



# **REDcert**

## Scheme principles for mass balancing

**Version 04**

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## 1 Introduction

The term “traceability chain” describes the chronological documentation of a process. It is a tool to track material through every step in the process. The mass balancing system is a central element of the sustainability scheme. It establishes a connection between information or claims related to raw materials or intermediate and end products. It is an essential component of the system which ensures that information about the sustainability of raw materials, intermediate and end products is credible in relation to its origin and type and can be verified along the entire production and supply chain.

A mass balancing system must be managed for each site by:

- a) First gathering points: Companies that buy and resell biomass from the farmer/producer and collection points that accept waste/residues from waste producers
- b) Processing companies that process biomass such as oil mills, biodiesel, ethanol plants, refineries, biogas facilities with feed-in to a methane filling station
- c) Suppliers before and after the last interface

There are generally several ways to provide this proof (see table below). Directive 2009/28/EC stipulates that economic operators **must** use a mass balancing system for sustainable bioliquids/biofuels.

Simplified diagram of “mass balancing” compared to other tracking processes:

Options for traceability chain	Information about the biomass properties (“certificate”/delivery slip) for every consignment	The biomass can be completely traced back to cultivation/origin	Complete separation of certified and non-certified biomass at one site
“book & claim” process	YES	NO	NO
<b>“Mass balancing”</b>	<b>YES</b>	<b>YES</b>	<b>NO</b>
“Identity preservation (hard/soft IP)”	YES	YES	YES

This document describes the requirements for a mass balancing system in accordance with Article 18 (1) of Directive 2009/28/EC. They guarantee the traceability of quantities of biomass in all phases of production and delivery in the supply chain for biofuels and bioliquids.

## 2 Scheme principles for mass balancing

If energy from biofuels and bioliquids is to be taken into account for the purposes referred to in Article 17 (a), (b) and (c) of Directive 2009/28/EC, the economic operators must use a mass balancing system that:

- allows consignments of raw material or biofuel with differing sustainability characteristics to be mixed
- requires information about the sustainability characteristics and sizes of the consignments referred to in point (1) to remain assigned to the mixture; and
- 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 are to be considered “minimum requirements” that have to be met by the economic operators. Depending on their individual process related to scope and complexity, they can opt for “stricter” specifications such as the identity preservation method.

The methods mentioned are described below.

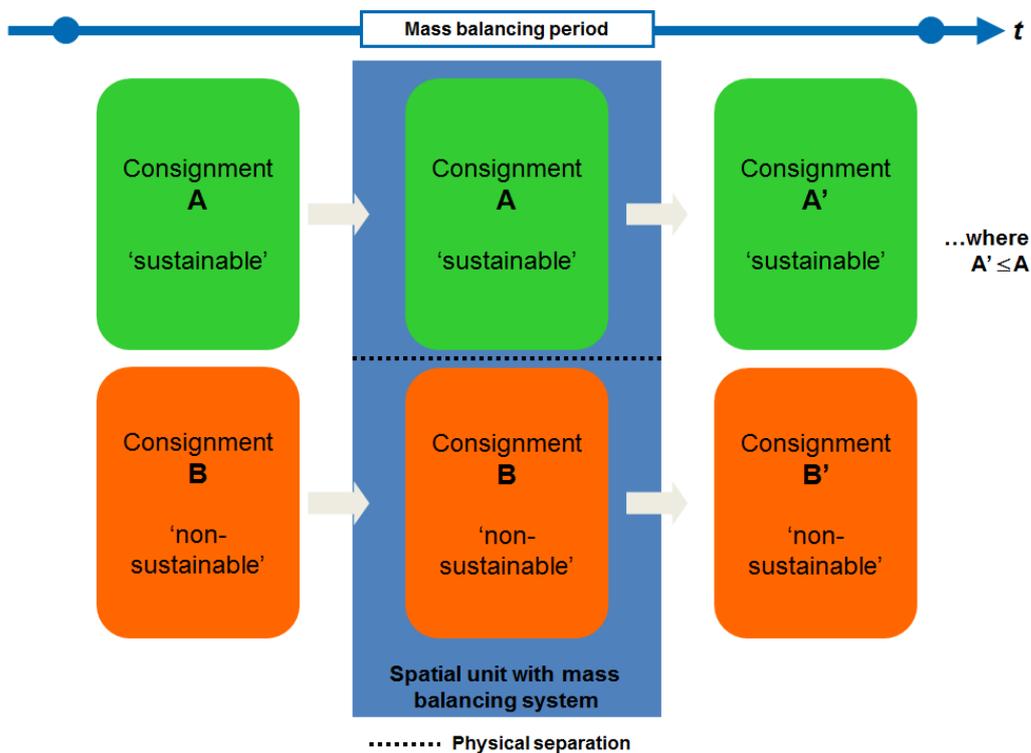
The on-site inspections carried out in the REDcert scheme by recognised certification bodies ensure that the economic operator satisfies the mass balancing requirements.

