REDcert

Requirements for mass balancing

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1 Introduction

The chain of custody refers to the chronological documentation of a process. It is a mechanism for tracking certified material through every step in the process. The mass balance system is a key element of the sustainability scheme, providing the method by which a connection is made between information or claims concerning raw materials or intermediate products and claims concerning final products It is an essential part of the system to ensure that sustainability claims about raw materials, intermediate products or final products are credible and verifiable throughout the whole supply chain.
There are generally several ways to provide this proof (see table below). Directive 2009/28/EC stipulates that economic operators **shall** use a mass balance system for sustainable bioliquids/biofuels.

Simplified characterisation of "mass balancing" vs. other chain of custody methods:

Options for chain of custody	Statement of biomass characteristics (‘certificate’/delivery note) for each consignment	The biomass is fully traceable to the source	Complete separation of certified biomass and non-certified biomass at a location
‘book & claim’	YES	NO	NO
‘mass balance’	**YES**	**YES**	**NO**
‘Identity preservation (hard/soft IP)’	YES	YES	YES

This document describes the requirements for a mass balance system as set forth in Article 18 (1) of Directive 2009/28/EC to ensure traceability of biomass quantities at all stages of production and distribution in the bioliquid/biofuel supply chain.

2 Requirements for mass balancing

Where biofuels and bioliquids are to be taken into account for the purposes referred to in points (a), (b) and (c) of Article 17(1), economic operators shall use a mass balance system which:

(1) allows consignments of raw material or biofuel with different sustainability characteristics to be mixed

(2) requires information about the sustainability characteristics and sizes of the consignments referred to in point (1) to remain assigned to the mixture and

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(3) provides for the sum of all consignments withdrawn from the mixture to be described as having the same sustainability characteristics, in the same quantities, as the sum of all consignments added to the mixture

These requirements shall be taken as 'minimum requirements' which have to be met by the economic operators. Depending on their specific process with regard to volume and complexity, they may opt for a 'stricter' approach like identity preservation.

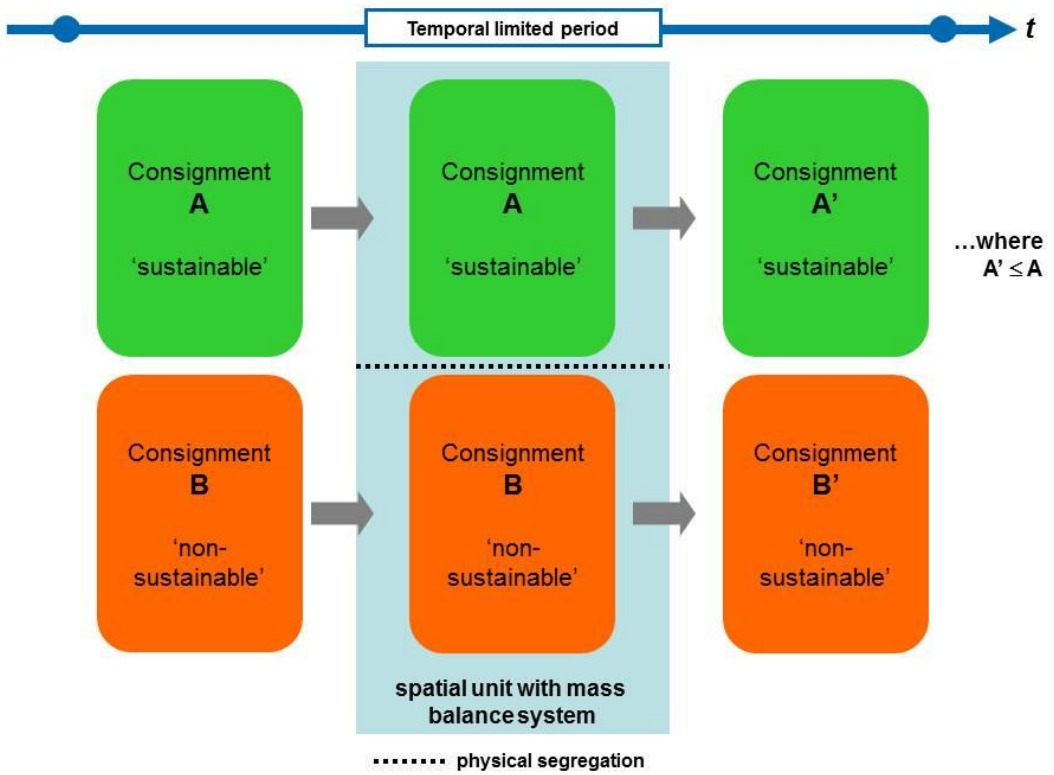
The different methods are described below.

