data. To calculate PDS, each attributable process is assessed individually. You determine which processes are based on primary data, calculate their emissions, and then express these emissions as a share of the total PCF. Direct emissions from your own operations are always treated as primary, both the activity data and the corresponding emission factor should be based on primary data.

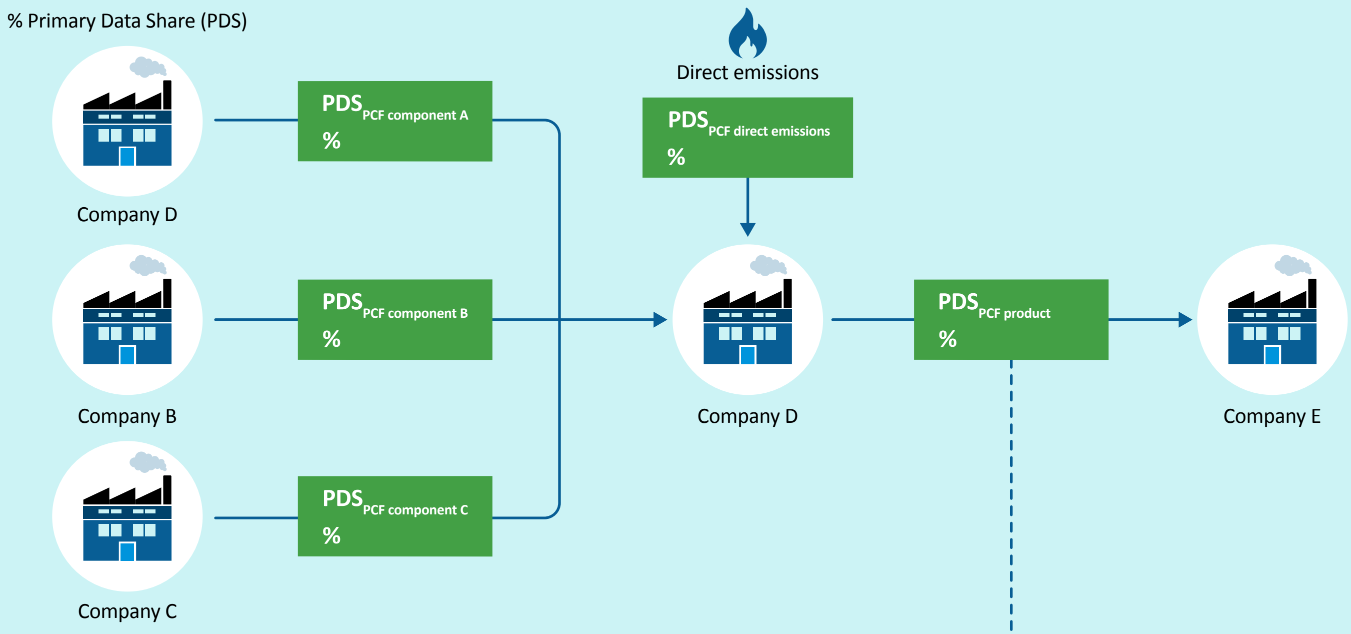
PACT requires PDS to be calculated and reported alongside the PCF. You should view PDS as a progress indicator, not a pass or fail threshold. Over time, you are encouraged to increase your PDS by replacing secondary or proxy data with primary data, particularly for high impact materials or processes. This makes PCFs more reliable and supports continuous improvement across the value chain.

As a general principle, the aim should be to maximise PDS wherever feasible.

3.7.2 DATA QUALITY RATINGS (DQRs)

Data Quality Ratings (DQRs) are used to provide a transparent indication of how well the data used in a PCF represents reality of the reported product's lifecycle processes and specification. While the Primary Data Share shows how much data is primary, DQRs describe how good the underlying data is.

Figure 15: Example of Primary Data Share Calculation (Source: Adapted from PACT Methodology, Version 3.0, Figure 16.)