### 2.1 Identity preservation through physical separation

The most reliable process of preserving identity is the “hard IP method”.

When this method is used, the economic operators ensure that no consignment with biomass or biofuels/bioliquids is mixed with other products. It also has to be ensured that the sustainable product can be identified as sustainable throughout the entire process with no changes. Individual consignments that are certified as sustainable are kept strictly separate from other products and raw materials during processing and storage so that their original characteristics are retained through to the end of the supply chain.

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



Consignments are also kept strictly separate during processing. This gives rise to the following mass balancing formula:

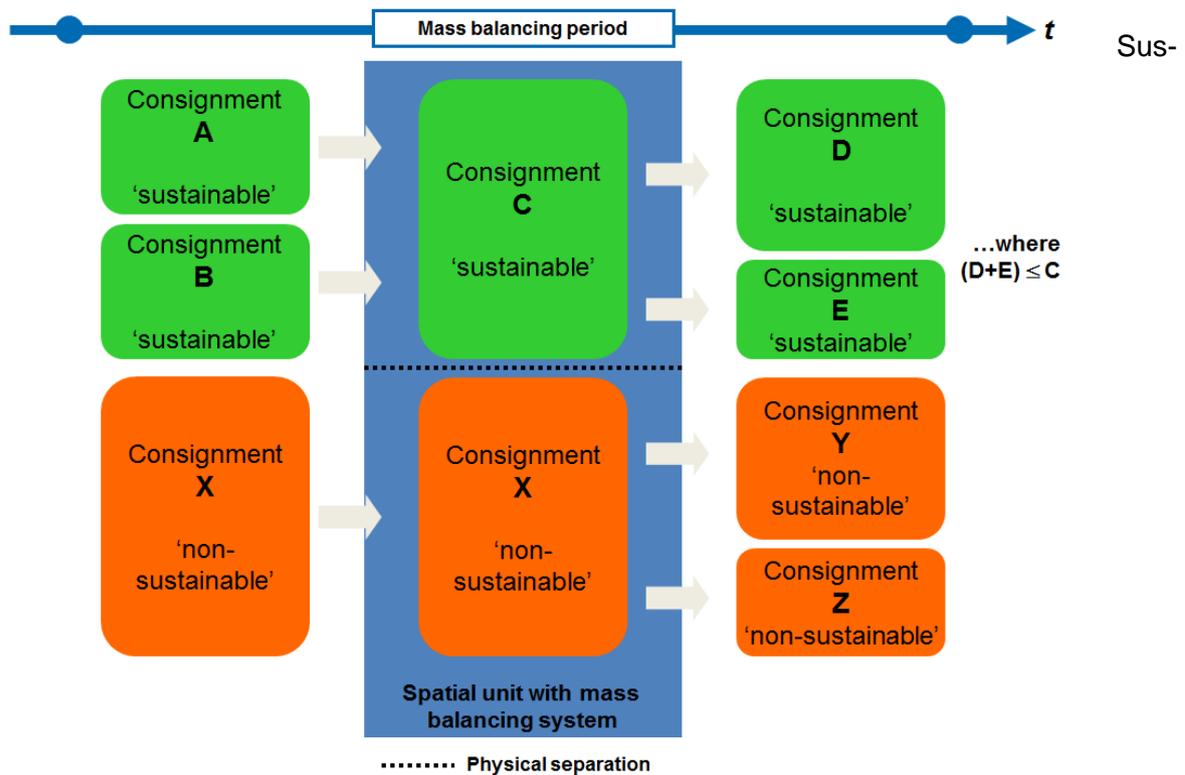
$$A' \leq A$$

$$\text{where } A' = A \times [\text{conversion factor}]$$

**Note:** Conversion factors describe the ratio of biomass input and output after a conversion process or after natural leakage, e.g. during storage or transport.

