



PACT
PARTNERSHIP FOR
CARBON TRANSPARENCY

White Paper

Using PCF Data in Practice: A Usability Model

A working model for product carbon data
applications – co-created and ready for validation

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Collaborators

WBCSD would like to thank the following companies and organizations that have supported and contributed to the development of this White Paper:



Background

Many companies request **supplier-specific Product Carbon Footprints (PCFs)** to strengthen **Scope 3 management and risk**, respond to customer requests, prepare for regulatory requirements and inform low-carbon procurement strategies.

At the outset of their Scope 3.1 data collection journey, companies often see PCFs as a critical enabler of **business decision-making**. PCFs are expected to bring greater clarity to supply chain emissions. However, the current PCF landscape remains uneven: coverage is often limited, supplier maturity varies, large variations in supplier data and secondary data exist, and standards are applied inconsistently to calculate a PCF.

As a result, PCFs shared along the supply chain today may lack the **completeness, consistency or transparency** to confidently integrate them into business decisions or applications. This creates a **structural tension**. PCFs are being requested with growing urgency, yet there is limited shared understanding of how to use early or incomplete or inconsistent datasets in business applications or decision contexts.

Importantly, **early PCF data can still create value**. Even partial or developing datasets can support certain decisions and applications, provided their limitations are clearly defined, addressed and matched to appropriate use cases.

The challenge is therefore not only to increase PCF availability and methodological alignment over time, but also to clarify **when and how different Levels of PCF methodological completeness and data reliability** can credibly enable different types of business decision-making, today.

Against this backdrop, this white paper introduces a **PCF Usability Model** designed to help companies move from **PCF collection to practical value creation** across sustainability, procurement, R&D, operations and strategy functions.

The Challenge

As supplier-specific PCFs are exchanged along supply chains, several barriers emerge:

- 1. Sparse and uneven inputs:** PCFs are often inconsistent in the first years of collection. Coverage may be patchy across suppliers and categories, making systematic decision-integration difficult.
- 2. Various methodological foundations:** PCFs may differ in allocation methods, data sources, temporal scope or validation status.
- 3. Lack of fit-for-purpose criteria:** There is no widely shared, pragmatic view on what constitutes “good enough” data for different business uses. As a result, early PCFs are either over-scrutinised and unused, or in some cases, applied without sufficient awareness of methodological limitations.
- 4. Missing demand-side signals:** Where PCFs are not clearly linked to usages, suppliers lack visibility on how their data will be used. Without clarity, incentives to calculate and provide robust PCFs remain weak.

Together, these barriers form the cornerstone of PCF usability failures, and raise a critical question:

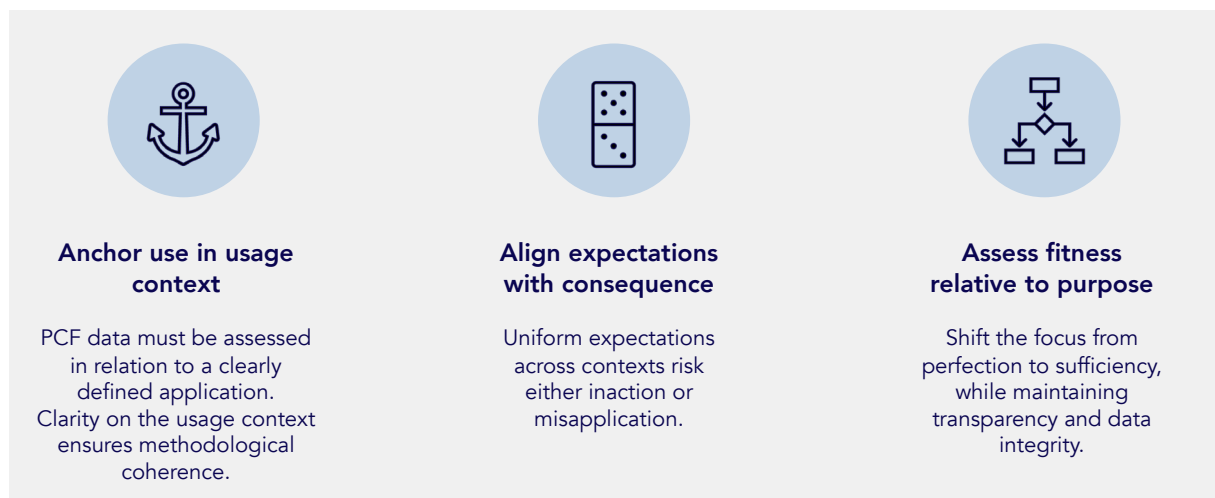
Under what conditions can PCF data credibly support decisions, even when datasets are not complete or perfect?