Formula to calculate $PDS_{PCF\ product}$

$$\frac{|PCF_{component\ A}| \times PDS_{component\ A} + |PCF_{component\ B}| \times PDS_{component\ B} + |PCF_{component\ C}| \times PDS_{component\ C} + |PCF_{direct\ emissions}| \times PDS_{direct\ emissions}}{|PCF_{component\ A}| + |PCF_{component\ B}| + |PCF_{component\ C}| + |PCF_{direct\ emissions}|}$$

Component	Data input	Activity data source	Emission factor	Emission factor source	$\lvert PCF_i \rvert$ $kgCO_2e$	% PCF	PDS_i	Total PDS
$PDS_{PCF\ component\ A}$	1,000 kg	Primary	0.8	Primary & Secondary	800	19%	36%	7%
$PDS_{PCF\ component\ B}$	2,000 kg	Secondary	1.2	Primary & Secondary	2,400	56%	0%	0%
$PDS_{PCF\ component\ C}$	500 kWh	Primary	0.18	Secondary	90	2%	0%	0%
$PDS_{PCF\ direct\ emissions}$	5,000 GJ	Primary	0.2	Primary	100	23	100%	23%
				$\lvert PCF_{product} \rvert$	4,290	$PDS_{PCF\ product}$		30%

Note: For the purpose of this example, please note that direct emissions are considered to have a PDS of 100%, since both the activity data and emission factor data come from primary sources, while component B and C are considered to have a PDS of 0%, since activity data and emission factors data respectively come from secondary sources.

Table 8: Data quality assessment matrix (Source: Adapted from PACT Methodology, Version 3.0, Table 12)

Data Quality Indicators (DQIs)				
Technological representativeness				
1 The dataset has been created based on data reflecting the exact technology employed (i.e. plant specific process/equipment data for the plant/ equipment where the product has been manufactured) Note this quality score can be achieved only in case of use of primary data	**2** The dataset has been created based on data reflecting the company-specific and same technology to the one employed for the actual manufacturing (i.e. same technology, the company/ site specific but not necessarily plant specific – it could be an average if several company/site specific data are available) Note this quality score can be achieved only in case of use of primary data	**3** The dataset has been created based on data reflecting an average for an equivalent technology to the one employed for the actual manufacturing (i.e. same technology, but not company specific) Note: this is the maximum score achievable with secondary data	**4** The dataset has been created based on data reflecting a technological proxy (i.e. similar but not same technology, irrespectively if based on averages or supplier specific data)	**5** The dataset has been created based on different or unknown technology vs technology actually employed
Geographical representativeness				
1 The dataset has been created based on data reflecting the country subdivision (if applicable) or country in which the product has been manufactured Country subdivision list: States in the USA, Provinces in Canada, Federative units in Brazil, Provinces in Argentina, States in Mexico, Republics in Russia, States in India, Provinces in China, States in Australia	**2** The dataset has been created based on data pertaining the country, in which the product has been manufactured. The area where the dataset is generated is valid for the geographical area where the site is located Example: The site is in California and the dataset is a US average	**3** The dataset has been created based on data pertaining to the geographical region (e.g., Europe, Asia, North America), in which the product has been manufactured The area where the dataset is generated is valid for the geographical area where the site is located Example: The site is in Spain and the dataset is a European average	**4** The dataset has been created based on global averages Example: The site is in Japan and the dataset is a global average	**5** The dataset has been created based on data with a geographical scope which is either unknown or pertaining a country, or region not including the site in which the product has been manufactured Example: In absence of a global average, the dataset geographical applicability is unknown
Temporal/Time representativeness				
1 The difference between "Reference Period End" of the dataset and "Reference Period End" of the PCF is ≤1 year (i.e., 366d (to count for leap year))	**2** The difference between "Reference Period End" of the dataset and "Reference Period End" of the PCF is >1 year and ≤2 years (i.e., 731d)	**3** The difference between "Reference Period End" of the dataset and "Reference Period End" of the PCF >2 years and ≤3 years (i.e., 1096d)	**4** The difference between "Reference Period End" of the dataset and "Reference Period End" of the PCF is >3 years and ≤4 years (i.e., 1461d)	**5** The difference between "Reference Period End" of the dataset and "Reference Period End" of the PCF is >4 years or unknown

Explanation of Temporal / Time representativeness
Reference Period End: the latest date for which the dataset is representative (e.g., 31.12.2023 for a data set that represents 2023)
Calculate Time Difference: "Reference Period End" of the dataset - "Reference Period End" of the PCF ": e.g., 31.12.2023 - 01.06.2024 = 6 months, i.e., rating 1

Under PACT, data quality is assessed across three dimensions:

- **Technological representativeness** – how closely the data reflects the actual technology or process used,
- **Geographical representativeness** – how well the data matches the location of production, and
- **Temporal representativeness** – how well the data reflects the stated reference period.

