

GDSN Implementation Guideline for exchanging Carbon Footprint Data

How to use GDSN to exchange detailed information about Carbon Footprint of products

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1 Introduction

Green House Gas (GHG) emissions, like carbon (CO₂), are the primary driver of climate change.

To manage and report these emissions on a company or product level, they are categorized into three scopes according to the GHG Protocol:

- Scope 1 covers direct greenhouse gas emissions from sources that are owned or controlled by the reporting company, such as fuel combustion in facilities or vehicles
- Scope 2 refers to indirect greenhouse gas emissions resulting from the generation of purchased electricity, steam, heating, or cooling consumed by the reporting entity
- Scope 3 encompasses all other indirect greenhouse gas emissions that occur throughout a company's value chain, including those from upstream and downstream activities, such as emissions from suppliers, transportation, and the use of sold products by customers

If the environmental impacts or emissions need to be assessed at the product level, there are two methods that can be applied:

- A **Life Cycle Assessment (LCA)** is a comprehensive evaluation of the environmental impacts of a product throughout its entire life cycle, from raw material extraction to disposal. LCA considers multiple impact categories, such as greenhouse gas emissions, resource use, biodiversity loss, water use, and pollution, in accordance with standards like ISO 14040 and ISO 14044.
- **Product Carbon Footprint (PCF)** is an application of the LCA methodology that focuses solely on the greenhouse gas (GHG) emissions associated with a product. It is a narrowly defined assessment that addresses only one category of environmental impact: global warming potential, often following standards such as the GHG Protocol Product Standard or ISO 14067.

The PCF is measured in CO₂ equivalents (CO₂eq), a metric that allows for the comparison of the global warming potential of different greenhouse gases. By expressing the impact of gases like methane (CH₄) and nitrous oxide (N₂O) in terms of the amount of CO₂ that would produce the same warming effect, CO₂eq provides a consistent and comparable measure of emissions.

Life Cycle Assessment (LCA)		Product Carbon Footprint (PCF)
<ul style="list-style-type: none"> • Climate change • Land use • Resource depletion • Etc. 	Assesed impacts	Climate change (GHG)
Comprehensive overview of the environmental impacts, considers multiple impacts	Pros	Limited complexity for identifying optimization potentials. Can be used for mandatory CSRD reporting
Complex, time-consuming	Cons	May oversimplify environmental impacts other than GHG's

These two methods of calculation have therefore a different approach. Which one is chosen depends on what results a company wants to achieve. While an LCA provides a comprehensive assessment of a product's environmental impact over its entire life cycle, considering multiple impact categories, the PCF focuses on greenhouse gas emissions. The LCA can be used for a broad environmental assessment and the PCF for targeted emission reduction.

Another consideration is the regulatory aspect, as it is becoming a legal requirement in the European Union and the United Kingdom for companies to report their carbon footprint.

1. **European Union:** *The Corporate Sustainability Reporting Directive (CSRD) mandates that a broader set of large companies and listed SMEs report on their sustainability, including carbon footprint.*
2. **United Kingdom:** *The UK has made Task Force on Climate-related Financial Disclosures (TCFD) aligned disclosures mandatory for the largest companies by 2025.*

These regulations aim to increase transparency and accountability, encouraging companies to reduce their environmental impact. While the CSRD can apply to both LCA and PCF, as it mandates comprehensive sustainability reporting, the PCF is explicitly listed as a data point depending on its materiality for the reporting company. The **TCFD** focuses mainly on climate-related financial disclosures, which aligns more closely with PCF.

Note that there are two methods to calculate the impact. The focus will be the PCF although many attributes that are described in this document are connected to LCA. Reference is made to the carbon footprint data in the following chapters. This relates exclusively to the product and not the company level.