Guiding Principles

This work builds on and complements **foundational LCA principles**. It also reflects practical insights gathered through expert discussions in the *PACT Product-level Data Use Case Forum*¹. These inputs led to the definition of **three guiding principles** (see: Figure 1).

These principles represent a **working hypothesis**: *anchoring PCF usability in concrete decision and application contexts will enable more pragmatic and transparent applications of product-level carbon data*. They are intended to support learning and application and will evolve as companies test and apply the approach.

Figure 1: Guiding principles of the PCF Usability Model White Paper



The PCF Usability Model

To bridge the gap between PCF availability and PCF usage, this paper proposes a **PCF Usability Model**. The model is built on two complementary components:

1. **PCF Levels**, which describe disclosure integrity, data reliability and methodological transparency; and
2. A **Fit-for-Purpose Matrix**, which links types of business decisions to minimum methodological maturity disclosure expectations.

Used together, these components are intended to help companies assess whether a supplier-provided PCF can enable a predefined decision or application.

The PCF Usability Model is a **proposed practical approach** designed to help companies start using supplier PCF data in decision-making. It is not intended as a final or fixed framework. Following the publication of this white paper, companies are invited to **pilot the model** in real business contexts and share their experiences with the PACT community². Insights from these pilots, including what works well, where challenges arise, and how decision needs differ across sectors, will be collected and used to **refine the model over time**, ensuring it reflects the practical needs of real economy players.

This model is designed as an **internal support tool** for users across several functions within a business, including sustainability, procurement, R&D, operations and strategy. The model helps teams interpret incoming PCF data, align expectations with the robustness of available datasets, and identify how value can be extracted from varying levels of completeness and transparency.

1. Previously, Scope 3 Problem Solving Group

2. Companies piloting the PCF Usability Model are invited to share their feedback with us by emailing: pact@wbcsd.org

It is important to highlight that the value of requesting PCFs extends beyond how the data is ultimately used. Engaging suppliers in PCF programs **strengthens relationships**, builds a **shared understanding of emissions drivers** and lays solid groundwork for future **decarbonisation action**. Even where datasets are still evolving, the PCF exchange process itself can create both organizational learning and collaborative value across the supplier chain.

Scope and Positioning

This work builds on, and complements, existing **PACT guidance**, including the [PACT Methodology v3](#) and the PACT Validation Approach. These elements address different needs in the product carbon data ecosystem.

The PACT Methodology defines how PCFs are calculated and exchanged. Validation strengthens trust in the calculation by increasing confidence in the underlying data and methodology. The PCF Usability Model focuses on a different question: *is the disclosed dataset suitable for a specific business decision or application?*

By clarifying how **PCF completeness and transparency** relate to real decision context, the model aims to support more **practical and proportional use of PCF data** across business functions.

The PCF Usability Model does **NOT**:

- Replace validation or third-party verification
- Amend or redefine the PACT Methodology
- Certify product comparability, support commercial differentiation or enable public claims
- Introduce a compliance requirement or scoring mechanism for suppliers.

The PCF model assumes **PACT alignment** as its baseline. Guidance on how product- and sector-specific methodologies, industry rules and product category rules (PCRs) are addressed, can be found in to Chapter 3.1.2 of the PACT Methodology.

In this first edition, the model focuses primarily on **disclosure completeness and methodological transparency** as a practical starting point. Data reliability indicators remain critical inputs to decision-making and will be further explored through pilot testing and future iterations of the model.