The on-site inspections performed by the recognised certification bodies in the REDcert system also ensure that the economic operator complies with mass balancing requirements.

2.1 Identity preservation through physical segregation

The most reliable approach to identity preservation is 'hard IP' where economic operators ensure that each consignment of biomass or bioliquids/biofuels is not mixed with other products and/or where the sustainable product can be identified as sustainable throughout the entire process with no changes. Individual consignments certified as sustainable are kept strictly separated from other products and raw materials during processing and storage so their original characteristics are retained at the end of the supply chain.

Fig. 1: Identity preservation ('hard-IP')



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Consignments are also kept strictly separate even during processing which results in the following mass balance equation:

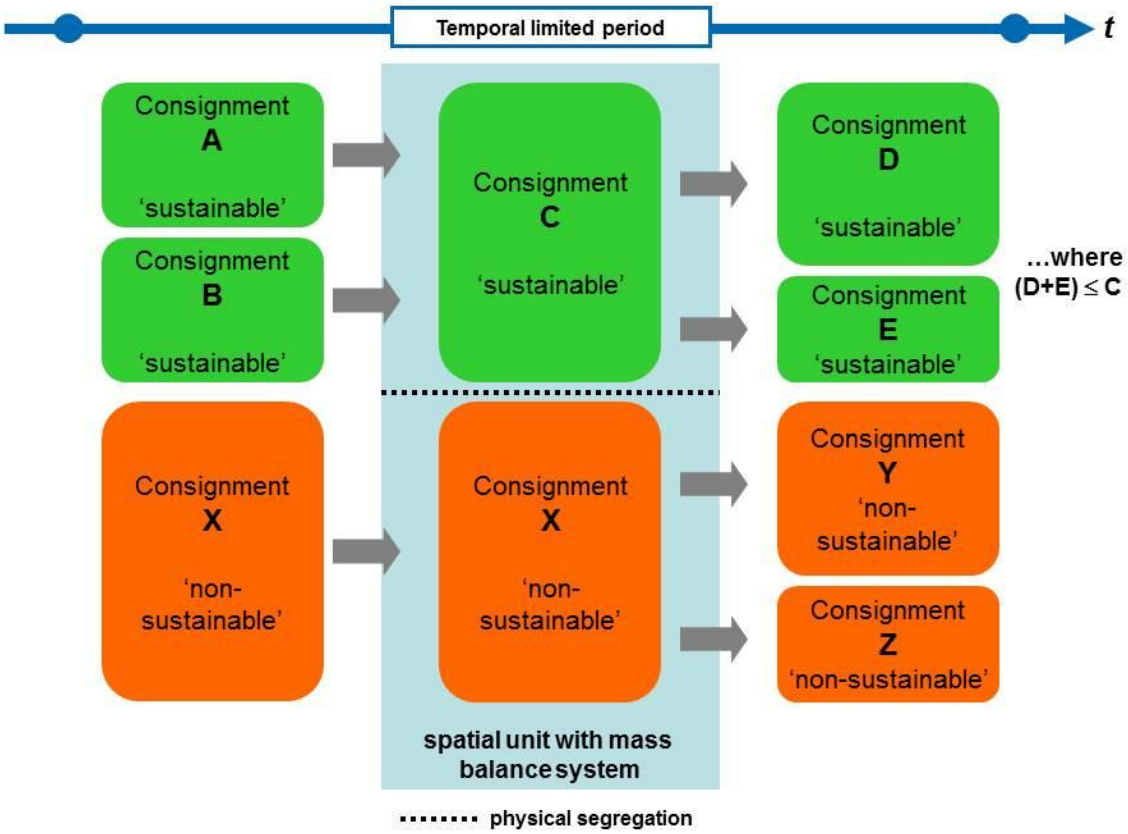
$$A' \leq A$$

where A' = A x [*conversion factor*]

Note: Conversion factors describe the ratio of input and output of biomass after a conversion process or after natural leakage during storage or handling.

