REQUIREMENTS

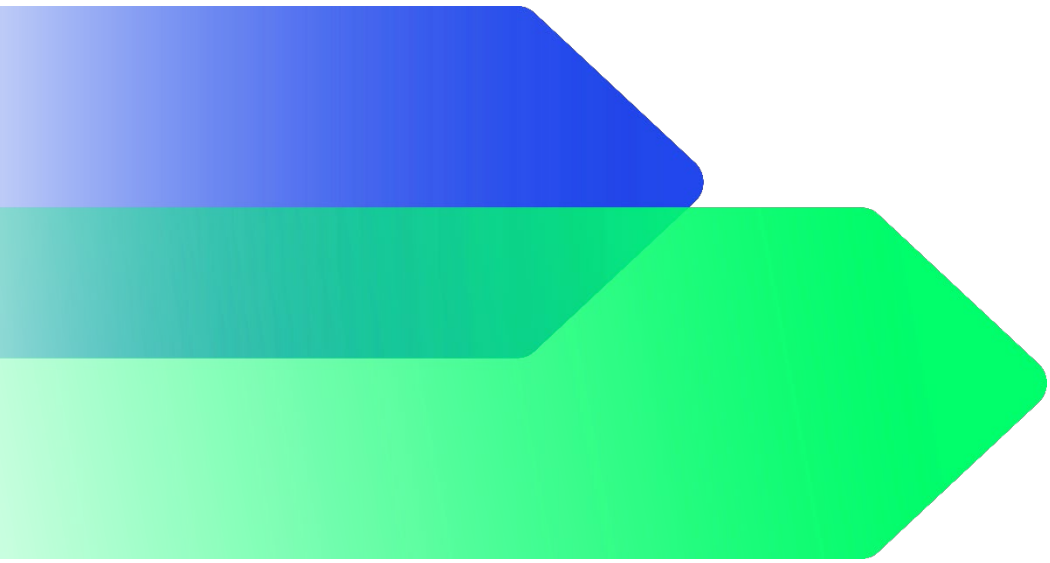
Mass Balance Allocation

Addendum to:
Product carbon footprints: Requirements for Assurance v3.0, part 1
Product carbon footprints: Requirements for Assurance v3.2, part 2

This is a temporary addendum document pending incorporation into the next versions of the Requirements for Assurance.

Version: 1.0

Issue date: 08 September 2025



Cover note

This text is temporary, pending the next versions of the product greenhouse gas accounting standards (ISO 14067: 2018 and the GHG Protocol Product Life Cycle Accounting and Reporting Standard).

Internationally recognised product greenhouse gas accounting standards do not currently acknowledge Mass Balance Allocation.

Mass Balance Allocation is not a requirement for the Carbon Trust Scheme Owner Product Carbon Footprint verification schemes but may be used if applicable. If You choose to use Mass Balance Allocation, then the requirements set out in this document shall be used.

It is Your responsibility to check with Your Conformity Assessment Body whether or not they will accept Mass Balance Allocation.

Contents

1. Acronyms and terms

Terms and definitions

Mass Balance Allocation	An accounting method tracking the flow of materials/energy through a system, ensuring that the input and output quantities are balanced over a defined period.
Mass Balance System	A type of chain of custody system. Covers all elements of the product carbon footprint (calculation, record keeping, governance, documentation) which are related to the instance of Mass Balance Allocation.
Chain of custody	The documented sequence of custody, control, transfer, and disposition of materials/energy as it moves through each step of the supply chain.
Chain of custody system	The processes and documentation used to track the handling of products and data from the point of origin to its final destination, allowing any special properties, such as sustainability credentials or benefits, to be protected.
Sustainable input	Materials/energy that meets the defined sustainability criteria, in this case giving it a lower product carbon footprint. Sustainable inputs contribute positively to environmental goals and are tracked within a chain of custody system.
Conventional input	Materials/energy that does not meet the defined sustainability criteria, in this case giving it a higher product carbon footprint. Conventional inputs are traditional materials/energy sources which have higher environmental impacts compared to sustainable inputs.
Lower-carbon output	(One of) the outputs to which more (or all) of the sustainable input is allocated, resulting in a lower product carbon footprint.
Higher-carbon output	(One of) the outputs to which less (or none) of the sustainable input is allocated, resulting in a higher product carbon footprint.

