

WHITE PAPER

Accounting Approach for Product Carbon Content

Definitions and Principles

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Date : November 2024

Version : V2 — *Published*

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Executive summary

In addition to existing approaches for counting carbon, financial accounting principles can be reused to calculate the carbon footprint of products. This “accounting approach for product carbon content” is described here through its general principles.

Several methods, including Cumulative Carbon Accounting, are part of this approach.

Audience

The present document is subject to further iterations. It is addressed to chartered accountants¹ and carbon experts for comments..

Definitions and positioning

Approach > method > tools

An **approach** is a set of principles. A principle applies universally.

The purpose of this document is to define the “accounting approach for product carbon content” through its general principles. As with any principle, an implementation phase may be necessary to fully comply with this approach..

A **method** is a set of rules. Rules are defined in more details than principles and certain rules could be context-specific. The method covers the implementation and verification phases. Distinct methods can arise from a common set of principles..

Tools (E.g., software, processes ...) help companies achieve their goals, in this instance to fulfil a method requirement.

Product Carbon content

The term **carbon accounting** applies to different entities and activities:

- Different entities: territories, corporations/organisation, products
- Different activities: upstream activities, direct activities, downstream activities.

The term **carbon footprint** applies to organisations and products (CCF - Corporate Carbon Footprint; and PCF - Product Carbon Footprint).

The product carbon footprint quantifies all greenhouse gas emissions of a product throughout its entire life cycle, from raw materials extraction to end-of-life disposal. (cradle-to-grave)

We define the **product carbon content** as the cradle-to-gate emissions of the product². This part of the life cycle covers upstream and direct activities (from the supplier point of view).

The kg CO₂ eq unit, used for product carbon content, is fungible like any currency as long as the same scope is designated.

Adherence to financial carbon accounting

¹Including but not limited to financial accountants, financial controllers, auditors.

²By now, in France, our initiative used the term carbon weight (poids carbone) as the unit is the kilogramme, but we tried to be aligned with other carbon ledger initiatives.

The term **financial accounting** refers to well established local and global generally accepted standards.

AFRA define the approach for product carbon content as a carbon accounting approach that aligns to financial accounting principles

Accounting approach to carbon footprint adheres³ to financial accounting principles (matching, sincerity, cost, consistency, continuity, periodicity). This adhesion is even stronger for accounting driven methods like Cumulative Carbon Accounting (CCA) and when the current accounting tools are extended to the use of an additional unit of account . Applying these accounting principles to accounting for carbon footprint have multiple benefits:

- to rely on a proofed and wide-spread standard globally accepted
- to expand and adapt existing principles rather than create new
- to leverage existing technologies, people and processes (financial systems, accountants, auditors, invoicing, cost allocation methods)

Existing methods for carbon accounting

As mentioned above, the Cumulative Carbon Accounting (CCA) taskforce of AFRA is conducting research to explore and understand existing carbon accounting methods.

Some methods adhere to the same approach: we have so far identified in Europe and US several alternatives to traditional carbon accounting, whose approach, principles, and/or objectives appear to be similar. For example, in France: Allocation Climat, Carbone sur Fature, CITEPA; in Germany: Deutsche Bank; in the United States of America: E-Ledger institute.

Their purpose is to make more reliable and widespread the calculation of products' carbon content. By design, this data has an intrinsic value that allows comparisons between products across all categories. In addition to data covering upstream activities, the organisation should provide carbon information above usage, life time, ... according to the customer requirement. Alone, the product carbon content and the organisation footprint does not depict a performance.

Other traditional accounting methods have different means and purposes:

The Lifecycle analysis (LCA) method covers a wider remit and purpose (eco-design, environmental impact beyond carbon, product future use) than the CCA, however these two methods could well be complementary.

The GHG protocol/ Bilan Carbone® provides a corporate⁴ carbon footprint assessment framework for climate action whereas the CCA aims for product level detail.