Another type of identity preservation is the 'soft IP' method. Sustainable and non-sustainable biomass are still kept separate but consignments of sustainable products can be physically mixed even if they have different sustainability characteristics as long as the requirements in Fig. 2 are met.

Fig. 2: Identity preservation ('soft-IP')



Sustainable and non-sustainable consignments are kept separate during processing which results in the following mass balance equation

$$(A+B) = C \quad \text{and} \quad (D+E) \leq C$$

where (D+E) = C x [*conversion factor*]

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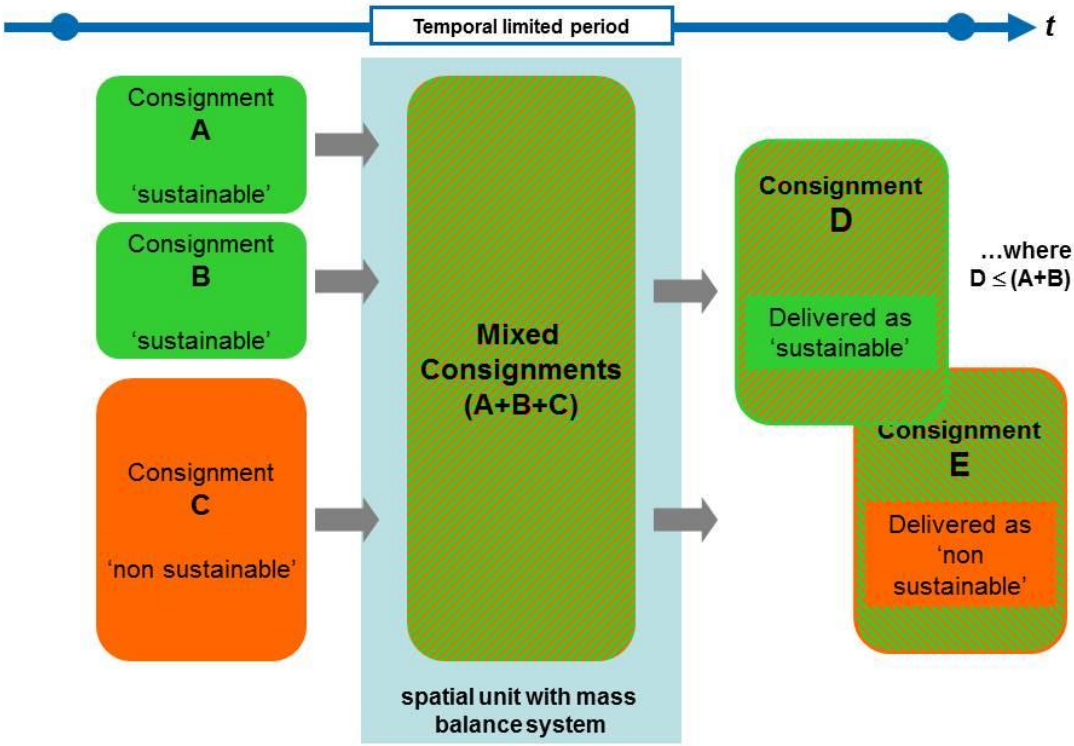
2.2 Mass balancing

The mass balance system set forth in Article 18 (1) of the RED means a system in which 'sustainability characteristics' remain assigned to 'consignments'. Sustainability characteristics can include, for example[1]:

- proof of compliance with the Directive's sustainability criteria and/or
- a statement that the raw materials used were obtained in a way that complies with the Directive's land-related sustainability criteria and/or
- a greenhouse gas emission figure and/or
- a description of the raw material used and/or
- the statement 'production has been awarded a certificate of type X from the recognised voluntary scheme Y', etc.

Sustainability characteristics shall include information on the country of origin of the raw material except for bioliquids where different countries of origin can be declared for a certain consignment[2].

Fig. 3: Mass balance



[1] see Fig. 2.2.3 of Communication from the Commission on voluntary schemes and default values in the EU biofuels and bioliquids sustainability scheme (2010/C 160/01)
[2] see Article 7a (1) a) of the Fuel Quality Directive 2009/30/EC

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The resulting mass balance equation is

$$\mathbf{D \leq (A+B)}$$

where D = (A+B) x [*conversion factor*]

When consignments with different sustainability characteristics (e.g. **A, B**) or no sustainability characteristics (e.g. **C**) are mixed, the conversion factors and sustainability characteristics as well as the size of each consignment remain assigned to the mixture. If, however, these sustainability characteristics have different greenhouse gas emissions, the values for the partial consignments have to be kept separate. These values cannot be averaged as proof of compliance with sustainability requirements.