PCF Levels

The PCF Levels describe how complete and transparent a disclosed PCF dataset is. They are not intended to certify **accuracy, integrity, or data quality**. Instead, they provide a practical indication of the extent to which required data fields are populated, methodological assumptions are made transparent, and data integrity is supported, to **facilitate business application and decision making**.

The structure of the PCF Levels is explicitly anchored in the underlying requirements and attributes of the PACT Methodology v3. The Levels are defined as follows:

- **Level 1 – An indicative PCF:** A minimal PCF dataset containing core identification, unit definition and cradle-to-gate emissions values
- **Level 2 – A consistent PCF:** A Level 1 dataset plus additional metadata enabling some evaluation of: data reliability, representativeness and methodological consistency
- **Level 3 – A methodologically complete PCF:** A Level 2 dataset that is methodologically complete with the majority of PACT data attributes populated, clear transparency on data sources, choices and exclusions, and data reliability indicators, demonstrating greater integrity than lower Levels.
- **Level + – A conditional PCF:** A PCF at any Level where the PCF alone is insufficient to satisfy the application or decision. Additional use-case-specific alignment conditions and supplementary metadata must also be met, for example, to support a formal comparison, commercial decision, certification or external claim. The specific conditions required are defined by the relevant use case and will be developed through the PACT Product-level Data Use-Case Forum.

The PCF Levels reflect three interconnected dimensions: **disclosure completeness, methodological transparency and data reliability**. Together, these dimensions serve as

a practical indicator of overall PCF integrity. The Levels are not a quality score and do not replace the data integrity requirements defined in the PACT Methodology.

Figure 2: PCF Levels

Level	What the received PCF is (high level description)	What the received PCF shows (Data Attribute)	Where the received PCF has limitations (high level description)
Level 1: Indicative PCF	A minimal PCF dataset containing core identification, unit definition and cradle-to-gate emissions values	<ul style="list-style-type: none"> Product name, description, relevant product IDs and classification codes, status PCF excluding biogenic CO₂ uptake Declared unit, unit and amount, and product mass per Declared unit Reference period Geographic Scope 	<ul style="list-style-type: none"> Majority of PACT SHALL attributes not populated Data reliability not assessable Sector-specific or optional contextual attributes likely absent
Level 2: Consistent PCF	A Level 1 dataset plus additional metadata enabling some evaluation of; data reliability, representativeness and methodological consistency	<ul style="list-style-type: none"> All Level 1 attributes PCF including biogenic CO₂ uptake Biogenic carbon content, if applicable* Primary Data Share (PDS) Secondary emission factor sources, Packaging emissions included IPCC Characterisation Factors Relevant standards used (product- or sector-specific rules), if applicable** 	<ul style="list-style-type: none"> Incomplete coverage of PACT SHALL attributes Some methodological assumptions not fully documented Limited methodological transparency
Level 3: Methodologically Complete PCF	A methodologically complete PCF with the majority of PACT data attributes populated, clear transparency on data sources, choices and exclusions, and data reliability indicators, demonstrating greater integrity than lower Levels	<ul style="list-style-type: none"> All Level 2 attributes Description of boundary processes 100% PACT SHALL attributes Allocation rules If exemption rules percentage >3%, exemption rules description 	<ul style="list-style-type: none"> Current climate of PCF landscape means that it is likely that emission factors remain secondary data
Level +: Conditional PCF	A PCF at any Level where the PCF alone is insufficient to satisfy the application or decision. Additional use-case-specific alignment conditions and supplementary metadata must also be met, for example, to support a formal comparison, commercial decision, certification or external claim. The specific conditions required are defined by the relevant use case and will be developed through the PACT Product-level Data Use-Case Forum	<ul style="list-style-type: none"> All required use-case-specific alignment attributes populated Explicit confirmation of, for example: <ul style="list-style-type: none"> Functional equivalence System boundary consistency Allocation approach consistency Declared unit consistency Primary Data Share (PDS) consistency Consistency on LCA database used Consistency on LCA software used PCF shared alongside supplementary documentation required for the specific decision 	<ul style="list-style-type: none"> Level + status is not achieved if required alignment conditions for the specific use case are missing. Comparability or claim validity breaks if assumptions differ or are insufficiently documented Alignment requirements differ depending on the application context (e.g., tendering vs marketing claim vs certification)

* Refer to the PACT Methodology Reporting Rules description, for the required “shall” attributes. For example, if the product is above the biogenic threshold, additional “shall” attributes are required in this instance, as per the reporting rules.