2 Importance of Carbon Footprint Data

Carbon footprint data is essential for making the environmental impacts of products transparent and traceable. This can be particularly important in the Fast-Moving Consumer Goods (FMCG) sector, which is characterized by high production and consumption rates. Accurate and standardized data enable companies to optimize their supply chains, make more sustainable decisions, and reduce their emissions. At the same time, consumers can make informed purchasing decisions, opting for products with lower carbon emissions, ultimately contributing to a more sustainable economy. So, there are several reasons why sharing carbon footprint data is so important for a company:

1. **Transparency and Accountability:** It allows companies to be transparent about their environmental impact and hold themselves accountable to consumers and stakeholders.
2. **Comparability:** Standardized data enables consumers and businesses to compare products based on their environmental footprint, promoting more informed purchasing decisions.
3. **Sustainability:** It encourages companies to adopt more sustainable practices in their production and distribution processes, ultimately reducing overall carbon emissions.
4. **Policy Development:** Governments can use this data to develop and implement more effective policies aimed at reducing carbon emissions.

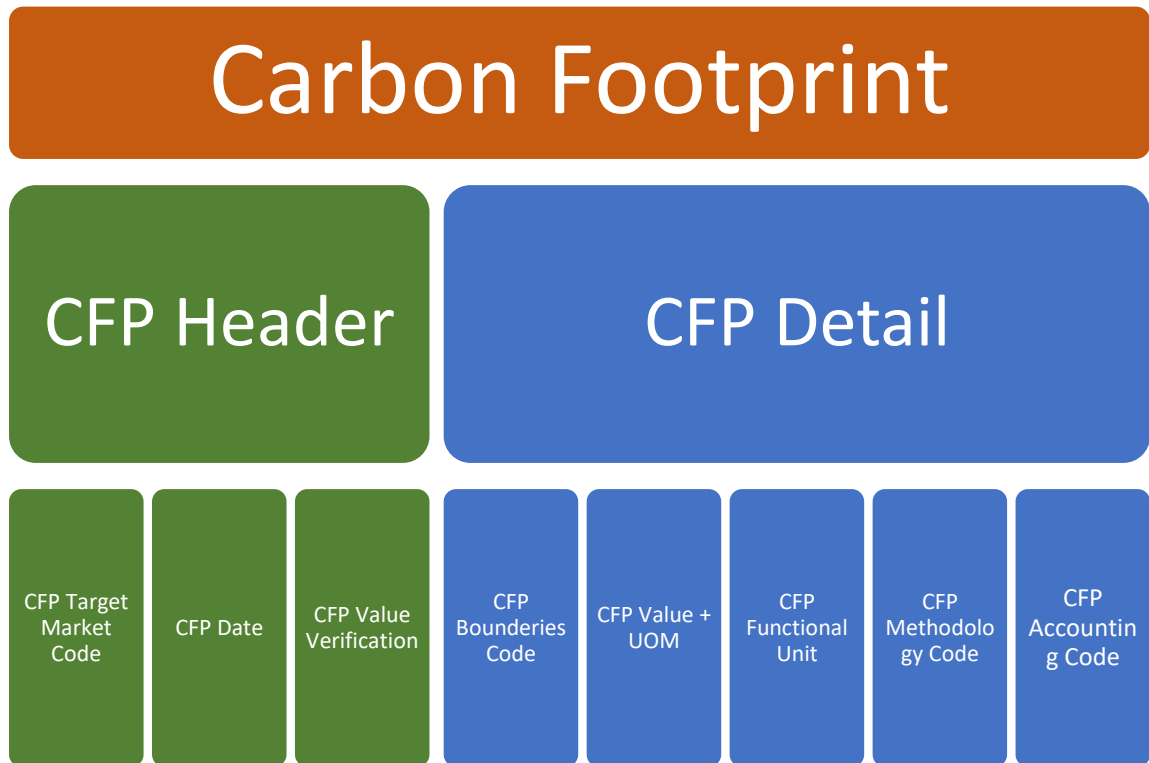
3 Structure of the Guideline

For the exchange of Carbon footprint data in GDSN, specific attributes will be available from GDSN Maintenance Release 3.1.31 (May 2025)

In Chapter 4 of the guideline, the usage of these attributes is described.

The attributes are divided into two classes:

1. **CarbonFootPrintHeader** – composed of attributes applicable to all detailed information specified in the dedicated CarbonFootPrintDetail class.
2. **CarbonFootPrintDetail** - the attributes in this class should be repeated in case more information is available. Ideally, all results and details from the Life Cycle Analysis (LCA) should be included.



