BONSUCRO EU-RED STANDARD V2.1

for compliance with the EU Renewable Energy Directive 2 requirements

Including the Implementing Regulation 2022/996 requirements

May 2024

Contents

1. Introduction

The "Bonsucro EU-RED Standard for Compliance with the EU Renewable Energy Directive Requirements" (also referred to as Bonsucro EU-RED Standard) has been designed as a voluntary add-on to the Bonsucro standards. The Bonsucro EU-RED Standard defines how, under certain conditions, sugar cane millers and their supplying area as well as supply chain operators are able to comply with the requirements in the EU Directive 2018/2001/EC on the promotion of the use of energy from renewable sources (recast). This Directive (commonly referred to as "RED recast", "RED2" or "REDII") specifies sustainability requirements for biofuels, bioliquids and biomass fuels in the European Union.

On 8 April 2022, the European Commission published Commission Implementing Decision 2022/600 on the recognition of the Bonsucro EU-RED scheme for demonstrating compliance with the requirements set in RED recast. This document is an updated version of the Bonsucro EU-RED Standard recognised in April 2022, including additional requirements laid down in the Commission Implementing Regulation 2022/996 of 14 June 2022.

The separate document Bonsucro EU-RED Low ILUC-risk module is a voluntary add-on to this Bonsucro EU-RED Standard for use by economic operators wishing to demonstrate (part of) their operations are low risk of causing indirect land use change (ILUC).

1.1. Bonsucro EU-RED Standard version and implementation

In a communication dated 03 January 2024 the European Commission (EC) has officially approved the updated Bonsucro EU-RED standard v2.0 that were revised to reflect the legal requirements of the Implementing Regulation (EU) 2022/996 on rules to verify sustainability and greenhouse gas emission saving criteria and low indirect land-use change-risk criteria (Implementing Regulation or IR).

The EC requires immediate compliance of all Bonsucro EU-RED certified economic operators with the requirements of the Implementing Regulation.

With immediate effect, all Bonsucro EU-RED audits (certification and surveillance audits) from the date of publication onward will have to be conducted in accordance with the updated requirements. The same applies to scope extensions.

Bonsucro has prepared a checklist to be used for all Bonsucro EU-RED audits with immediate effect. This checklist must be used in addition to the current Bonsucro calculator until Bonsucro launches a revised calculator.

Approved by the European Commission on: 03 January 2024
Valid from: 13 May 2024

1.2. Bonsucro EU-RED Standard Structure

As opposed to previous versions of the Bonsucro EU-RED Standard, specific RED recast requirements are no longer included in the Bonsucro Production Standard, the Bonsucro Mass Balance Chain of Custody Standard, and the Bonsucro Certification Protocol but in this separate Bonsucro EU-RED Standard.

The Bonsucro EU-RED Standard is a voluntary add-on to the other Bonsucro Standards and shall always be used in conjunction.

- Chapter 1 is the introduction.
- Chapter 2 presents the definitions used in the Bonsucro EU-RED Standard.
- Chapter 3 outlines general Bonsucro EU-RED requirements, applicable to both mills and supply chain operators.
- Chapter 4 elaborates on requirements specifically for mills.
- Chapter 5 elaborates on requirements specifically for supply chain operators.
- Chapter 6 details requirements for certification bodies and the certification process.
- Chapter 7 outlines RED recast requirements for Bonsucro as voluntary scheme owner.

- Annex I. Bonsucro EU-RED GHG calculation methodology: specifies in detail RED recast requirements for the greenhouse criterion.
- Annex II. Methodology for determining the emissions from the cultivation of sugarcane.
- Annex III. Methodology for determining the emission savings from soil carbon accumulation via improved agricultural management.
- Annex IV. Minimum content of Bonsucro EU-RED audit reports, summary audit reports and certificates.

A separate document contains the 'Bonsucro EU-RED Low ILUC-risk module'.

1.3. Version changes control

Below is an overview of the main changes in this version in relation to the previous version.