** Refer to Chapter 3.1.2 in the PACT Methodology v3 for guidance on how product and sector specific methodologies are approached at PACT.

Clarifications

- The Levels intentionally focus on **disclosure completeness and methodological transparency** as a practical starting point. **Data reliability metrics**, including the Data Quality Rating (DQR) and Primary Data Share (PDS) are recognised as complementary and critical inputs to decision-making. This relationship between completeness levels and data reliability thresholds will form a primary focus of the pilot phase for the PCF Usability Model (see: [Future Vision](#)).
- A higher Level does not automatically make a PCF suitable for all business decisions. **Suitability** of a PCF or data set for a specific business application or decision cannot be inferred from Level alone. It depends on the context and intended use. For example, certain reporting rule descriptions impose additional “shall” attributes under defined conditions. Where, for instance, a product exceeds a biogenic threshold, further mandatory attributes specific to the reporting rule may apply beyond those required for Level 3 classification.
- The model does not position a **PACT-aligned PCF** as inherently sufficient for all business decisions or applications. A PCF dataset will not, on its own, unlock certain business applications, such as formal material comparisons, commercial differentiation, certification or public-facing claims. In such cases, additional alignment conditions, documentation, or methodological confirmation beyond the cradle-to-gate boundary will be required, as reflected by the Level + row.
- Ultimately, suitability for **decision-making depends on both Level and decision context**.

[Appendix 1](#) contains a downloadable version of the Levels, mapped to the technical field name, as per the PACT Technical Specification.

The Fit-for-Purpose Matrix

Where the PCF Levels define what the dataset contains, the Fit-for-Purpose Matrix (see: [Figure 3](#)) proposes guidance on what ‘Level’ may be sufficient for a given business decision or application.

The matrix maps a **non-exhaustive list** of decisions and applications for PCF data, across use case categories of: supplier engagement and procurement, portfolio prioritisation, reporting and disclosure, product and engineering and comparison, to a proposed minimum viable Level required to support that decision.

Clarifications

- The matrix is both **illustrative and non-exhaustive**. Additional use cases and requirements may apply depending on the specific decision context (see: [How to contribute](#)).
- Where underlying assumptions are not fully documented, directional trends derived from PCF data should be interpreted with caution.
- The matrix is intended as **structured guidance rather than a fixed rulebook**. In practice, companies may apply PCF data in decisions contexts that are not fully reflected in the matrix. These applications will need to be tested during piloting to confirm whether the proposed Level thresholds are credible and proportionate.
- The **comparison use case category** could cover several distinct, comparison examples, each with different requirements. However, Level + conditions will vary depending on the specific comparison being made, and explored in the PACT Product-Level Data Use Case Forum.