4 Carbon Footprint attributes

4.1 Class: CarbonFootPrintHeader

The attributes in the class CarbonFootPrintHeader shall not be repeated and are applicable to the CFP attributes of the trade item. Data is only required for Consumer Units.

4.1.1 CFP Target Market Code (BMS ID 8700)

- **GDSN name:** cfpCountryCode
- **Definition:** The code specifying a target market for which the carbon footprint values have been calculated. Transportation emissions can greatly vary from country to country.
- **Instruction:** Populate the country code for which the values have been calculated.
- **Business Usage Statement:** Used by the seller and the buyer to identify the country for which the carbon footprint data has been calculated.
- **Remark:** Associated code list is 'countryCode'
- **Example:** '528' (Netherlands)

4.1.2 CFP Date (BMS ID 8716)

- **GDSN name:** cfpDate
- **Definition:** The date on which the product carbon footprint assessment was conducted.
- **Instruction:** Enter the date on which the product carbon footprint assessment was conducted.
- **Business Usage Statement:** Used by the seller and the buyer to identify the date of the calculated carbon footprint values.
- **Example:** 2024-05-31T00:00:00

4.1.3 CFP Value Verification Code (BMS ID 8712)

- **GDSN name:** cfpValueVerificationCode
- **Definition:** The code indicating how the calculated carbon footprint value is verified.
- **Instruction:** Enter the code indicating how the value is verified.
- **Business Usage Statement:** Used by the seller and the buyer to identify the verification used to calculate the carbon footprint values.
- **Example:** EXTERNAL_VERIFICATION
- **Code list:** CfpValueVerificationCode

Code name	Code value	Code definition
External verification	EXTERNAL_VERIFICATION	The values have been verified by an external party.
Not verified	NOT_VERIFIED	The values have been calculated according to the reported calculation method, but have not been verified.
Peer reviewed	PEER_REVIEWED	The values and methodology have been reviewed internally or by 3rd party.

4.2 Class: CarbonFootprintDetail

The attributes in the CarbonFootPrintDetail class should be repeated in case more information is available. Ideally, all results and details from the Life Cycle Analysis (LCA) should be included. Data is only required for Consumer Units.

4.2.1 CFP Boundaries Code (BMS ID 8702)

- **GDSN name:** cfpBoundariesCode
- **Definition:** The code identifying the life cycle stage that the product carbon footprint value refers to. The boundary setting may vary depending on the purpose of the product carbon footprint assessment.
- **Instruction:** Enter the code that represents the stage that the carbon footprint value refers to. This value should be repeated in case information of several stages is available. Only use the stages that correspond with your Life Cycle Assessment (LCA) report.
- **Business Usage Statement:** Used by the seller and the buyer to identify the life cycle stage that the carbon footprint value (specified in the CFP Value attribute) refers to. There may be multiple instances of the CFP Boundaries Code attribute in cases such as:
 - A single CO₂ value is provided to cover multiple life cycle stages (for example, transport and manufacturing), where the attribute is repeated.
 - A different CO₂ value is provided for each life cycle stage (for example, manufacturing and consumer use), where the entire carbon footprint group (class) of attributes is repeated.
- **Example:** RAW_MATERIALS
- **Code list:** CfpBoundariesCode)

Code name	Code value	Code definition
Cradle to consumption	CRADLE_TO_CONSUMPTION	Total amount of CO ₂ emission from a life cycle assessment (LCA) model that assesses a product's environmental footprint from raw materials extraction until it is consumed. (PEF guidance, the European Commission 2021b)
Cradle to gate	CRADLE_TO_GATE	Total amount of CO ₂ emission from a life cycle assessment (LCA) model that assesses a product's environmental footprint from raw materials extraction until it leaves the factory gate.
Cradle to grave	CRADLE_TO_GRAVE	Total amount of CO ₂ emission from a life cycle assessment (LCA) model that assesses a product's environmental footprint from raw materials extraction until its disposal, including manufacturing, transportation, product use.
End of life	END_OF_LIFE	The emission of the product when it is disposed, recycled, recovered after use.
Manufacturing	MANUFACTURING	The emissions resulting from the manufacturing/production of the product.
Raw materials	RAW_MATERIALS	The emissions resulting from the production/extraction, packaging, storage, warehousing and transportation of raw materials.