Version	Date	Change
2.0	08 April 2024	Not applicable, initial version.
2.1		3.1 section: it was improved the definition of the activities and products that can be certified under this standard

2. Definitions and Clarifications

• **Agricultural biomass**	biomass produced from agriculture.
• **Agricultural residues**	in the context of sugarcane production, agriculture residues include any feedstock other than harvested cane, i.e. leaves, thrashes, tops, stumps, roots, etc. They do not include residues from related industries or processing, e.g. sugarcane bagasse.
• **Biomass**	the biodegradable fraction of products, waste, and residues from biological origin from agriculture, including vegetal and animal substances, from forestry and related industries, including fisheries and aquaculture, as well as the biodegradable fraction of waste, including industrial and municipal waste of biological origin.
• **Biofuels** - **Advanced biofuels**	liquid fuel for transport produced from biomass. biofuels that are produced from the feedstocks listed in Part A of Annex IX of RED recast.
• **Bioliquid**	liquid fuel for energy purposes other than for transport, including electricity and heating and cooling, produced from biomass.
• **Biomass fuels**	gaseous and solid fuels produced from biomass.
• **Bonsucro EU-RED Standard**	refers to the Bonsucro EU-RED Standard for Compliance with the EU Renewable Energy Directive Requirements', which comprise of a voluntary add-on to the Bonsucro standards and allow producers and processors under certain conditions to comply with requirements in EU Directive 2018/2001/EC on the promotion of the use of energy from renewable sources.
• **Certificate**	conformity statement by a certification body within the framework of the voluntary scheme, certifying that an economic operator complies with the requirements of RED recast.
- **Suspended certificate**	a certificate temporarily invalidated due to non-conformities identified by the certification body or upon voluntary request of the economic operator.
- **Withdrawn certificate**	a certificate that has been permanently cancelled by the certification body or the voluntary scheme.

- **Terminated certificate** a certificate that has been voluntarily resigned while it is still valid.

- **Expired certificate** a certificate that is no longer valid.

- **Continuously forested area** land with more than one hectare of area with trees higher than five metres and a canopy cover of more than 30%, OR trees able to reach those thresholds in situ.
  This criterion includes forests according to the respective national legal definition but excludes land that is predominantly under agricultural land use.

- **Continuously forested area** Land with more than one hectare of area with trees higher than five metres and a canopy cover of more than 30%, OR trees able to reach those thresholds in situ.
  This criterion includes forests according to the respective national legal definition but excludes land that is predominantly under agricultural land use.

- **Degraded** means characterised by long-term loss of biodiversity due to for instance overgrazing, mechanical damage to the vegetation, soil erosion or loss of soil quality (definition following Regulation (EU) No 1307/2014).

- **Economic operator**: a producer of raw material, a collector of waste and residues, an operator of installations processing raw material into final fuels or intermediate products, an operator of installations producing energy (electricity, heating or cooling) or any other operator, including of storage facilities or traders that are in physical possession of raw material or fuels, provided that they process information on the sustainability and greenhouse gas emissions saving characteristics of those raw materials or fuels.

- **Facility (site)** a single functional unit of an organisation or a combination of units situated at one locality, which is geographically distinct from other units.

- **EU-RED** (or RED recast or REDII or RED2): recast of the European Union Directive on the promotion of the use of energy from renewable sources (Renewable Energy Directive, 2018/2001/CE).

• **Fuels**	fuels that are ready to be supplied for consumption, including biofuels, bioliquids, biomass fuels, renewable liquid and gaseous transport fuels of non-biological origin and recycled carbon fuels.
• **GHG**	greenhouse gas(es).
• **Grasslands**	terrestrial ecosystems dominated by herbaceous or shrub vegetation for at least 5 continuous years. It includes meadows or pasture that are cropped for hay but excludes land cultivated for other crop production and cropland lying temporarily fallow. It further excludes continuously forested areas as defined in this Chapter unless these are agroforestry systems which include land use systems where trees are managed together with crops or animal production systems in agricultural settings. The dominance of herbaceous or shrub vegetation means that their combined ground cover is larger than the canopy cover of trees (definition following Regulation (EU) No 1307/2014).
• **Highly biodiverse forest and other wooded land**	forest and other wooded land which is species-rich and not degraded, or has been identified as being highly biodiverse by the relevant competent authority, unless evidence is provided that the production of that raw material did not interfere with those nature protection purposes; • Where **species rich**, means it is: (i) a habitat of significant importance to critically endangered, endangered, or vulnerable species as classified by the International Union for the Conservation of Nature Red List of Threatened Species or other lists with a similar purpose for species or habitats laid down in national legislation or recognised by a competent national authority in the country of origin of the raw material; or (ii) a habitat of significant importance to endemic or restricted-range species; or (iii) a habitat of significant importance to intra-species genetic diversity; or (iv) a habitat of significant importance to globally significant concentrations of migratory species or congregatory species; or (v) regionally or nationally significant or highly threatened or unique ecosystem. (definition following Regulation (EU) No 1307/2014)

- **Human intervention** — in the context of the grasslands definition in this document means managed grazing, mowing, cutting, harvesting, or burning (definition following Regulation (EU) No 1307/2014).