When consignments that have the same sustainability characteristics are mixed, only the size of the consignment is adjusted accordingly. Sustainability characteristics are likely to be the same when the same raw materials are used and ‘default values’ or ‘actual regional values’ are used for the GHG calculation.

If a mixture is divided up, any consignment (quantity) removed (e.g. $\mathbf{D_1}$ … $\mathbf{D_n}$) can be assigned any of the sets of sustainability characteristics (9) - accompanied with sizes - as long as the combination of all consignments removed from the mixture has the same sizes for each of the sets of sustainability characteristics that were in the mixture. ‘Mixtures’ can take on different forms in situations where consignments would normally come into contact with one another, such as in a container, processing or logistics facility or site (defined as a geographic location with precise boundaries within which products can be mixed).

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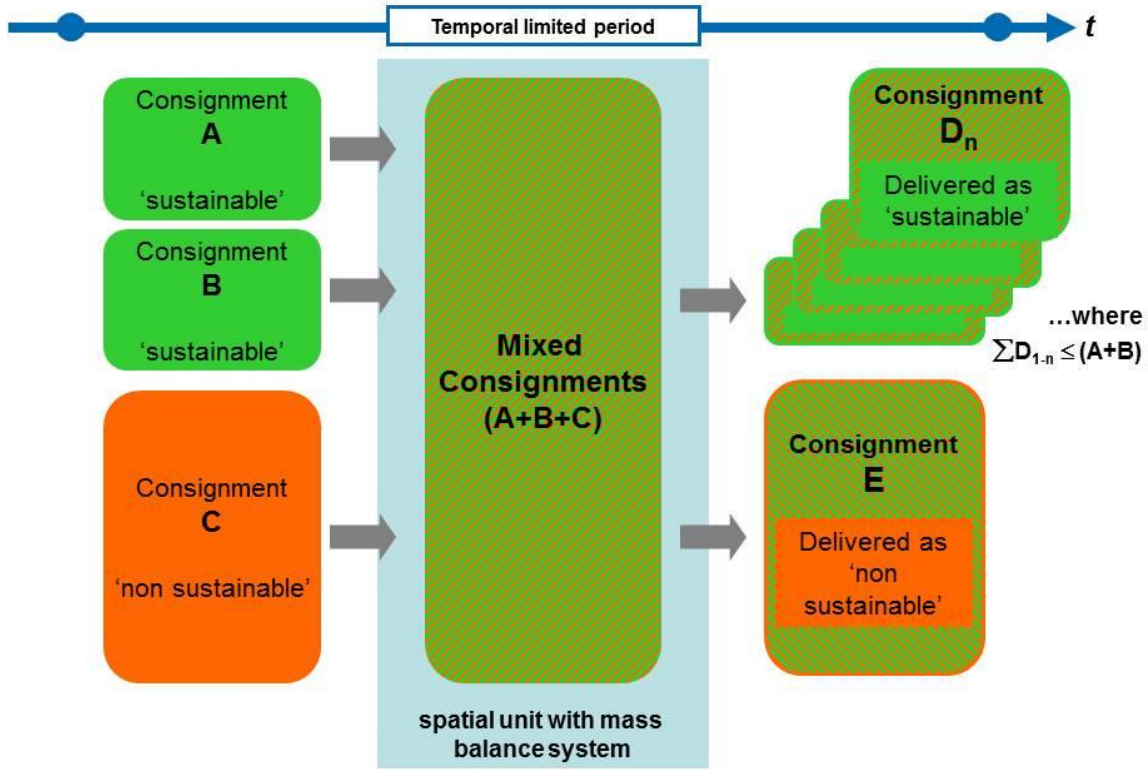
Fig. 4: Mass balance



The following mass balance equation applies

$$\sum D_{1...n} \leq (A+B)$$

where $\sum D_{1...n} = A \times [\textit{conversion factor}]_A + B \times [\text{conversion factor}]_B$

2.3 Mass balance period

Economic operators are free to define a balance period after which the balance is positive (less outgoing sustainable biomass than incoming) as long as this period does not exceed **3 months** with an **exemption possible for the first year** of certification of an economic operator under the REDcert certification system where the mass balance period may last **up to 12 months**. The time period for balancing must be defined by the economic operator ahead of time.