Another way to preserve identity is the “soft IP” method. Sustainable and non-sustainable biomass is also segregated here. Consignments with sustainable products, however, can also be mixed with products with other sustainability characteristics as long as the requirements shown in Fig. 2 are satisfied.

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



tainable and non-sustainable consignments are kept separate during processing. This gives rise to the following mass balancing formula:

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

$$\text{where } (D+E) = C \times [\text{conversion factor}]$$

## 2.2 Mass balancing

The mass balancing system described in Article 18 (1) of Directive 2009/28/EC describes a system in which the “sustainability characteristics” remain assigned to “physical consignments”. Sustainability characteristics are e.g.<sup>1</sup>:

- evidence showing 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

<sup>1</sup> See Fig. 2.2.3 of the Communication from the Commission on voluntary schemes and default values in the EU biofuels and bioliquids (2010/C 160/01)

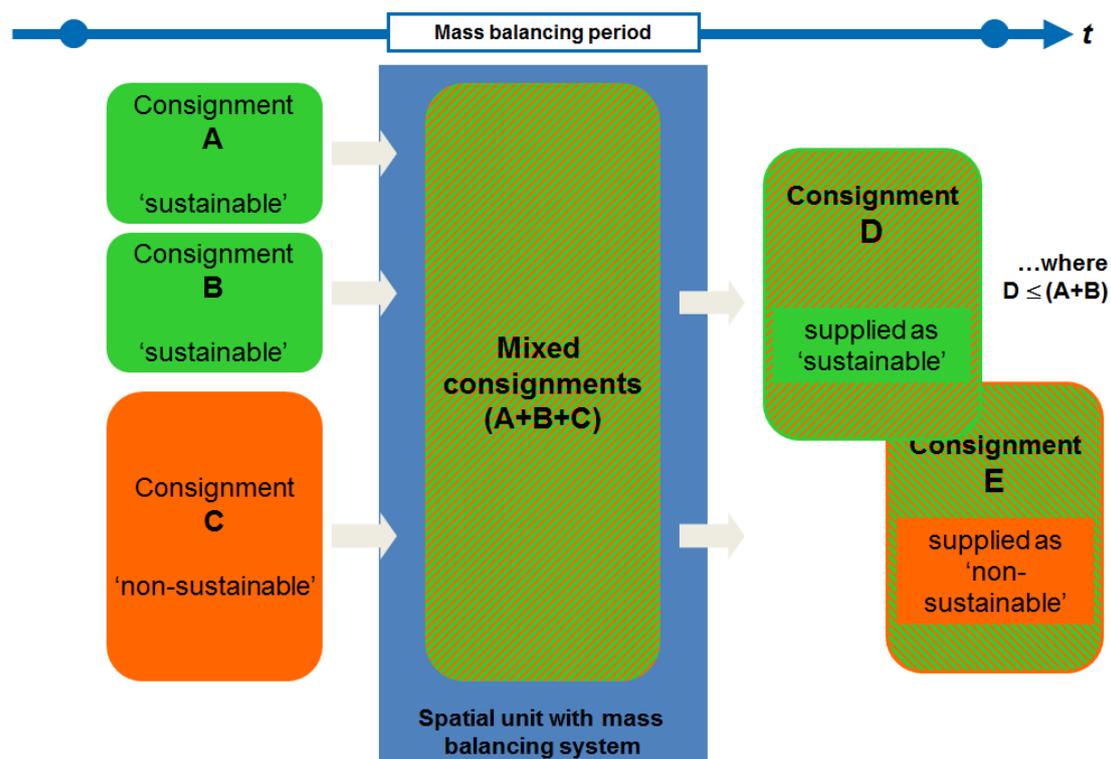
- a greenhouse gas emission figure, and/or a description of the raw materials used while preserving product identity as well as their origin, and/or
- the statement “production has been awarded a certificate of type X from recognised voluntary scheme Y”, etc.