Code name	Code value	Code definition
Transport of final product	TRANSPORT_FINAL_PRODUCT	The emissions resulting from the distribution of the product to the retail network or to downstream stakeholders. This stage includes transport of the final product and its packaging, storage and warehousing.
Use	USE	The emissions of the product when used by the consumer.

4.2.2 CFP Value (BMS ID 8704)

- **GDSN name:** cfpValue
- **Definition:** The emissions value, i.e., carbon footprint, for a specific boundary setting.
- **Instruction:** Enter the value for the carbon footprint that corresponds to the boundaries code used in attribute cfpBoundariesCode.
- **Business Usage Statement:**
 - Used by the seller and the buyer to state the emissions value per boundary setting (specified by the CFP Boundaries Code).
 - Used by consumers who are concerned about the environment for search and discovery to assist in the selection of products with lower carbon footprints.
- **Example:**
 - For a clothes dryer:
 - CFP Boundaries Code = USE
 - CFP Value and Measurement Unit Code = 1.7 KG_CO2_EQ_PER_FU (Kilogram CO₂ equivalent per functional unit)
 - For a plastic bottle:
 - CFP Boundaries Code = MANUFACTURING
 - CFP Value and Measurement Unit Code = 8.28 KG_CO2_EQ_PER_100G (= Kilogram CO₂ equivalent per 100 gram)

4.2.3 CFP Value Measurement Unit Code (BMS ID 8705)

- **GDSN name:** cfpValue/@measurementUnitCode
- **Definition:** Any standardised, reproducible unit that can be used to measure any physical property.
- **Instruction:** Enter the unit of measurement that corresponds to the used cfpValue.
- **Business Usage Statement:**
 - Used by the seller and the buyer to state the emissions value per boundary setting (specified by the CFP Boundaries Code).
 - Used by consumers who are concerned about the environment for search and discovery to assist in the selection of products with lower carbon footprints.
- **Example:**
 - For a plastic bottle:
 - CFP Boundaries Code = MANUFACTURING
 - CFP Value and Measurement Unit Code = 8.28 KG_CO2_EQ_PER_100G (= Kilogram CO₂ equivalent per 100 gram)

Code name	Code value	Code definition
Euro CO2eq per kg	EUR_CO2_EQ_PER_KG	Euro CO2 equivalent per kilogram.
Kg CO2eq per 100 g	KG_CO2_EQ_PER_100G	Kilogram CO2 equivalent per 100 grams.
Kg CO2eq per 100 ml	KG_CO2_EQ_PER_100ML	Kilogram CO2 equivalent per 100 milliliters.
Kg CO2eq per functional unit	KG_CO2_EQ_PER_FU	Kilogram CO2 equivalent per functional unit.
Kg CO2eq per kg	KG_CO2_EQ_PER_KG	Kilogram CO2 equivalent per kilogram.

4.2.4 CFP Functional Unit (BMS ID 8707)

- **GDSN name:** cfpFunctionalUnit
- **Definition:** The functional unit describes the quantity and/or performance characteristics of a product as it is used by the end-user, which forms the basis for calculating the emissions value (i.e., carbon footprint), and can be used for comparison to other similar products.
- **Instruction:** Specify the Functional Unit (in text) in case you have selected the cfpValue/@measurementUnitCode "KG_CO2_EQ_PER_FU". If you have selected another UoM this attribute shall not be used.
- **Business Usage Statement:** Used by the seller and the buyer to understand the basis of use for which the CFP Value attribute is calculated, when the attribute CFP Boundaries Code value is 'USE', indicating emissions related to the use of the item by the consumer.
- **Example:**
 - For a washing machine:
 - CFP Functional Unit = 'Washing machine with a capacity to wash 10 kg of laundry at 60 degrees'
 - For a plastic shopping bag:
 - CFP Functional Unit = 'Shopping bag with a volume of 22 liters, can carry a maximum weight of 12 kilograms'

4.2.5 CFP Methodology Code (BMS ID 8710)

- **GDSN name:** cfpMethodologyCode
- **Definition:** The code specifying the method used to assess and communicate the environmental impact of the product in terms of carbon footprint.
- **Instruction:** Use the code to specify the calculation method that is used to calculate the CFP values.
- **Business Usage Statement:** Used by the seller and the buyer to identify the methodology used to calculate the carbon footprint.
- **Example:** CARBON_FOOTPRINT_STANDARDPEF
- **Code list:** CfpMethodologyCode

Code name	Code value	Code definition
Carbon footprint standard	CARBON_FOOTPRINT_STANDARD	Product-specific value, based on carbon footprint standard (ISO 14067).