Each dimension is scored on a scale from 1 (high quality) to 5 (low quality) for the relevant emission factors and direct emissions data. The overall DQR for a product is calculated as a weighted average, where data points with a larger contribution to the total PCF have a greater influence on the final score. PACT requires DQRs to be calculated and reported from 2027 onwards. Until then, they serve as an internal tool to help you identify data quality weaknesses and prioritise improvements. Over time, improving DQRs typically involves updating outdated datasets, selecting more geographically relevant data, or replacing secondary data with primary or supplier specific information.

DQRs do not change the PCF value itself, but they provide important context on how reliable and representative the result is. Data quality assessment matrix is shown in table 8.

3.8 VERIFICATION

Verification is an important part of ensuring confidence in PCF results. The PACT Methodology focuses on verifying how PCFs are calculated, rather than verifying every individual product footprint. For the period up to 2030, companies are expected to verify their PCF Calculation Model. This means demonstrating that the methodology, calculation logic, assumptions, and system boundaries you use to generate PCFs are consistent with the PACT requirements.

Verification does not require third party assurance of each individual PCF result or of all underlying activity data.

3.8.1 VERIFICATION COVERAGE

In the short term, verification applies to the PCF Calculation Model, not to individual PCF results. This means the verifier assesses the methodology, rules and systems you use to generate PCFs, rather than checking all underlying activity data for each product.

Dimension	SHORT-TERM REQUIREMENTS 2025-2030	LONG-TERM REQUIREMENTS 2030 onwards
Coverage Granularity of data to be verified	PCF Calculation Model	PCF Program
Conformance Basis for the verification	PCR or sector-specific guidance, if followed, in addition to PACT Methodology Verification against additional cross-sectoral standards is optional	PCR or sector-specific guidance, if followed, in addition to PACT Methodology Verification against additional cross-sectoral standards is optional
Boundary Depth of the data to be verified	Cradle-to-gate	Cradle-to-gate
Level Degree of confidence	Limited assurance	Certification
Provider Entity providing the verification	Independent third party	Independent third party
Process cycle Temporal validity of the verification	Three years or earlier if variance >10% or if calculation methodology update takes place	Three years or earlier if variance >10% or if calculation methodology update takes place
Application to SMEs SME requirements	**Phased-in approach for SMEs** All requirements above apply identically to SMEs but with a two-year time lag to allow for capacity building	

Figure 16: Verification Roadmap Overview
(Source: Adapted from PACT Methodology, Version 3.0, Figure 22)

The verification scope includes:

- Boundary of approach
- Calculation standard
- Characterization factors
- Unit of analysis
- Exempted emissions
- Data quality
- Data source
- Calculation

3.8.2 VERIFICATION ROADMAP AND PROCESS STEPS

Short term verification follows a phased approach:

1. **Calculate** - You document your PCF calculation model and supporting evidence.
2. **Review** - An independent third party verifier reviews the model against PACT requirements.
3. **Correct** - Any findings are addressed, and corrective actions
   are implemented where needed.
4. **Verify** - Once confirmed, the calculation model is considered PACT conformant.

This roadmap allows organisations to improve PCF quality over time while establishing a solid methodological foundation.

3.8.3 SPECIAL CONSIDERATIONS FOR SMES

PACT recognises that smaller organisations may require additional time to build capability. The same verification principles apply to SMEs, but the timeline is phased, giving them more time to prepare without lowering methodological expectations.

3.8.4 VERIFICATION TIMING AND REPORTING

Verification should be carried out after the PCF has been calculated and before it is shared or exchanged. As the verification process may take time, you should plan to avoid delays in reporting or data exchange. When PCFs are disclosed, verification information must be included alongside the results. This should clearly state that the PCF calculation has been reviewed by an independent verifier and outline the scope and level of verification applied.

Verification details must also be shared when exchanging PCF data, in line with the PACT Technical Specifications. Where PCFs or related emissions data have already been verified for other purposes, such as regulatory or reporting requirements, this existing verification may be reused, provided it meets the applicable PACT verification requirements.

3.9 DATA EXCHANGE

To ensure PCFs are comparable and usable across the DIY supply chain, PCF data must be exchanged in a standardised format aligned with the PACT Methodology and Technical Specifications. At a minimum, you must share the elements shown in Table 9, below.