- **Implementing Regulation (IR)** — Commission Implementing Regulation (EU) 2022/996 of 14 June 2022 on rules to verify sustainability and greenhouse gas emissions saving criteria and low indirect land-use change-risk criteria.

- **Installation** — Any processing installation used in the production process. An installation shall be considered to be in operation once the physical production of fuel, heat or cooling, or electricity has started (i.e. once the production of fuels including biofuels, biogas or bioliquids, or production of heat, cooling or electricity from biomass fuels has started). It does not include production facilities that have been intentionally added to the production chain to qualify for the exemption set out in Directive 2018/2001/EC, Article 29.10.

- **Ligno-cellulosic material** — material composed of lignin, cellulose, and hemicellulose such as biomass sourced from forests, woody energy crops and forest-based industries' residues and wastes.

- **Natural highly biodiverse grassland** — grassland that would remain grassland in the absence of human intervention and that maintains a natural species composition and the ecological characteristics and processes (definition following Regulation (EU) No 1307/2014).

- **Non-food cellulosic material** — raw materials mainly composed of cellulose and hemicellulose, and having a lower lignin content than ligno-cellulosic material; it includes food and feed crop residues such as straw, stover, husks and shells); grassy energy crops with a low starch content such as ryegrass, switchgrass, miscanthus, giant cane; cover crops before and after main crops; ley crops; industrial residues, including from food and feed crops after vegetal oils, sugars, starches and protein have been extracted, and material from bio-waste. Where ley and cover crops are understood to be temporary, short-term sown pastures comprising grass-legume mixture with a low starch content to obtain fodder for livestock and improve soil fertility for obtaining higher yields of arable main crops.

- **Non-natural highly biodiverse grassland**

means grassland that:

- would cease to be grassland in the absence of human intervention; and
- which is species-rich and not degraded and has been identified as being highly biodiverse by the relevant competent authority, unless evidence is provided that the harvesting of the raw material is necessary to preserve its grassland status.

- Where **species rich**, means it is:
  (i) a habitat of significant importance to critically endangered, endangered, or vulnerable species as classified by the International Union for the Conservation of Nature Red List of Threatened Species or other lists with a similar purpose for species or habitats laid down in national legislation or recognised by a competent national authority in the country of origin of the raw material; or
  (ii) a habitat of significant importance to endemic or restricted-range species; or
  (iii) a habitat of significant importance to intra-species genetic diversity; or
  (iv) a habitat of significant importance to globally significant concentrations of migratory species or congregatory species; or
  (v) regionally or nationally significant or highly threatened or unique ecosystem.

(definition following Regulation (EU) No 1307/2014)

- **Other wooded land**

land not defined as 'forest', spanning more than 0.5 hectares; with trees higher than 5 meters and a canopy cover of 5-10 percent, or trees able to reach these thresholds; or with a combined cover of shrubs, bushes, and trees above 10 percent. It does not include land that is predominantly under agricultural or urban land use (definition from FAO Global Forest Resource Assessment Definitions, version 2015).

- **Peatland soils**

are soils with horizons of organic material (peat substrate) of a cumulative thickness of at least 30 cm at a depth of down to 60 cm. The organic matter contains at least 20 mass percent of organic carbon in the fine soil.

- **Primary forest** — naturally regenerated forest of native species, where there are no clearly visible indications of human activities, and the ecological processes are not significantly disturbed.
  Some key characteristics of primary forests are:
  a. they show natural forest dynamics, such as natural tree species composition, occurrence of dead wood, natural age structure and natural regeneration processes;
  b. the area is large enough to maintain its natural characteristics;
  c. there has been no known significant human intervention, or the last significant human intervention was long enough ago to have allowed the natural species composition and processes to have become re-established (definition from FAO Global Forest Resource Assessment Definitions, version 2015).

- **Proof of sustainability** — a declaration by an economic operator, made on the basis of a certificate issued by a certification body within the framework of a voluntary scheme certifying the compliance of a specific quantity of raw materials or fuels with the sustainability and greenhouse gas emissions savings criteria as set out in Articles 25(2) and 29 of RED recast (A proof of sustainability is not the Bonsucro EU-RED certificate itself, but a mandatory declaration accompanying each consignment of Bonsucro EU-RED certified material).