Sustainability characteristics would have to include information on the country of origin of the feedstock if several countries of origin can be specified for a specific consignment.

Please note that only actual GHG emission values are to be recorded/transmitted along the supply chain in the appropriate unit (i.e. dry matter basis for raw materials and intermediate products). Furthermore, actual values for each specific element must be reported (if appropriate). If (disaggregated) default values are applied then it should simply be stated “(Disaggregated) default value applied” or similar. For more information, see the “Scheme principles for the production of biomass, biofuels and bioliquids” or “Scheme principles for GHG calculation”.

Whenever a processing step or losses are involved, appropriate conversion factors should be used to adjust the size of a consignment. In addition, it is important to note that, generally, the sustainability characteristics of the feedstock that is processed should be attributed to products and residues of that process equally. For instance when 50% of a mixture has been certified as being sustainable, 50% of all products and residues from that mixture should also be considered sustainable. The only exception is the allocation of GHG emissions which should follow the rules of Annex V RED.

Fig. 3: Mass balancing



This gives rise to the following mass balancing formula:

$$D \leq (A+B)$$

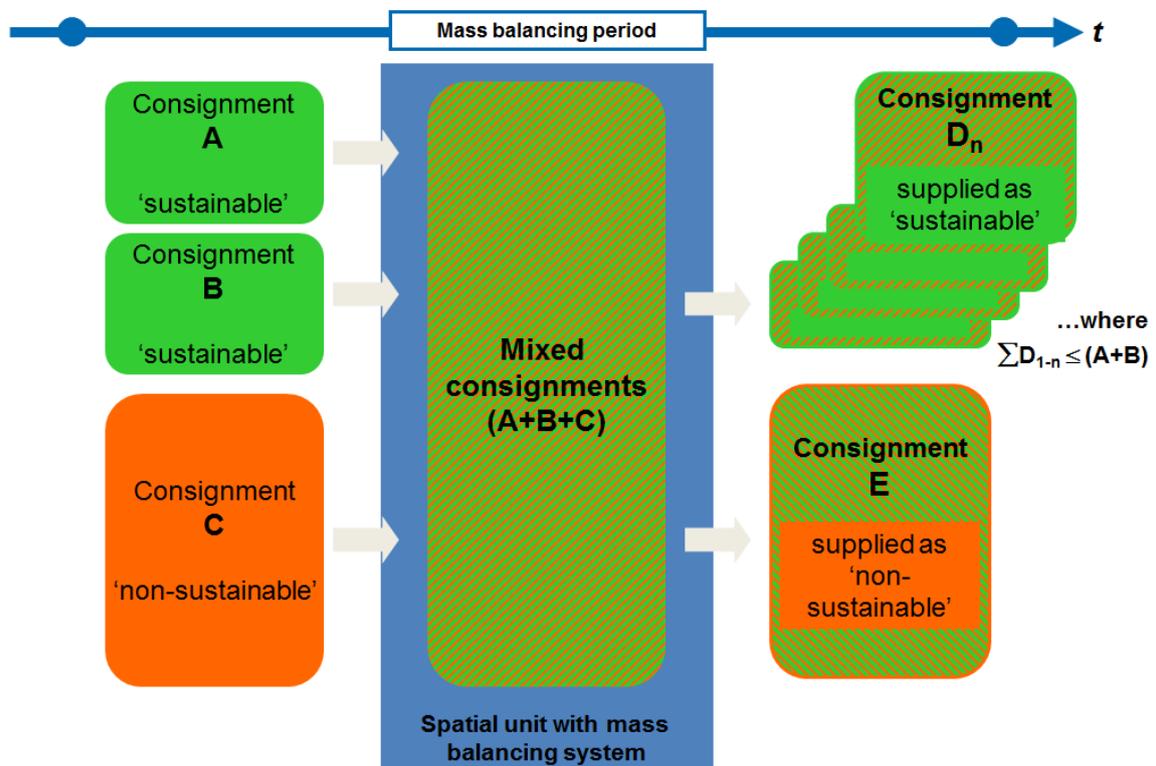
where  $D = (A+B) \times [\text{conversion factor}]$

When consignments with different sustainability characteristics (e.g. **A**, **B**) or no sustainability characteristics (e.g. **C**) are mixed, the respective conversion factors and sustainability characteristics as well as the size of the individual consignments remain assigned to the mixture. If different GHG emissions, however, are assigned to these sustainability characteristics, these values must be kept separate for the respective partial consignments. These values cannot be offset against one another to prove that the sustainability requirements are fulfilled.