Table 9: Minimum Data Elements Required for PCF Reporting

Data element	What to report
Product and company information	Product name, description, product ID, company name and ID
Product-specific PCF	Total cradle-to-gate emissions (kgCO_2e per declared unit), including values excluding and including biogenic CO_2 uptake
Declared unit and boundary	Declared unit, cradle-to-gate system boundary, period and geography
Carbon attributes	Fossil, biogenic and recycled carbon content of the product
Emissions breakdown	Key emission categories such as fossil emissions, biogenic non CO_2 emissions and land use change (where relevant)
Additional reported elements	Packaging, outbound logistics, CCU, CCS and other separately reported information
Methodological disclosures	Allocation approach, exemption use, standards applied, and use of secondary data
Data quality indicators	Primary Data Share (PDS) and Data Quality Ratings (where applicable)
Verification status	Whether the PCF has been verified and level of assurance
Characterisation factors	Use of IPCC characterisation factors

PACT recommends exchanging this data using PACT conformant digital solutions to enable secure, consistent data sharing and integration into Scope 3 calculations. Supplier specific PCFs should be incorporated progressively across purchased products to support better sourcing decisions and targeted decarbonisation. Below is a visual representation of exchanging PCFs using PACT Network.

In practice, PCFs are increasingly accessed and used through supplier data exchanges and internal databases. You may receive PCF data directly from suppliers as part of procurement processes, or store and manage it in dedicated PCF databases alongside product information such as declared units, validity dates, and supplier details.

Linking this data to product-level information (for example, SKUs, pack sizes or units of measure) is essential to ensure that emissions are calculated correctly and consistently. This approach enables PCFs to be integrated into wider Scope 3 reporting, supporting more accurate aggregation of emissions across purchased goods and services.

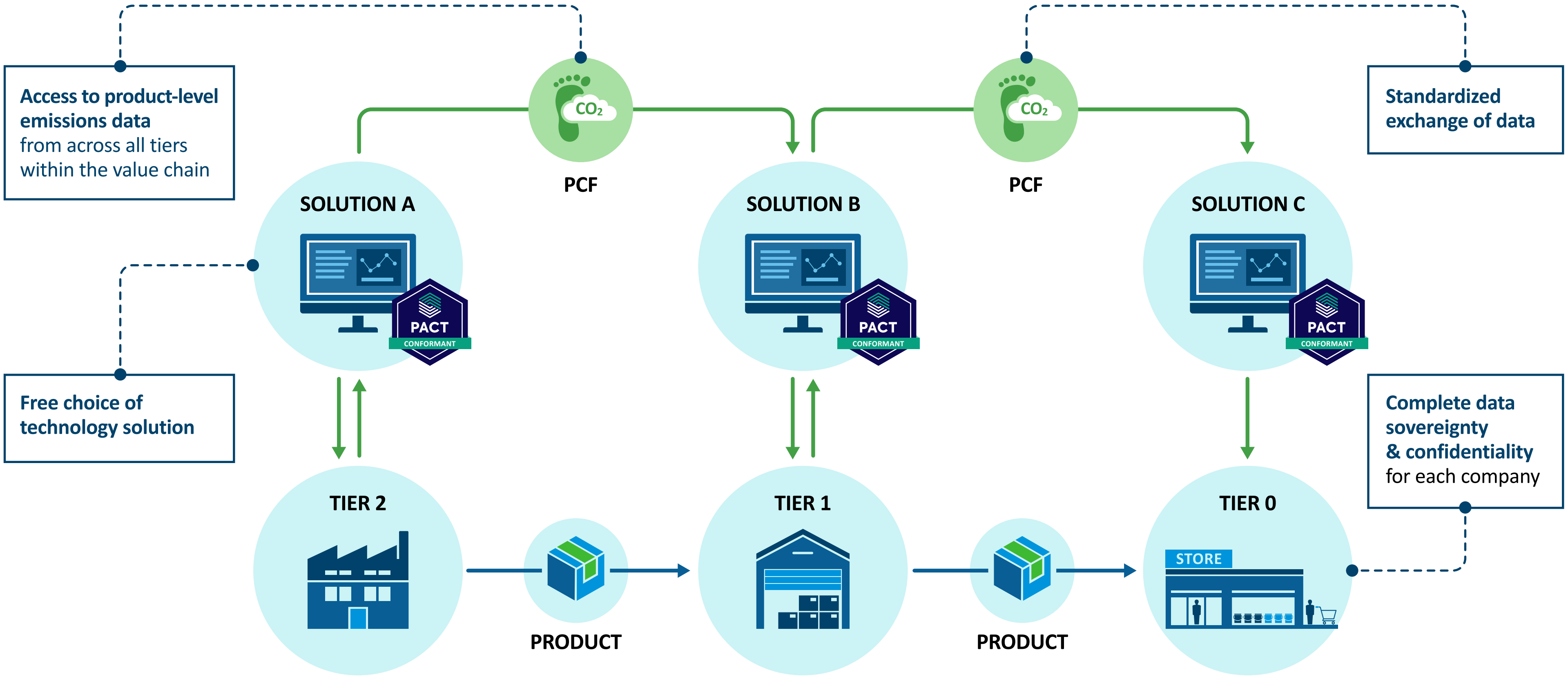


Figure 17: Visual representation of exchanging PCFs using PACT Network (Source: Adapted from PACT Methodology, Version 3.0, Figure 23)