Figure 3: The Fit-for-Purpose Matrix

Business Area	Business Decision / Application of PCF Data	Level 1	Level 2	Level 3	Level +
Supplier engagement and procurement	Identify priority product categories for decarbonization planning	Fit for purpose	Fit for purpose	Fit for purpose	
	Refine/prioritize suppliers' engagement	Fit for purpose	Fit for purpose	Fit for purpose	
	Decide whether to invite a supplier into a joint decarbonization or capability-building program	Fit for purpose	Fit for purpose	Fit for purpose	
	Cluster suppliers (services or homogeneous portfolios) by relative carbon intensity	Directional insight	Fit for purpose	Fit for purpose	
	Use PCF data as a criterion in carbon-informed tendering processes	Not fit for purpose	Directional insight	Fit for purpose	
	Decide to pay/refuse a green premium based on PCF comparison for the same material	Not fit for purpose	Not fit for purpose	Not fit for purpose	Required
Internal portfolio and intervention planning	Prioritize internal decarbonisation interventions across products or portfolios	Directional insight	Fit for purpose	Fit for purpose	
	Evaluate the credibility and potential impact of the Supplier PCF Reduction Plan	Directional insight	Fit for purpose	Fit for purpose	
	Identify specific SKUs or part numbers for decarbonization efforts	Not fit for purpose	Fit for purpose	Fit for purpose	
	Refine Scope 3.1 hotspot analysis using supplier-specific PCF data	Not fit for purpose	Fit for purpose	Fit for purpose	
Reporting and disclosure	Track and report year-on-year Scope 3.1 emissions performance, incorporating supplier PCF data	Not fit for purpose	Directional insight	Fit for purpose	
	Integrate supplier-specific PCF data into Scope 3.1 inventory calculations	Not fit for purpose	Not fit for purpose	Fit for purpose	
	Use PCF data as an input for EU Battery Regulation / EU Digital Product Passport reporting requirements	Not fit for purpose	Not fit for purpose	Fit for purpose	
Product and engineering	Prioritize engineering / redesign effort across SKUs or part numbers	Not fit for purpose	Directional insight	Fit for purpose	
	Analyze carbon performance trends across material classes	Not fit for purpose	Directional insight	Fit for purpose	
	Use supplier PCF data as an input to publishing or certifying your own product-level PCF or EPD	Not fit for purpose	Directional insight	Fit for purpose	
	Use PCF data as an informational input for marketing / launching a "lower-carbon" product variant	Not fit for purpose	Directional insight	Fit for purpose	
Comparison	Compare 'Material A' from Supplier 1 and Supplier 2	Not fit for purpose	Not fit for purpose	Not fit for purpose	Required

Model Application Guidance

The PCF Usability Model becomes actionable by connecting the two components:

- The Level of the received PCF; and
- The Level required for the intended decision.

A PCF may be considered **fit-for-purpose** when its Level meets or exceeds the indicative minimum threshold proposed in the Fit-for-Purpose Matrix, including any additional alignment conditions relevant to that decision context. For some use cases, Level + conditions may be required (see: [PCF Levels](#)).

By structuring assessment in this way, the model avoids two recurring errors:

1. Applying incomplete datasets to structural decisions, and
2. Over-specifying methodological requirements where incremental insight would suffice.

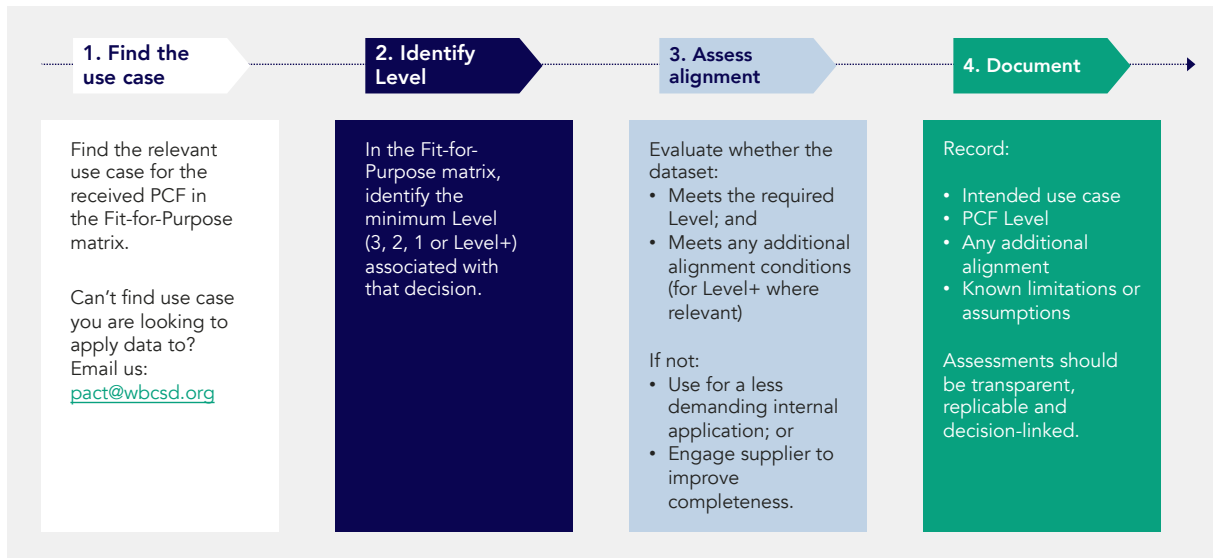
Before applying the model, requesting organisations should first **clarify the intended use case** for the PCF upon PCF request. Without a defined decision or application in mind, it will not be possible to meaningfully apply the model, as neither the appropriate Level nor the relevant alignment conditions can be determined. This **demand-side challenge** (whereby PCF requests are made without clear reference to intended use) is precisely what this proposed model is designed to address.