The CCA could benefit from using estimates from LCA and GHG protocol where supplier data are missing. The use of CCA facilitates the estimation of the organization footprint and products footprint throughout the entire life cycle and makes it more accurate.

Integrated accounting method, such as CARE⁵, enable corporate environmental performance management to include environment debt in the profit or loss of a company.

³ Partly or wholly adhere, based on method applied

⁴ The GHG protocol also partly covers the product object.

⁵ Cf Website: <https://www.chaire-comptabilite-ecologique.fr/?lang=en>

Principles with comments

Introduction

The principles presented below are designed to create a robust framework while leaving enough flexibility to adapt to real-life existing practices (E.g., Cost Allocation) and to be consistent with different methods (e.g., for small businesses).

The approach covers MRV (Measurement, Reporting, Verification).

This approach to the product carbon content is part of a broader effort to introduce carbon materiality into all economic concepts and practices.

Key principles from A to H.

A Product Carbon Content : refers to all greenhouse gas emissions issued throughout the value chain for the production and delivery of a product or service to a customer expressed in kg CO₂ eq.

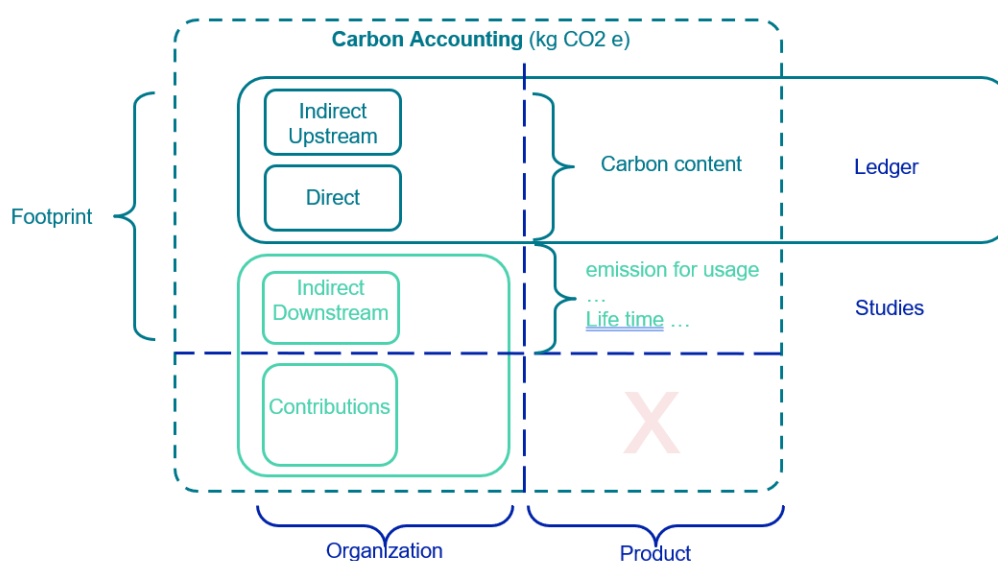
“Carbon dioxide equivalent” or “CO₂e” is a term for describing different greenhouse gases in a common unit. For any quantity and type of greenhouse gas, CO₂e signifies the amount of CO₂ which would have the equivalent global warming impact.

Product Carbon Footprint refers to all emissions issued at every stage of the product life product or service, including direct and indirect emissions. Indirect emissions include upstream (Cradle to gate) and downstream (Gate to grave) emissions. The product carbon content has an intrinsic value that is solely driven by its production process.

Product carbon content is a short name for product carbon footprint from cradle to gate, and adds up emissions issued during upstream and direct activities.

In this document, “product” refers to both manufactured products and services.

Just as financial accounting records past monetary transactions, product carbon content accounting records emissions that have already occurred during production. This parallel makes the recording and reporting of carbon content a natural extension of financial accounting, aligning environmental impact with established accounting principles.