Chapter 4

PCFs Utilisation

Having a clear strategy for the utilisation of PCFs is key to generating momentum across an organisation to continue to calculate and maintain a high-quality database of PCFs. The most common way to use a PCF is to satisfy the requests of a customer, to demonstrate the sustainable attributes of your product. PCFs can also be used to demonstrate reductions in an organisations corporate carbon footprint as a replacement for less accurate quantity or spend based calculations.

As product related emissions are typically a significant part of a company's emissions incorporating PCFs into an inventory can greatly improve accuracy of the calculation, but as product emissions never make up the complete emissions for a company an organisation must develop a hybrid methodology of carbon accounting.

Depending on how your organisation wishes to use PCF data it will change slightly the approach you take to prioritise and gather the data.

4.1 WHERE TO BEGIN WITH PCF COLLECTION AND UTILISATION – PRODUCT TYPE AND SUPPLIER PRIORITISATION FOR DECARBONISATION

Objective: Engage with supplies to gather PCFs to encourage product decarbonisation and progress towards organisation decarbonisation targets.

When prioritising product categories for the application of PCFs within DIY sector GHG accounting, organisations should begin by identifying emissions hotspots. This involves analysing which product categories contribute the largest share of total emissions and therefore represent the greatest opportunity for meaningful decarbonisation impact. A robust approach considers multi-year historic data alongside current performance and anticipated future trends, ensuring that selections reflect sustained emissions significance rather than short-term anomalies. While historical data provides useful context, emphasis should be placed on the most recent reporting years to avoid allocating resources to discontinued or declining product lines. This forward-looking perspective ensures that PCF implementation efforts remain aligned with the evolving product portfolio and strategic business priorities.

Beyond overall emissions contribution, several additional criteria should be applied to refine the selection of priority products. Year-on-year (YoY) emissions variance is a key indicator of changing importance; products with increasing emissions should be prioritised, as this may signal growth in sales volume, rising emissions intensity, or both. Similarly, emissions intensity (emissions per unit of product) should be a critical consideration. Higher-intensity products offer greater potential impact per unit when improving data accuracy through PCFs, making them particularly valuable priority areas for enhanced measurement and supplier engagement.

Another important factor is YoY spend-based emissions factor volatility. Products with significant fluctuations in spend-based emissions factors may introduce instability into emissions reporting due to external economic or sector-wide factors; prioritising these product categories for the PCF-based accounting methodology can improve the robustness and reliability of inventory results by anchoring emissions estimates in more precise, product-specific data.

Finally, prioritisation should account for the potential for decarbonisation innovation within each product category. Products with a demonstrated history of emissions reduction initiatives, or clear opportunities for future innovation, should be favoured, as PCFs enable organisations to more accurately capture and reflect incremental improvements over time. This ensures that both historic progress and future decarbonisation efforts are visible within GHG inventories, supporting credible reporting and stakeholder engagement. Conversely, effort should not be disproportionately directed towards simple or commoditised product categories, such as sold fuels or bulk raw materials, where limited differentiation or innovation potential reduces the value gained from highly granular PCFs. Instead, focus should be placed on more complex products, particularly those with intricate manufacturing processes or supply chains, where increased accuracy in emissions calculations can yield greater strategic insight and influence over decarbonisation pathways.

In summary, the key factors to consider when selecting and prioritising product categories to collect PCFs, and utilise them in a hybrid accounting methodology, are as follows:

- Emissions hotspots – multi-year historic, current and future hotspot products
- Products with increasing emissions
- Products with high emissions intensity
- Products currently using spend-based factors with high volatility
- Products with history of, and future capacity
- for, decarbonisation innovation.

Once priority product categories have been identified, a targeted approach to supplier engagement is essential to maximise the efficiency and impact of PCF collection. A key initial criterion is the existing availability of PCFs. Suppliers that have already developed PCFs for their products represent a low-effort, high-value starting point, enabling organisations to quickly improve the accuracy and granularity of their emissions data. Leveraging existing PCFs reduces the need for intensive supplier engagement and minimises the investment required from both parties, allowing early progress while broader capability is developed across the supply base.