If consignments with identical sustainability characteristics are mixed, only the size of the consignment is adjusted accordingly. Sustainability characteristics are likely to be the same where the same feedstocks are used and use is made of “default values” or “actual regional values” for the GHG calculation.

If a mixture is split, any consignment taken out of it (e.g.  $D_1 \dots D_n$ ) can be assigned any of the sets of sustainability characteristics (9) as long as the combination of all consignments taken out of the mixture - in addition to the weight - has the same sizes for each of the sets of sustainability characteristics that were in the mixture. A “mixture” can have any form where consignments would normally be in contact, such as in a container, processing or logistical facility or site (defined as a geographical location with precise boundaries within which products can be mixed).

Fig. 4: Mass balancing



The following mass balancing formula applies here:

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

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

## 2.3 Mass balancing period

Economic operators are free to define a balance period after which the balance is positive (less outgoing than incoming biomass) as long as this period is not longer than 3 months. During this balancing period, the balance may be temporarily negative (temporarily more sustainable biomass sold/delivered than received). At the end of the mass balancing period, however, the overall result must be balanced out by receiving corresponding quantities of sustainable biomass.

If the economic operator decides to balance the sustainability data on an ongoing basis, the balance may not be negative.

If the quantity of sustainable biomass in the balance exceeds the physical quantity of biomass in the company, only the physically existing biomass can be carried forward to the next balancing period. Credit balances of sustainable biomass may not be transferred to the next balancing period. This kind of situation can occur, for example, if sustainable rapeseed is included in the mass balance but during the balancing period a large quantity of it was sold for a use other than for the production of biofuels and bioliquids (e.g. for use as food or animal feed).

## 2.4 Spatial boundaries

For every company that produces, processes or stores biomass or biofuels and bioliquids, the property line of the premises defines the geographic location. This demarcation is to be identified by clearly identifying the address of the property where the facility is located.

A mass balancing system must be set up for every company/operating site. The balancing systems can either be physically separate in the operation, or every operating site can have its own balancing system if every consignment is documented is clearly identified by its location (operating site).

For example, a first gathering point can operate two similar facilities in close proximity to one another (e.g. on both sides of a street). If these facilities have different addresses, two mass balancing systems have to be set up (one for each facility).

## 2.5 External storage facilities/storage facilities with several users

If several economic operators/companies supply biomass to an external storage facility, e.g. forwarding, leased or tank warehouse, for storage, each of these economic operators/companies has to keep a mass balancing system for the product he delivered.

This means “if more than one legal entity operates a site then each legal entity is required to operate its own mass balance system.”

## 3 Documentation requirements

The document requirements of the mass balancing system do not relate to the format or medium of the documentation, but rather to the type of information to be documented. It is therefore largely left to the facilities and operating sites of the individual economic operator to decide how to set up a mass balancing system for every operating unit that produces, processes or stores sustainability biomass or biofuels/bioliquids. Existing enterprise resource planning systems, e.g. can be used as long as they have the capability to record and process all of the necessary information.

The general specifications for documentation relate to

- reliability (verifiable accuracy of the balance figures)
- accessibility (time and format of the documentation archive)
- certainty (no subsequent changes to balances)

of the documentation of the mass balancing system. This is to be checked by the independent certification bodies as part of the on-site inspections (for more information, see “Scheme principles for neutral inspections”).

In particular, the documentation which provides the following information is required:

- proof of all incoming and outgoing consignments with sustainable biomass and bioliquids/biofuels in the mass balancing system (input/output). This also applies for ligno-cellulosic material and non-food cellulosic material. “Ligno-cellulosic material” means material composed of lignin, cellulose and hemicellulose such as biomass sourced from forests, woody energy crops and forest-based industries’ residues and waste. “Non-food cellulosic material” means feedstocks mainly composed of cellulose and hemicellulose, and having a lower lignin content than ligno-cellulosic material (the complete legal definition

is separately provided and explained in the annex of the document “Scope and basic scheme requirements”. All of the scheme principles of REDcert refer to this annex).