- **Raw material** — substances that have not yet been processed into fuels including intermediate products.

- **Residues from agriculture, aquaculture, fisheries, and forestry** — residues directly generated by agriculture, aquaculture, fisheries, and forestry, and that do not include residues from related industries or processing.

- **(Processing) Residues** — a substance that is not the end product(s) that a production process directly seeks to produce; it is not the primary aim of the production process, and the process has not been deliberately modified to produce it.

- **Site** — a geographical location, logistical facilities, transmission, or distribution infrastructures with precise boundaries within which products can be mixed.

• **Sustainability and greenhouse gas emissions saving characteristics**	the set of information describing a consignment of raw material or fuel that is required for demonstrating compliance of that consignment with the sustainability and greenhouse gas emissions saving criteria for biofuels, bioliquids and biomass fuels or the greenhouse gas emission savings requirements applicable for renewable liquid and gaseous transport fuels of non-biological origin and recycled carbon fuels.
• **Waste**	a 'waste' can be understood as 'any substance or object which the Waste' shall be defined as in Article 3 (1) of the Waste Framework Directive 2008/98/EC. According to this definition 'it is something the holder discards, intends to, or is required to discard". Raw materials or substances that have been intentionally modified or contaminated to meet this definition are not covered by this definition. This means that substances which are intentionally produced or modified to count as waste (e.g., by adding waste material to a material that was not waste) do not qualify as waste. The concept of 'discarding' a material according to the WFD requires a consideration of all relevant circumstances at the point of origin of a material.
• **Wetlands**	land that is covered with or saturated by water permanently or for a significant part of the year (RED recast definition).

3. General Bonsucro EU-RED requirements

This chapter explains the scope of the Bonsucro EU-RED Standard and the relation between the Bonsucro EU-RED Standard and other Bonsucro Standards. It also specifies Bonsucro EU-RED requirements applicable to all operators which are or wish to become Bonsucro EU-RED certified (mills and supply chain operators).

3.1. Scope of the Bonsucro EU-RED Standard

The Bonsucro EU-RED Standard covers the cultivation/farming and processing of sugarcane and sugarcane derived products to produce biofuels, bioliquids and biomass fuels for use in the EU, including all related processing, transportation, and storage activities.

More specifically, it covers the cultivation and processing of sugarcane and sugarcane derived products (e.g., but not limited to bagasse, molasses) to produce the below final fuels:

A. first-generation ethanol (1G ethanol) produced by fermentation of sugarcane juice;
B. first-generation ethanol (1G ethanol) produced by fermentation of molasses;
C. second-generation ethanol (2G ethanol) produced from bagasse;
D. (solid) biomass fuels produced from bagasse.

The Bonsucro EU-RED Standard applies globally.

Agricultural residues from sugarcane cultivation are **not** in the scope of Bonsucro EU-RED. Processing waste and processing residues are **not** in the scope of Bonsucro EU-RED, **with the exception of bagasse** which is included in the scope.

3.2. Relationship between the Bonsucro Standards and the Bonsucro EU-RED Standard

The Bonsucro EU-RED Standard shall be used in conjunction with the actual valid version of the Bonsucro Production Standard, the Bonsucro Mass Balance Chain of Custody Standard, and the Bonsucro Certification Protocol. Audits of farms, mills and supply chain operators against Bonsucro EU-RED requirements may only be carried out as an **add-on** to the generic Bonsucro Standards requirements. This means that under the Bonsucro EU-RED Standard, all requirements of the other Bonsucro Standards apply and must be met.

If an economic operator is not already Bonsucro certified the Bonsucro and Bonsucro EU-RED audit process may occur simultaneously.

It is not possible to have operations certified against the Bonsucro EU-RED Standard without having a valid Bonsucro certificate in place that covers at least that same operation. Should the Bonsucro certification lapse for any reason the Bonsucro EU-RED certification shall also lapse at the same time, with the same rules in place about selling material produced while the certification was valid as in the appropriate Standard (Bonsucro Production Standard or the Bonsucro Mass Balance Chain of Custody Standard).