Closely linked to availability is the maturity of the supplier's understanding of PCF requirements, GHG accounting methodologies, and LCA principles. Suppliers with established expertise in these areas are more likely to produce robust, consistent, and standards-aligned PCFs, reducing the need for validation, iteration, and guidance. Engaging with such suppliers can also create opportunities for knowledge transfer, supporting wider capability building across the supply chain. In contrast, suppliers with limited experience may require significant support, increasing the time and resource burden associated with PCF implementation.

The strength of the existing commercial relationship is another important consideration. Suppliers with well-established, collaborative relationships with procurement teams are typically more receptive to new data requests and strategic initiatives such as PCF development. These relationships provide established communication channels, clearer leverage, and a greater degree of trust, all of which can accelerate engagement and improve data quality. Aligning PCF requests with ongoing supplier management processes, such as procurement reviews or other sustainability initiatives, can further streamline integration and reduce friction.

Suppliers' commitment to decarbonisation should also play a central role in prioritisation. Those with transparent product-level decarbonisation strategies, credible targets, and a demonstrated track record of innovation are more likely to see value in PCFs as a tool for measuring and communicating progress. Engaging these suppliers enables organisations to better capture emissions reductions over time within their inventories and to align more closely with partners who are actively contributing to shared sustainability objectives. This is particularly valuable in the DIY sector, where product differentiation and innovation can drive not only emissions reductions, but commercial advantage too.

In practice, these criteria often point towards larger suppliers as priority candidates. Such organisations typically have greater technical and financial resources to develop high-quality, standardised PCFs across their product portfolios. Additionally, where suppliers offer a relatively uniform range of products, there may be opportunities to streamline PCF generation using representative models or product archetypes, reducing duplication of effort while maintaining sufficient accuracy. By focusing initial efforts on these suppliers, organisations can rapidly scale PCF coverage across high-impact categories, creating a strong foundation for broader rollout to smaller or less mature suppliers over time.

In summary, the key factors to consider when prioritising target suppliers to engage with on PCFs, are as follows:

- Suppliers with pre-existing PCFs, of sufficient quality, accuracy and standardisation.
- Suppliers with a strong existing commercial relationship with your procurement team.
- Suppliers with a demonstrated history of, and commitment to, product decarbonisation.
- Suppliers that offer a relatively uniform product range with capacity for future decarbonisation innovation.
- Suppliers with sufficient resource, and a mature and demonstrated understanding of LCA, PCF and GHG accounting methodologies.

4.2 IMPROVING PCFS – PRODUCT TYPE PRIORITISATION

From a supplier perspective, selecting which products to prioritise for PCF development should follow a similarly structured, impact-led approach, balancing emissions relevance with practical feasibility and strategic value. A primary consideration is the emissions significance of products within your own portfolio. Products that contribute the largest share of cradle-to-gate emissions, whether due to high production volumes, energy-intensive manufacturing processes, or emissions-intensive materials, should be prioritised. Developing PCFs for these products ensures that effort is directed towards areas where improved data accuracy will have the greatest influence on both your internal GHG management and your customers' scope 3 reporting.

Suppliers should also consider customer demand signals when determining priorities. Products supplied to key customers, particularly those with mature GHG reporting requirements, such as larger DIY retailers, are strong candidates for early PCF development. Where customers are actively requesting PCF data, developing footprints for these products can strengthen commercial relationships, enhance procurement competitiveness, and improve alignment with customer sustainability objectives. In many cases, prioritising products linked to strategic accounts or framework agreements will yield the greatest near-term business value.

Another important factor is product standardisation and scalability. Products that are representative of a broader range, either through shared or similar bill of materials, manufacturing processes, or design characteristics, offer an opportunity to create archetype PCFs that can be efficiently adapted across multiple SKUs. This approach reduces the marginal effort required per product while enabling relatively rapid expansion of PCF coverage. Conversely, highly bespoke or low-volume products may be deprioritised in early phases unless they are particularly emissions-intensive or strategically important.

Suppliers should also assess data availability and readiness across their operations and supply chains. Products for which high-quality primary data is already accessible (such as energy use, material inputs, and supplier-specific information) are typically more straightforward to assess and can serve as early quick wins. Prioritising these products enables suppliers to establish internal methodologies, test data collection processes, and build organisational confidence before tackling more complex or data-constrained product lines. Over time, lessons learned can be applied to progressively more challenging categories, as an increasing PDS, both within individual products and across the entire product portfolio, is targeted (Section 3.7.1).