- proof of every conversion step that takes place when processing biomass raw materials to allow this result to be incorporated into the calculation
- a defined time period for mass balancing (not longer than 3 months)
- the results of every sustainable biomass balance (positive/negative balance)
- All of the documents in the document management system must be kept for at least 5 years regardless of any other legal requirements relating to retention period

Detailed information on the requirements of the documentation is provided in detail in the “Scheme principles for the production of biomass, biofuels and bi-liquids” in the sections

- 6.2.1 Incoming sustainable biomass
- 6.2.2 Internal documentation
- 6.2.3. Outgoing sustainable biomass

## 4 Requirements for co-processing fossil fuels and biofuels

According to the stipulations in Directive (EU) 2015/652, the GHG intensity of fuels and energy sources must be factored in when biofuels and fossil fuels are processed together.

Processing includes any modification during the life cycle of a fuel or energy supplied with the same chemical properties and a specific biogenic and fossil fuel component which causes a change to the molecular structure of the product (see figure). The addition of denaturant does not fall under this processing.

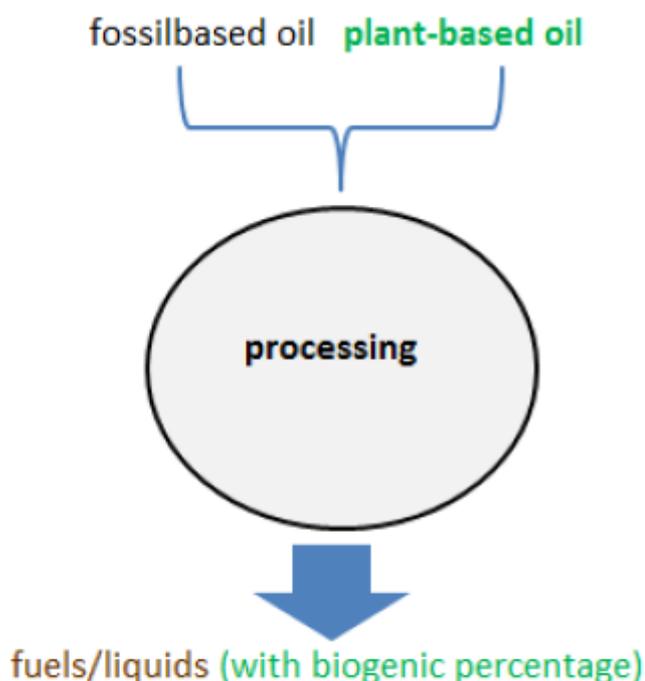


Figure 1: Combined processing of fossil fuels and biofuels

The quantity of the co-processed biofuel is determined according to the energy balance and efficiency of the co-processing process as set out in Council Directive (EU) 2015/652. The energy content and energy balance affect the quantity as well as the GHG intensity of the biogenic component. The national regulations apply when crediting the biogenic component from co-processing of biofuels and fossil fuels in the respective member states.

Should the Commission issue any further guidance/rules regarding co-processing (e.g. on determining the biogenic content of a fuel, or on GHG emission calculation) then this will be incorporated into the REDcert scheme with immediate effect.

## 5 Relevant Documents

The documentation structure of the REDcert-EU scheme includes the following:

No.	Document	Published/revised
1	Scope and basic scheme requirements	The current version of the REDcert-EU scheme principles is published on the website at <a href="http://www.redcert.org">www.redcert.org</a> .
2	Scheme principles for the production of biomass, biofuels and bioliquids	
3	Scheme principles for GHG calculation	
4	Scheme principles for mass balancing	
5	Scheme principles for neutral inspections	
6	Sanction system	
7	Complaint management system	
8	Phase-specific checklists	

REDcert reserves the right to create and publish additional supplementary scheme principles if necessary.

The legal EU regulations and provisions for sustainable biomass as well as biofuels and bioliquids including other relevant references that represent the basis of the REDcert-EU documentation are published separately on REDcert's website at [www.redcert.org](http://www.redcert.org). When legal regulations are referenced, the most current version is always assumed.