Key abbreviations

GHG	Greenhouse gas
RfA	Requirements for Assurance
CO_2e	Carbon dioxide equivalent
PCF	Product carbon footprint
OCF	Organisational carbon footprint
PCF RfA 1	Product carbon footprint: Requirements for Assurance, part 1
PCF RfA 2	Product carbon footprint: Requirements for Assurance, part 2
OCF RfA 1	Organisational carbon footprint: Requirements for Assurance, part 1
OCF RfA 2	Organisational carbon footprint: Requirements for Assurance, part 2
MA RfA	Model Assurance: Requirements for Assurance
QC	Quality control

Assurance terms

Shall	A requirement to be in conformance with this document
Should	A recommendation, but not a requirement of this document
May	An option that is allowable or permissible

Parties involved

Us	The scheme owner
CAB	Conformity Assessment Body
You	The developer and owner of the PCF, applying for Assurance

2. Pre-engagement requirements

See Appendix 1 for the context of these new requirements.

2.1. Mass Balance Allocation **shall** only be used in situations where:

2.1.1. A complete switch from conventional to sustainable input in a single step is not possible, **and;**

2.1.2. There is genuine intent to make a total switch to the sustainable input in order to achieve Net Zero.

2.2. Mass Balance Allocation **shall not** be used to:

2.2.1. Mislead the purchaser regarding the emissions of the products and/or the organisation's emissions as a whole.

2.3. You **may** use Mass Balance Allocation **if**:

2.3.1. There is a prohibitive cost or technical barrier to the segregation of conventional and sustainable inputs due to a lack of available/affordable technical solutions on the market, **and**;

2.3.2. Conventional and sustainable inputs are substitutable, **and;**

2.3.3. Lower-carbon and higher-carbon output products between which the inputs are being allocated are identical.

Note: There may be more than two inputs, e.g., recycled steel, low-carbon steel, and virgin steel. There may also be more than two outputs with different allocations, leading to multiple lower-carbon and higher-carbon footprints.

3. Mass Balance Allocation

3.1. To apply Mass Balance Allocation, You **shall**:

3.1.1. Show the boundary of the Mass Balance System to be applicable to the product being footprinted.

3.1.2. Show the implementation of the Mass Balance System to be valid and comply with the requirements in 3.2.

3.1.2.1. You **may** use separate certifications or assurance of the Mass Balance System or chain of custody system against applicable recognised certification schemes (e.g., REDcert, ISCC Plus) to support this.

3.2. Mass Balance System requirements:

3.2.1. Product System Boundaries **shall** apply the following logic:

3.2.1.1. Contain all inputs as well as all outputs (product, co-product, waste) that could feasibly contain any amount of the sustainable input, **and**;

3.2.1.2. Be technically **and** legally feasible for the output product to absorb the sustainable and conventional inputs which it is being allocated.

Technical example 1: If an oil-derived chemical product can technically only tolerate 10% bio-oil input due to contaminant risk, then no more than 10% bio-oil shall be allocated to the product.

*Technical example 2: Where lower levels of purity or differences in alloy composition (e.g., in recycled metals) mean the sustainable input cannot technically be used in the output product, then the two inputs are not substitutable, and Mass Balance Allocation **shall not** be applied.*

Legal example: If a food-grade glass product is legally restricted to <=35% recycled content, then no more than 35% recycled shall be allocated to the product.

3.2.2. Physical System Boundaries and multi-site instances **shall** apply the following logic:

3.2.2.1. **If** there is only one manufacturing site for the applicant product, the sustainable input **shall** be physically used in that site.