Rather than asking whether a PCF is “good” or “bad” in abstract terms, the model prompts users to ask:

Can this PCF credibly enable the specific decision or application under consideration?

This shift is intended to support more structured and proportionate integration of PCFs into business processes.

Figure 4: How-to Guide on Assessing PCF Suitability for a Predefined Use Case



Future vision: From concept to application

The Usability Model represents a **structured hypothesis**, providing an approach to link PCF completeness with business decision-making and application. However, its practical value will only emerge through real-world testing. The next phase of this work will, therefore, focus on **piloting the model in concrete business contexts**.

Through the *PACT Product-level Data Use-Case Forum*, participating companies will apply the model to real PCF datasets and defined business applications. A key focus of the pilot phase will be exploring the relationship between **disclosure completeness** (as captured in the Levels) and **data reliability** and whether proposed Level thresholds materially influence decision outcomes.

Practical testing will help to:

- Test whether the proposed Data Level thresholds are proportionate to decision impact
- Determine where additional alignment conditions are required
- Revisit decision classifications where evidence diverges from initial assumptions
- Refine the Fit-for-Purpose Matrix based on application

It is expected (and welcomed) that some decision mappings may be revised over time. Certain uses may prove to require less methodological rigidity than assumed, while others may expose additional gaps in comparability or transparency. This **iterative refinement** is not a weakness of the model, but an **intended design feature**.

Towards Technical Enablement

As patterns emerge across tested use cases, insights may inform future evolution of the PACT Technical Specifications and data model.

Such developments would not seek to fundamentally change the core requirements. Instead, they may explore **extensions or structured metadata signals** that improve transparency around **decision suitability, comparability attributes or alignment status**. This would allow the PACT dataset to better signal suitability for applications without compromising methodological integrity.

In this way, the model acts as both application guidance, and as a feedback interface between business use and the PACT Technical Standard evolution.

Towards Digitisation and Tooling

Another area of exploration is whether and how the model may be **integrated into digital tools and software environments**. Initial hypotheses include, for example:

- PCF calculation tools adopting the Data Levels as a scoring mechanism, providing real-time assessment of a dataset's Level;
- Automated services into which PCFs are uploaded and receive an assigned Level, removing the need for manual assessment;
- Tools that allow a customer to input PCFs alongside chosen use cases and assess whether the dataset meets the minimum Level required for that application;
- Analytics across aggregated data to surface patterns in completeness and data quality across sectors, geographies or tiers.

Whether and how these applications are developed will be informed by **practical testing outcomes and demand signals** emerging from the PACT Product-level Data Use Case Forum.

How to contribute

The continued development of the PCF Usability Model is deliberately phased and will be shaped by the wider PACT ecosystem of corporates, suppliers, solution providers, industry initiatives and consultants.

Through **real-world testing**, the approach will allow us to:

- Assess whether the decision-linked mapping is effective in practice
- Pilot and refine Level thresholds based on application experience
- Inform future technical and methodological evolution
- Develop and refine implementation guidance

Companies across sectors and geographies are invited to **test and refine the model**, or to **sponsor new use cases application** through the PACT Product-level Data Use-Case Forum.