During this balance period, the balance is allowed to be temporarily negative (temporarily more sustainable biomass sold/delivered than received) but it has to be counterbalanced at the end of the period by the reception of appropriate amounts of sustainable biomass when the balance is calculated.

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If the economic operator decides to continuously track the sustainability information, the balance shall not be negative.

If the amount of accounted sustainable biomass in the balance exceeds the amount of biomass physically in the operational unit, only those biomass physically existing in the unit can be transferred into the next balance period. Credits of accounted sustainable biomass are not allowed to be transferred to the following balance period. A situation like this could occur, for example, when rapeseed from sustainable biomass is included in the mass balance but, during the balance period, a large amount of rapeseed (i.e. not certified as sustainable) is delivered for a purpose other than bioliquid/biofuel production, e.g. for use in food or animal feed.

2.4 Spatial boundary

Each facility where biomass or bioliquids/biofuels are produced, processed or stored in appropriate installations can be defined by a spatial boundary. This boundary shall be identified by the specific address for the property where the facility is located.
A mass balance system has to be in place for each facility. The balance systems can either be physically separate or the facility can have a unique balance system if each consignment recorded is clearly indicated by its location (facility).
For example, if a first gathering point has two similar installations on different sides of a road or in close proximity to one another, i.e. these installations have different addresses, two mass balances have to be created – one for each installation.

3 Documentation requirements

The documentation requirements for the mass balance system focus on the type of information documented, not on the format or media of the documentation. As a result, how economic operators implement a mass balance system for each physical unit where biomass or bioliquids/biofuels are produced, stored or processed very much depends on the individual economic operator's equipment and facilities. They may use existing warehouse management or accounting systems as long as they are capable of handling all the necessary information.

General documentation requirements relate to

- reliability (verifiable accuracy of balance figures)
- accessibility (time and format of documentation archive)

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- certainty (no subsequent change in balances)

for the mass balance system's documentation. This has to be verified by the independent certification bodies during the on-site inspection (see 'Requirements for neutral inspection').

In particular there has to be appropriate documentation that provides

- proof of all incoming and outgoing consignments of sustainable biomass or bioliquids/biofuels in the mass balance system (input/output)
- proof of each conversion factor used in the calculation of biomass feedstock as the result of a conversion process
- a defined time period for the mass balance (at least 3 months)
- the results of each balance of sustainable biomass (positive/negative balance)

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4 Relevant documents

The documentation structure of the REDcert system contains:

No.	Document	Issued / revised
1	System scope and basic requirements	V EU 3; 15.02.2012
2	Requirements for the production of biomass, bioliquids and biofuels	V EU 3; 15.02.2012
3	Requirements for GHG calculation	V EU 3; 15.02.2012
4	Requirements for mass balancing	V EU 3; 15.02.2012
5	Requirements for neutral inspections	V EU 3; 15.02.2012
6	Sanction system	V EU 3; 15.02.2012
7	Checklist for the inspection of interfaces, storage facilities and suppliers	V EU 3; 15.02.2012
8	Checklist for the inspection of farms	V EU 3; 15.02.2012

These documents describe the requirements and implementation of the European legislation and communication for sustainable biomass and bioliquids/biofuels:

No.	Document	Issued / revised
1	DIRECTIVE 2009/28/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC	23 April 2009
2	COMMISSION DECISION on guidelines for the calculation of land carbon stocks for the purpose of Annex V to Directive 2009/28/EC (notified under document C(2010) 3751) (2010/335/EU)	10 June 2010
3	Communication from the Commission on voluntary schemes and default values in the EU biofuels and bioliquids sustainability scheme (2010/C 160/01)	19 June 2010
4	Communication from the Commission on voluntary schemes and default values in the EU biofuels and bioliquids sustainability scheme (2010/C 160/02)	19 June 2010
5	Council Regulation (EC) 73/2009	19 January 2009
6	ILOLEX Database http://www.ilo.org/ilolex/english/index.htm	

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