Example: An organisation with one manufacturing site makes a plastic product. It inputs recyclate material directly and inputs renewable energy which is purchased from a local supplier who delivers it on the same grid. Both of these inputs may be attributed using Mass Balance Allocation.

3.2.2.2. **If** there are multiple sites within the organisation that are processing/manufacturing the product, You **shall:**

3.2.2.2.1. Demonstrate the sustainable input is physically used for the product in at least one of the manufacturing sites, **and**;

3.2.2.2.2. Use at least the quantity of sustainable input in the products that is being claimed by those products, **and;**

Note: To allocate the sustainable input, it must be used in the manufacturing of the product in at least one of the sites. It cannot be purchased but not used (i.e. stockpiled) if it is to be allocated in that reporting period. Sustainable input that is purchased but not used can be carried over to the following reporting period to be used and allocated then instead.

3.2.2.2.3. Demonstrate the Mass Balance System is shared in common across all sites.

Example: An organisation has one manufacturing site in France and one in Mexico. Both make the same product out of steel ('same product' means that it is sold under the same name/product code regardless of which site it is manufactured at). The Mexico site inputs some green steel and some conventional steel. The France site inputs only conventional steel.

The organisation may choose to use Mass Balance Allocation to assign the green steel to products regardless of where they are manufactured. To do this, it must use a Physical System Boundary that includes both sites, i.e., it must track and record the sustainable inputs and the product outputs from both sites together, so that the mass of lower-carbon product sold is mass-balanced with the sustainable input that is purchased.

3.2.2.3. You **shall not** allocate the sustainable input to any product other than the one(s) which are made by the process and site that is physically receiving the sustainable output [this would invalidate 2.3.3].

3.2.3. Temporal System Boundaries **shall** apply the following logic:

3.2.3.1. You **shall** specify the time boundary over which Mass Balance Allocation is being applied, and **shall** apply it consistently across sites.

3.2.3.2. You **may** carry forward excess sustainable input not allocated to output products during one time period.

3.2.3.3. There **shall** not be a negative balance (meaning more sustainable output is claimed than input) across any time period.

3.2.4. Conversion Factors **shall** apply the following logic:

3.2.4.1. You **shall** document and evidence conversion factors for all output products within the boundary. You **shall** include:

The quantity of sustainable input that must be purchased to have one unit quantity of content in the output products, so that it reflects the compounded losses/waste/yield through each production process.

Example: A company makes a food product which contains strawberries and other ingredients. It inputs 'sustainable' strawberries from a lower-emissions grower, and 'conventional' strawberries from a higher-emissions grower and uses Mass Balance Allocation for these inputs. The company must document how much strawberry is required to be input in order to make the food product. It will not be a 1:1 conversion as there will be wastage.

3.2.4.1.1. Different adjustment factors for sustainable and conventional inputs can be used **if** different quantities of sustainable and conventional input are required to create one unit of output product.

Example: A company inputs a sustainable fuel and a conventional fuel. The sustainable fuel has a lower energy density and so a greater volume of it is consumed in order to make the output product. Therefore, the conversion factor is different for the sustainable fuel versus the conventional fuel, and an adjustment factor must be calculated.

Note: Conversion and adjustment factors are needed so that the Mass Balance Allocation can be checked to ensure the sustainable input is not over-allocated to your output product.

3.2.4.2. You **shall** use conversion factors based on the real operational data of the product's manufacturing process, not theoretical values.

Example: If the conversion factor is dependent on wastage rates in the manufacturing process, then evidence must be provided to demonstrate that the wastage rates derive from real operational data

from the manufacturing process, and not theoretical wastage rates, such as from industry average statistics.

3.2.4.3. **If** multiple processes/sites are involved, multiple conversion factors **shall** be defined for each separately and applied multiplicatively as applicable to each product.

3.2.4.4. 'Product groups' **may** be defined to determine 'simplified conversion factors' for all products from this group, using weighted averaging where needed.