The Forum provides a member-based environment to apply the model to concrete business decisions, share practical insights and surface methodological implications.

Companies may also bring forward **new applications of product-level data**, including regulatory use cases such as **Carbon Border Adjustment Mechanism (CBAM) (this workstream is live)**, **Digital Product Passports (DPP)**, or other emerging decision contexts where structured testing can clarify data suitability and alignment requirements, such as the comparison of PCFs.

PACT also welcomes feedback from companies **beyond the Forum**, including non-members, as the model is applied in practice. Insights on what works, where ambiguities arise and what additional clarification or safeguards will be critical for the model to scale credibly.

To share feedback or express interest in contributing, please contact: pact@wbcso.org



Appendices

Appendix 1: PACT Methodology and Technical Specification – Name <> Field Name Mappings

To access the file, please [click here](#).

Appendix 2: Key Terms

Emissions completeness: The extent to which all attributable cradle-to-gate processes and their associated emissions have been identified and included within a PCF calculation. Under the PACT Methodology exemption rules, excluded processes must collectively represent less than 3% of the total cradle-to-gate PCF emissions (PACT Methodology, Section 3.3.1.2).

Data Integrity: A term used in the PACT Methodology to describe the overall quality and trustworthiness of a PCF dataset, encompassing the appropriate prioritisation of data sources, adherence to the data hierarchy, and the application of data reliability metrics (PACT Methodology, Section 4).

Data Quality: The characteristics of data, including completeness, reliability, and technological, temporal and geographical representativeness, that relate to their ability to satisfy stated requirements for a PCF (PACT Methodology, Appendix A).

Data Reliability: An indicator of the confidence in the PCF results as determined by the reliability of the combined set of input data and assessed through two composite metrics: Primary Data Share (PDS) and Data Quality Rating (DQR) (PACT Methodology, Section 4.2).

Disclosure Completeness: A term introduced by this model that refers to the extent to which the required data fields and supplementary methodological attributes of a PCF have been populated and disclosed by the reporting company. Within this model, disclosure completeness forms a foundational dimension of the PCF Levels.

Fit-for-Purpose: A term introduced by this model. A PCF dataset is considered fit for purpose when its level of disclosure completeness, methodological transparency and data reliability meets or exceeds the minimum requirements of a specific business decision or application of the PCF, including any additional requirements relevant to that usage context.

Transparency: A principle applied throughout the PACT Methodology, referring to the clear disclosure of methodological choices, data sources, allocation approaches, exclusions and data reliability indicators when exchanging a PCF, enabling the recipient to understand how the results were derived (PACT Methodology, Sections 2.4 and 6.1)

Disclaimer

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The World Business Council for Sustainable Development (WBCSD) is the leading community of around 230 global businesses making sustainability performance a key driver for competitiveness. Established in 1995, WBCSD is a non-profit member-led organization that connects business leaders through all sectors and major economies, and creates the tools and frameworks to scale collective impact, drive cross-sector innovation, and shape an ambitious, enabling policy agenda. We operate from seven offices worldwide – in Geneva, New York, Chicago, Amsterdam, London, Singapore and Wuhan – enabling collaboration across value chains and geographies. Together with our members, we are rewiring economic and financial systems to support the transition to a net-zero, nature-positive, and inclusive future that creates business value.

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About PACT

PACT offers a streamlined methodology for calculating and exchanging product carbon footprints (PCFs) to promote decarbonization across value chains. Powered by the World Business Council for Sustainable Development (WBCSD), PACT harmonizes the PCF calculation and exchange through a universal methodology, technical specifications for PCF exchange, and an ecosystem enriched by a network of committed, impact driven companies.

With participation from more than 150 stakeholders, including businesses, policymakers, and standard setters, PACT collaborates with over 11 industry specific initiatives. More than 5,000 companies have adopted PACT, striving to accelerate supply chain transparency and foster decarbonization within the private sector, driving sustainable and enduring business practices.

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