Definition Ledger⁶ et Studies⁷

B Dual ledger : Financial accounting ledger is extended to carbon. Whatever is paid in currency is equally paid in carbon to the extent that it reflects a physical flow.

A financial accounting ledger is a list of accounting entries recorded in accordance with accounting rules. Accounting rules (how to record, classify, present accounting entries) are defined by international⁸ and national standards.

The dual ledger principle mandates companies' transactions to be posted into both currency (E.g., €, \$, ...) and product carbon content (kg CO₂ eq), in parallel, into separate carbon and financial ledgers.

According to principle A (Product carbon content), only direct emissions should be added to the carbon ledger, therefore indirect downstream emission⁹ are not included in the carbon ledger.

The approach exclusively focuses on transactions reflecting a physical flow, which means it excludes banking transactions such as loans, interests and income tax payments. This general principle is not sufficient to define all exclusions not registered in carbon ledger. This must be specified in the details of the method.

The product carbon content takes into account all transactions registered in the carbon ledger.

This approach clarifies who must account for an emission, and therefore eliminates the risk of any duplicate accounting of the same emission..

C Transmission : Product carbon content sold is indicated on the transaction documents (E.g., invoice, credit note,...)

The transmission of the carbon emissions at each level of the supply chain is the DNA of this approach. The key message is *do for your customers what you would like your suppliers to do for you*, i.e. provide them with your product carbon content.

Transmission could be made possible through the invoice document. Sticking to the invoice means again to adhere to the financial accounting approach and leverage existing processes (including e-invoicing). Whether the product carbon content is included in the invoice or attached as an annex is to be defined in upcoming regulations.

The organization must clearly state¹⁰ that the calculation methodology complies with the approach described here and each of its principles, or whether there are any deviations.

Principle C does not require that the product carbon content shall be public. The information is required to be disclosed to the product user. As for price, the carbon content information disclosure remains under the company's control.

⁶ A ledger is a book or collection of accounts in which accounting transactions are recorded. Each account has: an opening or brought-forward balance; a list of transactions each recorded as either a debit or credit in separate columns (usually with a counter-entry on another page)

⁷ Studies refer to gathering and analysing information to estimate carbon emissions of a product, based on product technical specifications and production process.

⁸ Companies' transactions are recorded into a financial ledger, and summarised in annual reports following a standard, mandated reporting structure which can vary depending on the country where they operate. These standards are set by the IFRS (International Financial reporting Standards) foundation globally, but most countries also have their own standards, called local GAAP (Generally Accepted Accounting Principles)

⁹ Indirect downstream emission could be reported in an additional book

¹⁰As detailed in D and G principles, within a company all products should have a carbon content.

D Completeness: All direct and indirect upstream emissions are accounted for.

While existing carbon accounting methods focus primarily (and rightly so) on the measurement of significant emissions to drive companies' decarbonation agenda, the accounting approach argues that not only accounting for every emission does not involve much more effort¹¹, it also reduces the risk of mis-assessing significant emissions.

The benefit of this principle is two-fold:

- it is fully auditable
- it is the basis for the reconciliation of emissions purchased and sold (balance, see principle G)

Note: The approach presented in this document does not intend to discuss any existing or upcoming direct emissions calculations methodologies.

E Product carbon content first: The primary source of information is the product carbon content reported by the supplier. If this information doesn't exist or could not be used, the source of the registered information should be recorded.

As per principle D and C above, every emission should be recorded and transmitted.

If the product carbon content is missing, this information should be estimated using established practices, e.g., using industry databases or conducting studies.

Also, disclosing the physical units of the transaction is a best practice, for example to support the emissions computation when needed.

This principle recommends that the data sources used for carbon content are thoroughly recorded for audit purposes, beyond any methods best practice.

F Allocation: Product carbon content calculation method is the responsibility of the company. However the rules applied must be documented and consistent year over year unless justified.