3.2.5. System Governance **shall** apply the following logic:

3.2.5.1. You **shall** have governance systems in place for the Mass Balance System including:

3.2.5.1.1. Defined roles and responsibilities;

3.2.5.1.2. Procedures and policies for implementation at the organisational and site levels;

3.2.5.1.3. Internal data management procedures; and

3.2.5.1.4. Regular internal audits to identify and correct discrepancies in the Mass Balance System.

3.2.6. System Implementation **shall** apply the following logic:

3.2.6.1. The Mass Balance System **shall** ensure that the GHG emission attributes of the received sustainable input are valid.

Example: A company receives 'green steel' from a supplier which it intends to use as sustainable input. The supplier provides an emission factor for the green steel which is significantly lower than the conventional steel emission factor. The company's system must demonstrate the validity of the emission factor that it is using.

3.2.6.2. Records **shall** be kept for all input quantities (conventional and sustainable), output product production quantities, inventory transfers, sustainable input carry over or excess, and other system inputs/outputs (e.g. waste) in the Mass Balance System boundary.

3.2.6.3. **If** multiple sites are within the boundary, each site **shall** have a record for its part of the Mass Balance Allocation input/output record.

3.2.6.4. **If** more than one legal entity operates at one location, each legal entity applying Mass Balance Allocation **shall** operate its own quantity bookkeeping.

3.2.6.5. The Mass Balance System **shall** keep records of the quantity of sustainable input allocated to output products.

3.2.7. Downstream Traceability **shall** apply the following logic:

3.2.7.1. You **shall** ensure traceability of output product quantities (sustainable and conventional) per customer.

3.2.7.2. You **shall** report the following information to customers:

3.2.7.2.1. The types of materials/energy that the sustainable and conventional inputs are.

3.2.7.2.2. The allocated percentages of the sustainable and conventional inputs in the product.

3.2.8. Specific Cases **shall** apply the following logic:

3.2.8.1. **If** the sustainable input is renewable electricity purchased through the grid, the conventional input **shall** use the residual grid emission factor where available.

3.2.8.2. **If** the sustainable input is renewable electricity generated on site, the conventional input **shall** use the average grid emission factor where available.

3.2.8.3. **If** the sustainable input is biomethane purchased through the grid, the conventional input **shall** use the fossil gas emission factor.

3.2.8.4. **If** the sustainable input is recyclate **and** You are using Mass Balance Allocation for that input, You **shall** adapt Your Recycling Allocation approach accordingly.

3.2.8.5. **If** the sustainable input contains biogenic carbon, then the reporting of biogenic carbon content **shall** follow Mass Balance Allocation.

Example: A company inputs 50% bioplastic and 50% fossil plastic to make a product. Mass Balance Allocation is used to attribute all the bioplastic to Product A, and all the fossil plastic to Product B. The total amount of biogenic carbon shall be attributed to Product A even though it is, in reality, present in both Product A and Product B. This prevents the situation where the recipient of Product B receives a calculated footprint that reflects 0% bioplastic used, but they receive a reported biogenic content amount that reflects that there is some bioplastic content.

Note: This is an area of ongoing development and may need to follow updated standards as applicable.

3.2.8.6. You **may** use multiple instances of Mass Balance Allocation in a single PCF for different inputs.

3.2.8.7. You **shall** follow legal requirements if they differ from the requirements of this document.

Example: EUDR does not permit Mass Balance chains of custody that allow for the mixing of deforestation-free commodities with commodities of unknown origin, or non-deforestation-free commodities, because they do not guarantee that the commodities placed on the market or exported are physically deforestation-free.

Part 2: Claims and labelling

1. Reduction claims

1.1. Reduction claims based on Mass Balance Allocation **shall** be based on increased quantity of sustainable input used, not just an increased allocation percentage.