The potential for decarbonisation and product differentiation should also inform prioritisation decisions. Products that are subject to ongoing innovation (such as material removal or substitution, energy efficiency improvements, or optimised manufacturing processes) are strong candidates for PCFs, as these footprints provide a mechanism to quantify and communicate improvements over time. This is particularly relevant for suppliers seeking to differentiate their offerings through lower-emission alternatives, as PCFs can support credible environmental claims and facilitate participation in low-emission procurement initiatives.

Finally, suppliers should consider internal capability development and strategic alignment. Prioritising products that align with corporate decarbonisation targets, reporting frameworks, or sustainability commitments can help integrate PCF development into broader business processes. In many cases, starting with a focused subset of products, balancing emissions impact, customer relevance, and feasibility, allows suppliers to build technical expertise, refine governance structures, and demonstrate value, before scaling PCF development more widely across their portfolio.

4.3 HOW TO USE PCFS IN AN ORGANISATIONAL SCOPE 3 INVENTORY

Incorporating Product Carbon Footprints (PCFs) into your organisation's GHG inventory is a challenging task and can take multiple years due to the complexity and cost associated with gathering and organising PCFs at scale. This means the transition requires setting up a hybrid accounting methodology to begin incorporating PCFs into your inventory in a manageable and scalable way. This approach enables you to start benefiting from PCFs in the short term while transitioning to increased PCF coverage over time. Continuing to utilise the spend-based method alongside the PCF-based method allows you to account for emissions from all your products' supply chains, while focusing on the most significant ones using PCFs.

The hybrid methodology outlines the process by which PCF data, for key products in your organisation's range, can be combined with spend-based emissions data for the remaining products. Emissions are calculated using the spend-based method in the usual way; however, spend on products selected for the PCF-based method must be subtracted to avoid double-counting.