Allocation is the process of calculating the carbon content of products sold based on the carbon content of purchased products and direct emissions related to their processing. This is similar to the method used by financial controllers to calculate the cost of goods sold.

In the context of product carbon content, these calculations should be designed to reflect as much as possible the physical flow and its temporality. Since companies may already use cost allocation methods for their existing financial processes, they may want to apply the same to carbon allocation. While the approach suggests to follow physical flow as much as possible, companies are ultimately responsible for the best trade-off between this principle and their existing practices.

However, the company must document their baseline allocation rules and any amendments, as well as any gap with existing financial cost allocation.

We anticipate the need for a variety of allocation methods to address all business cases, and all should at least ensure that, by design, the total of output emissions (= product carbon content of product sold) matches total of input emissions (product carbon content of purchased products and direct emissions).

¹¹Less significative emissions to be estimated based on national averages issued by national accounting institutions

G Balance: Across multiple financial periods, the sum of product carbon content sold must balance with the sum of product carbon content purchased, plus direct emissions.

Building on principle F (designed to be balanced), principle G adds that balance must be verified.

There are many reasons why the forecast balance is not reached : activity variation, product mix, actuals vs budget variances.

When a significant deviation in one period is observed, an adjustment could be required to correct the carbon content of products sold for more accuracy in future transactions and ensure a multi-year balance.

The implementation of the balance principle may be dependent on existing account practices, whether companies use Single entry accounting (Cash accounting) or Double entry accounting (Accrual accounting).

While both frameworks are accepted and comply with the principle of Balance, they present fundamental differences when applied to product carbon content accounting, where the calculations should be designed to reflect as much as possible the physical flow and its temporality.

The product carbon accounting approach is designed to leverage established practices as much as possible. Most companies, for compliance or internal management purposes (E.g., performance measurement) use double-entry accounting.

H Verification: Verification is required on direct emission, data used for estimation, allocation.

To converge over time toward the intrinsic value of carbon content, best practices in financial accounting verification are very useful but insufficient. A verification should be performed in following areas :

- reporting of direct emissions
- sourcing estimation of missing product carbon content
- allocation method¹²

The verification rules are dependent on various criteria, including (but not limited to) the business type, size, local regulations, maturity of implementation ...

¹² For instance, since 2012 OECD mandate companies to provide transfer pricing information ie. the allocation method they use for their intercompany transactions and whether they align to market benchmark.

Additional comments

Principles hierarchy

This section aims at proposing the order in which the principles presented in this document should be implemented when approaching product carbon content accounting, if not simultaneously. They range from 1 (most important) to 6 (least important/to be refined when implementing a method).

1. Transmit product carbon content information (irrespective of how it is calculated) through the value chain (B & C & D & E)
2. Outline clearly the relevant activities (E.g., Cradle to gate, etc) taken in account to calculate product carbon content (A).
3. Balance total purchased and sold emissions (D & G)
4. Allocate Upstream and direct emissions to the product sold the allocation (F).
5. Verify (H)

Benefits

Key approach benefits are:

- Simplified carbon information exchange throughout the value chain via the invoice, which as a result ignite and expand the dynamics of the carbon measurement ecosystem
- Improved carbon information consistency that allows emissions aggregations without duplication
- Enhanced (more reliable and efficient) carbon measurements through adherence to existing financial accounting