Example: A company buys 50% sustainable input and 50% conventional input in Year 1. It allocates 60% of its sustainable input to its lower-carbon output and 40% to its higher-carbon output. In Year 2 the company still buys 50% sustainable input and 50% conventional input, but it now allocates 65% of its sustainable input to its lower-carbon output and 35% to its higher-carbon output. Although the lower-carbon output's product carbon footprint will decrease, this does not warrant a reduction claim, as there has been no real reduction activity; only a change in allocation percentage (the company has not procured any more sustainable input than before).

2. Reporting

2.1. Reporting product carbon footprints (PCF) versus organisational carbon footprints (OCF) for the seller and buyer of the product using Mass Balance Allocation.

	PCF boundary	OCF boundary
Seller of product	**Shall** communicate the lower **and** higher product carbon footprints. **Should** communicate the weighted average footprint (without applying Mass Balance Allocation).	No special reporting required as Mass Balance Allocation does not affect the seller's OCF.
Buyer of product	Recipient of the higher-carbon output **shall** report its footprint using the higher product carbon footprint calculated via Mass Balance Allocation. The recipient of the lower-carbon output **should** dual-report its footprint: • With the incoming PCF calculated with Mass Balance Allocation **and;** • With the incoming PCF calculated without Mass Balance Allocation.	Recipient of the higher-carbon output **shall** report its footprint using the higher product carbon footprint calculated via Mass Balance Allocation. The recipient of the lower-carbon output **should** dual-report its footprint: • With the incoming PCF calculated with Mass Balance Allocation **and;** • With the incoming PCF calculated without Mass Balance Allocation.

*Example: A company calculates one lower-carbon and one higher-carbon footprint for its product using Mass Balance Allocation, **and** it also calculates the weighted average carbon footprint (without Mass Balance Allocation); it must avoid double counting of emissions savings through awareness of these scenarios:*

If all recipients of the products use the Mass Balance Allocated carbon footprints (according to which product they purchased), then there will be no double counting.

If all recipients use the weighted average carbon footprint, then there will also be no double counting.

However, if recipients of the higher-carbon output use the weighted average carbon footprint while recipients of the lower-carbon output use the Mass Balance Allocated carbon footprint, then there will be an over-allocation of the sustainable input, i.e. double counting.

Appendices

Appendix 1: Context for new Mass Balance Allocation requirements

Chain of custody aims to reward as much physical segregation as possible of sustainable inputs, so that they can be traced through supply chains and organisations can make robust claims about the sustainable properties of their product. This typically operates at a site-level. However, when there is a lack of segregation and traceability, Mass Balance Allocation is an approach that can be used.

Mass Balance Allocation has been adopted into GHG accounting to reward emissions reductions across product portfolios and whole organisation footprints. The principles of GHG accounting therefore operate at an organisational level, which is often multi-site, with emissions of a given product averaged across the sites where it is manufactured.

Hence, a degree of multi-site allocation should be permissible, since maintaining strict physical linkage requirements would lead to additional transport between sites and thereby increased upstream emissions. It could also lead to customers demanding products from only some sites, causing further downstream emissions, and potentially stranded assets if the sites with no locally available sustainable input are abandoned.

Mass Balance Allocation is intended be used when interchangeable sustainable and conventional versions of an input (material or energy) are 'mixed'[1] during processing/manufacturing of a product, and the company wishes to allocate proportions of more sustainable input to specific output product(s) without the need for physical segregation of inputs.

Reporting companies are responsible for providing evidence and supporting governance documents that support a valid implementation of Mass Balance Allocation.

[1] *Either literally mixed, or where there is no means of tracing which inputs go into which outputs.*

VERSION HISTORY

Version	Date	Summary of changes	Author	Approved by
1.0	08/09/2025	Initial version	Jack Judd, Associate Director	Martin Barrow, Director John Kazer, Senior Consultant Imogen Catterall, Senior Consultant Kirsten Dollery, Senior Consultant

carbontrust.com

+44 (0) 20 7170 7000

Published in the UK: 2025