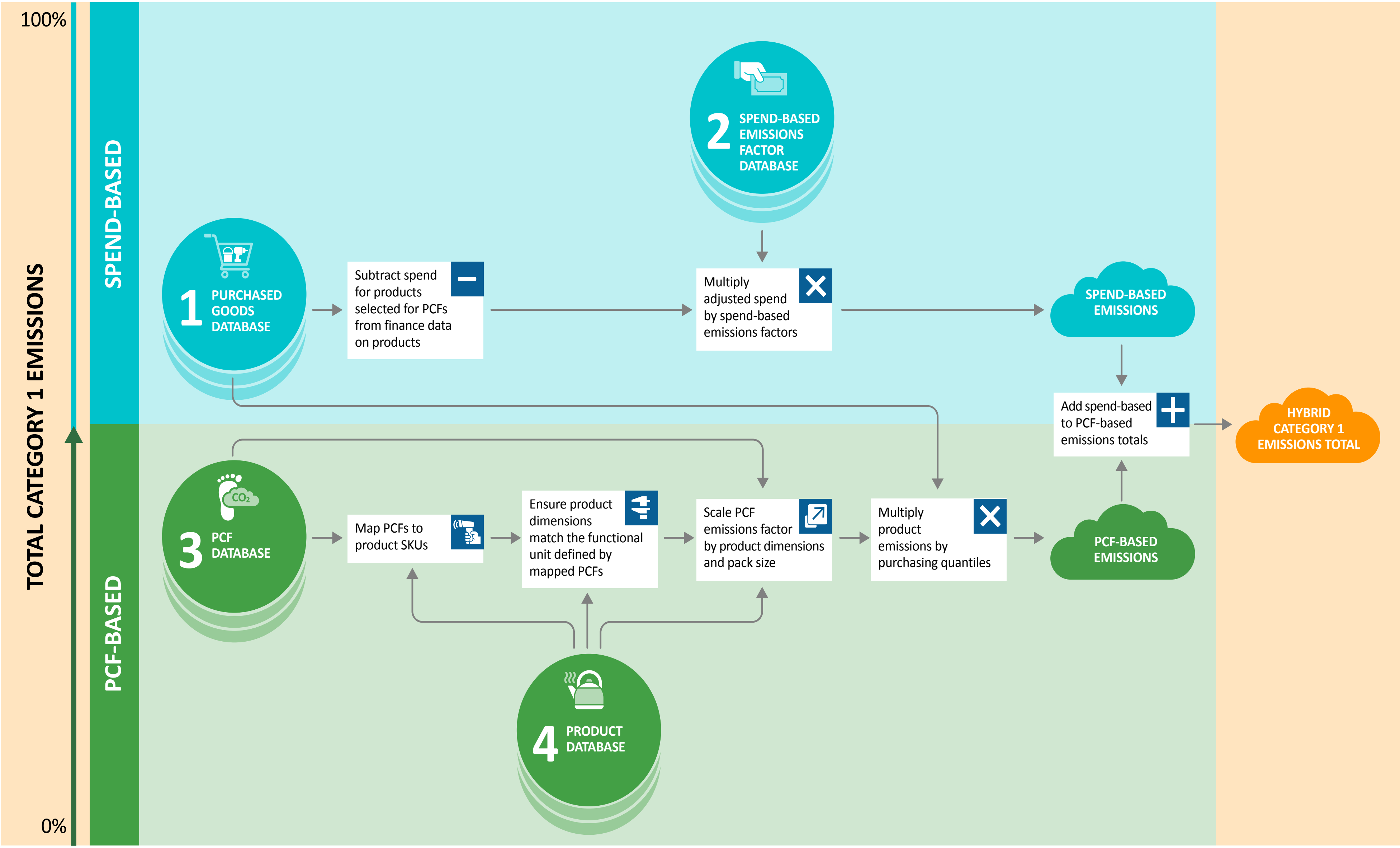


Figure 17: Steps involved in Integrating PCFs into an existing scope 3 carbon inventory

PCFs are mapped to individual product SKUs or to groupings of products, depending on the specificity of the available data. PCFs define emissions per a 'declared' or 'functional unit'—that is, a unit of measure such as 1 kg, 1 m², or 1 litre of the product. Emissions are therefore calculated by multiplying the PCF emissions factor by the total quantity of product sold in that defined unit of measure. Total hybrid Category 1 emissions are calculated as the sum of the spend-based and PCF-based totals.

The purchased goods database should contain both the quantities and financial values (e.g. £) of purchased materials and products to be accounted for in Scope 3 Category 1. Both types of data should be stored at the individual product level, as this level of granularity is critical for correctly accounting for emissions when using a hybrid methodology. Many retailers and suppliers refer to this level of detail as the Stock Keeping Unit (SKU). For products selected for the PCF-based method, the associated spend must be subtracted from the overall product category spend totals. These totals would otherwise be multiplied by spend-based emissions factors, so this adjustment is necessary to avoid double-counting emissions.

The spend-based emissions factor database should contain emissions factors expressed in units such as $kgCO_2e$ per £. These factors are typically assigned at the product category level rather than to individual products. This dataset is the same as that used in the conventional spend-based methodology for calculating supply chain emissions and provides a baseline for emissions estimation where PCF data is not available.

The PCF database should contain upstream lifecycle emissions factors, often referred to as Global Warming Potentials (GWPs), along with the associated functional (or declared) units. These units define the quantity of product to which the PCF applies (e.g. kg or litre). GWPs are therefore expressed as $kgCO_2e$ per functional unit of measure, and both GWPs and functional units are essential for PCF-based calculations. To account for Category 1 emissions, the A1–A3 GWP is typically used, covering emissions associated with material production, transport, and manufacturing. GWP values are expressed in CO_2 equivalent (CO_2e).

Additional, non-critical but important data should also be stored, including the PCF validity date, supplier name, supplier country, and detailed product descriptions such as materials, construction, and other physical characteristics. While not required for calculations, this information helps assess the accuracy of PCF-to-product mapping and supports the creation of a reliable, auditable PCF library.

The product database must contain detailed information for each individual product or SKU in your catalogue, typically sourced from a Product Information Management (PIM) system or similar. Key data fields should include physical dimensions and associated units of measure. It is critical that product quantities are defined in the same unit of measure as the PCF functional unit to ensure emissions are calculated correctly, with unit conversions applied where necessary. Pack size is another essential data point, particularly for multipack products, as it ensures the full quantity of purchased product is accounted for. For example, if the system defines the mass per individual screw but screws are purchased in boxes of 50, emissions should be calculated as: emissions from screws purchased ($kgCO_2e$) = individual screw mass (kg) × box purchase quantity × 50 × emissions factor ($kgCO_2e$ per kg).

Non-critical but important data should also be stored, including the PCF validity date, supplier name, supplier country, and detailed product descriptions such as materials, construction, and other physical characteristics. While not required for calculations, this information helps assess the accuracy of PCF-to-product mapping and supports the creation of a reliable, auditable PCF library.

Funded by EDRA/GHIN

Release date: June 2026

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Thank you to all the members of the Make it Zero Taskforces
and the Accounting Working Group.