Acronyms

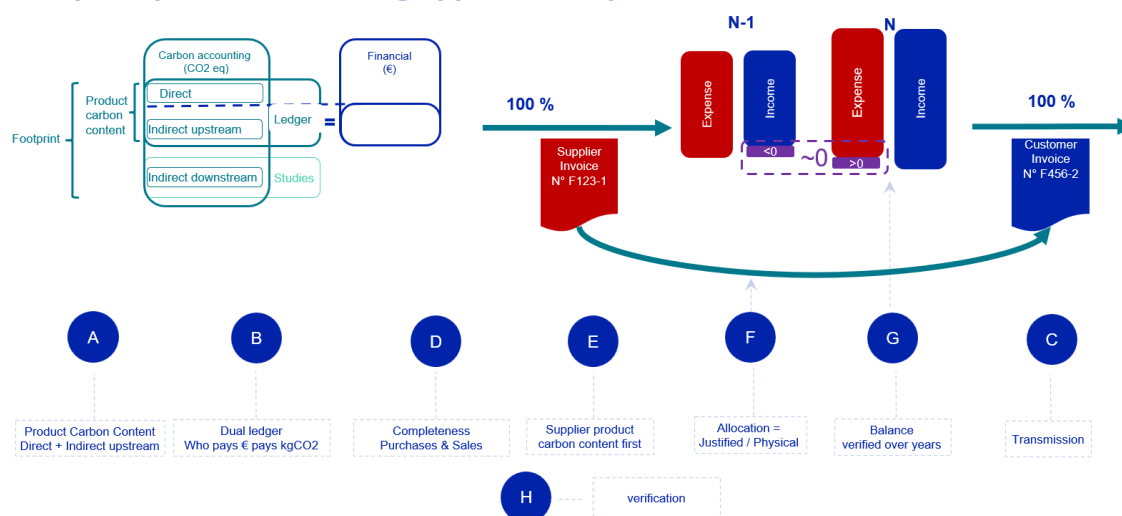
CCA	Cumulative Carbon Accounting
LCA	Life Cycle analysis
CSRD	Corporate Sustainability Reporting Directive
CARE	Comprehensive Accounting in Respect of Ecology
P&L	Profit and loss
GHG protocol	Greenhouse gas protocol
BC®	Bilan Carbone®

Authors

Versions	Modifications	Authors
Version 1 - 24/06/2024	Initial document	CT compta carbone AFRA
Version 2 - 29/09/2025	Wording simplification and alignment. Additional verification principle (H). Hierarchisation of principles	Gilles Cormary (CT compta Shifters) Mathieu L'Hermite (CT compta Shifters) reviewers : Gilles Wallis (CT compta Shifters)
Version 3 en-cours		

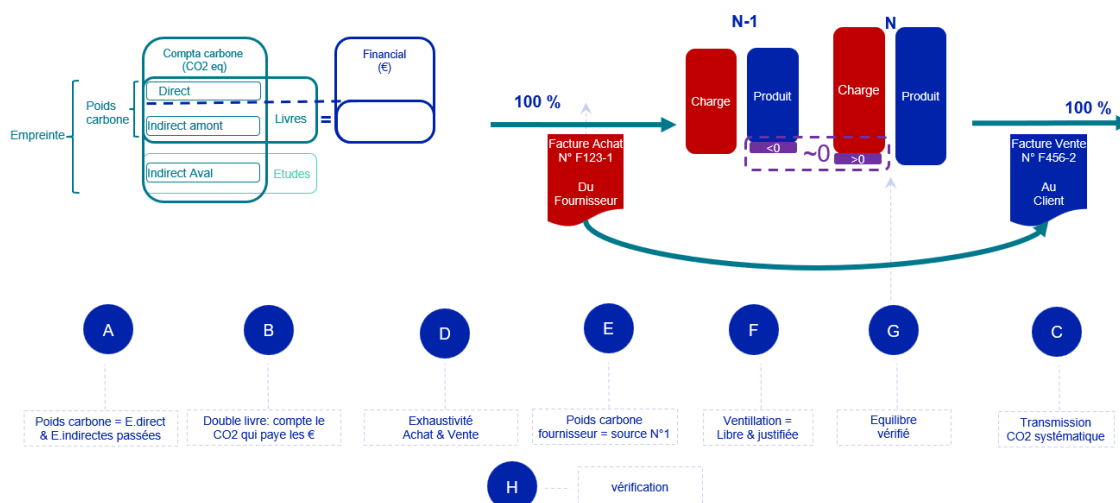
Contact for any comments: contact@resilienceaccounting.org