Code name	Code value	Code definition
ENVIMAT	ENVIMAT	Value for the product-group from an input-output study, based on ENVIMAT in Finland (Nissinen et al. 2019, SYKEra 15/2019).
EPD	EPD	Environmental Product Declaration (EPD).
Greenhouse Gas (GHG) Protocol	GHG_PROTOCOL	The Product Life Cycle Accounting and Reporting Standard can be used to understand the full life cycle emissions of a product and focus efforts on the greatest Greenhouse Gas (GHG) reduction opportunities.
ISO 14064	ISO_14064	ISO 14064 specifies requirements for selecting Greenhouse Gas (GHG) validators/verifiers, establishing the level of assurance, objectives, criteria and scope, determining the validation/verification approach, assessing GHG data, information, information systems and controls, evaluating GHG assertions and preparing validation/verification statements.
Not classified	OTHER	A standard calculation method, not classified in theodelist.
PCR	PCR	Product Category Rules.
PCR EDF	PCR_EDF	Product-specific value, based on Product Category Rule (PCR) of an Environmental Product Declaration (EPD) system.
PEF	PEF	The Product Environmental Footprint (PEF) methodology is performed following the PEF guidelines published by the European Commission and, if available, specific category rules (PEFCRs).
ReCiPe	RECIPE	Based on National Institute for Public Health and the Environment (RIVM), Institute of Environmental Sciences (CML), Product Category Rule (PCR).

4.2.6 CFP Accounting Code (BMS ID 8714)

- **GDSN name:** cfpAccountingCode
- **Definition:** The code indicating which method is used to conduct the lifecycle assessment for carbon footprint calculation.
- **Instruction:** Use the code that corresponds to the method that is used.
- **Business Usage Statement:** Used by the seller and the buyer to identify what activities are represented by the carbon footprint values.
- **Example:** CONSEQUENTIAL
- **Code list:** CfpAccountingCode

Code name	Code value	Code definition
Attributional	ATTRIBUTIONAL	An attributional life cycle assessment (ALCA) is focusing on describing, assessing and quantifying environmentally relevant physical flows of specific life cycle(s) and its subsystems. An ALCA gives an estimate of what part of the global environmental burdens belongs to the study object. An ALCA does not include environmental benefits or other indirect consequences that arise outside the life cycle of the investigated product.
Consequential	CONSEQUENTIAL	A consequential life cycle assessment (CLCA) is focusing on describing, assessing and quantifying environmentally relevant flows and how they will change in response to possible decisions. A CLCA gives an estimate of how the production and use of the study object affect the global environmental burdens. For example, an increased use of a material in the studied system can lead to less material being used in other systems.

5 Example

Attribute Name	Attribute Value
cfpCountryCode	528
cfpDate	2024-05-31T00:00:00
cfpValueVerificationCode	EXTERNAL_VERIFICATION
cfpBoundariesCode	RAW_MATERIALS
cfpValue	8,28
cfpValueUom	KG_CO2_EQ_PER_100G
cfpFunctionalUnit	
cfpMethodologyCode	CARBON_FOOTPRINT_STANDARD
cfpAccountingCode	ATTRIBUTIONAL
cfpBoundariesCode	MANUFACTURING
cfpValue	3,75
cfpValueUom	KG_CO2_EQ_PER_100G
cfpFunctionalUnit	
cfpMethodologyCode	CARBON_FOOTPRINT_STANDARD
cfpAccountingCode	ATTRIBUTIONAL
cfpBoundariesCode	TRANSPORT_FINAL_PRODUCT
cfpValue	2,45
cfpValueUom	KG_CO2_EQ_PER_100G
cfpFunctionalUnit	
cfpMethodologyCode	CARBON_FOOTPRINT_STANDARD
cfpAccountingCode	ATTRIBUTIONAL