principles of accounting approach for product carbon content

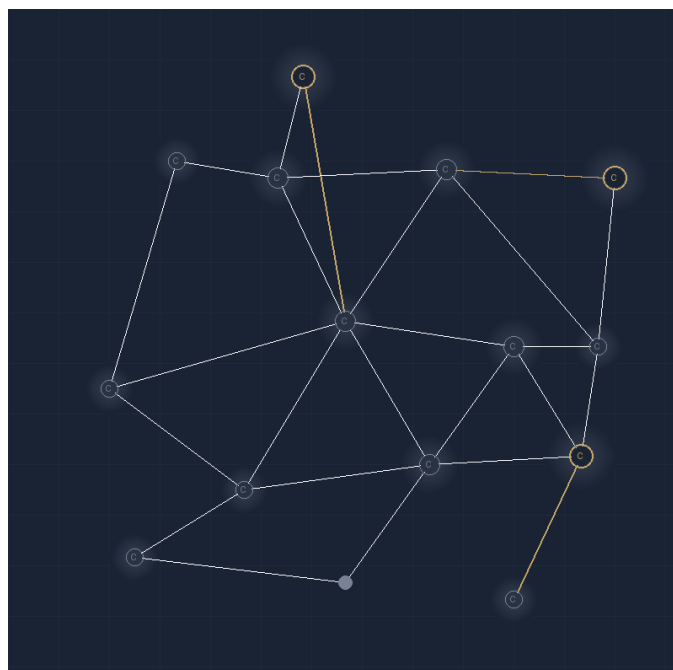


A	Product Carbon Content	Refers to all greenhouse gas emissions issued throughout the value chain for the production and delivery of a product or service to a customer expressed in kg CO ₂ eq.
B	Dual ledger	Financial accounting ledger is extended to carbon. Whatever is paid in currency is equally paid in carbon to the extent that it reflects a physical flow.
C	Transmission	Product carbon content sold is indicated on the transaction documents (E.g., invoice, credit note,...)
D	Completeness	All direct and indirect upstream emissions are accounted for.
E	Product Carbon Content first	The primary source of information is the product carbon content reported by the supplier. If this information doesn't exist or could not be used, the source of the registered information should be recorded.
F	Allocation	Product carbon content calculation method is the responsibility of the company. However the rules applied must be documented and consistent year over year unless justified.
G	Balance	Across multiple financial periods, the sum of product carbon content sold must balance with the sum of product carbon content purchased, plus direct emissions.
H	Verification	Verification is required on direct emission, data used for estimation, allocation.

Les principes de l'approche comptable du poids carbone



A	Poids carbone	Désigne pour un produit ou service toutes les émissions de gaz à effet de serre CO ₂ eq émises dans sa chaîne de valeur pour en permettre la production et la livraison.
B	Double livre	Les comptes financiers sont étendus au carbone. Ce qui est payé en devise, l'est également en carbone si cela traduit par un flux physique d'émission.
C	Transmission	Le poids carbone des produits et services vendus est indiqué sur les documents transmis lors de chaque transaction (ex facture, avoir, ...)
D	Exhaustivité	Toutes les émissions directes et indirectes amonts sont prises en compte.
E	Poids carbone en priorité	Le poids carbone fourni par le fournisseur est la donnée prioritaire. Si elle n'est pas fournie, la source de la donnée utilisée doit être enregistrée.
F	Ventilation	Le mode de calcul du poids carbone vendu est de la responsabilité de l'entreprise. Mais elles doivent être documentées et ne pas changer sans justification.
G	Ventilation	Sur plusieurs périodes, la totalité des poids carbonés des produits vendus doit être équilibré avec la somme des poids carbonés des produits achetés et des émissions directes.
H	Vérification	Les émissions directes, les données utilisées et la ventilation doivent être vérifiées.



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