3.3. Audits before participation in the Bonsucro EU-RED scheme

All economic operators **physically handling** sugarcane and derived products **and taking legal ownership** shall be certified against the Bonsucro EU-RED Standard before being allowed to purchase, sell and/or claim in the Bonsucro EU-RED scheme. Economic operators seeking to continue their Bonsucro EU-RED certification shall undergo recertification prior to the expiry of their actual valid Bonsucro EU-RED certificate.

3.4. Unit of certification

In the Bonsucro Production Standard, the unit of certification is the mill and its cane supplying area. It includes all relevant activities on the farms, mill site, including residue production and power export.

The cane supply area included in the area of Bonsucro EU-RED certification comprises the farms/estates supplying cane in conformity with the Bonsucro and Bonsucro EU-RED standards. This may be 100% of the farms/estates supplying cane to the mill, or a lesser percentage. For each individual farm/estate either the full area or part thereof may comply with Bonsucro and Bonsucro EU-RED standards.
If only part of the area covered by the farms/estates supplying to the mill complies with Bonsucro and Bonsucro EU-RED standards, then only the respective percentage of the mill's production would be considered as Bonsucro EU-RED certified.

Cane supply area which is Bonsucro certified can also be Bonsucro EU-RED certified provided it meets the relevant requirements laid down in this Bonsucro EU-RED Standard. Cane supply area which is not Bonsucro certified cannot be Bonsucro EU-RED certified. Also refer to Chapter 5 (Bonsucro EU-RED Chain of Custody requirements).

The definition of the scope of the certification for Bonsucro EU-RED shall clearly identify what portion of the supply base is certified. Mass balance accounting shall ensure that no more Bonsucro EU-RED compliant material is claimed than has been produced by the Bonsucro EU-RED certified part of the supply base.

3.5. Document management system

All operators wishing to comply with Bonsucro EU-RED requirements, shall have a document management system.

Operators shall have an auditable system for safekeeping and reviewing all evidence related to the claims they make or rely on. Documentation/evidence must ensure a comprehensive link between products and documentation including but not limited to the following:

- Records of all incoming and outgoing Bonsucro EU-RED certified products, and related sustainability information;
- Records of internal processing of Bonsucro EU-RED certified products;
- Mass balance records for Bonsucro EU-RED certified material;
- Contracts related to Bonsucro EU-RED certified products;
- Copies of Bonsucro EU-RED certificates from all suppliers of Bonsucro EU-RED certified material;
- Records of internal audits.

Any evidence necessary to comply with RED recast and the Implementing Regulation 2022/996 shall be kept for a minimum of 5 years, or longer if required by the relevant national authority. Operators shall make the evidence in the system available for review (auditing).

The auditable system should be a quality system drawing on points 2 and 5.2 of Module D1 ('Quality assurance of the production process') of Annex II of the *'Decision on a common framework for the marketing of products'*[1] or justified equivalent.

Note: This requirement is an elaboration and further specification of the requirements for document management laid down in the Bonsucro Production Standard and the Bonsucro Chain of Custody Standard.

3.6. Claims on Bonsucro EU-RED compliance

Claims shall only be made about compliance with Bonsucro EU-RED Standard if the operator has been successfully assessed against the Bonsucro EU-RED requirements laid down in this Standard, and if the sugarcane derived feedstocks or products have been received from economic operators who had a valid Bonsucro EU-RED chain-of-custody certificate or valid Bonsucro EU-RED producer certificate.
Please refer to Section 7.3 for more information on 'Bonsucro EU-RED certified' claims and on claims that Bonsucro EU-RED certified operators can make when accepting and supplying material which has been certified against another EC approved voluntary scheme.

4. Additional Bonsucro EU-RED requirements for mills

4.1. General

This chapter specifies Bonsucro EU-RED requirements for mills. These requirements are additional to the generic requirements for mills laid down in the Bonsucro Production Standard. If there is a conflict between the requirements in this Bonsucro EU-RED Standard and requirements in the Bonsucro Production Standard, the Bonsucro EU-RED requirements shall take precedence.

The additional EU-RED requirements for mills specified in this chapter relate to:

1. Greenhouse gas emissions savings: the use and production of biofuels, bioliquids and biomass fuels should lead to reductions in greenhouse gas emissions compared to fossil fuels (Article 29(10) of RED recast);
2. Conservation of biodiversity: Biofuels, bioliquids and biomass fuels produced from agricultural biomass shall not be made from raw material obtained from land with high biodiversity value (Article 29(3) of RED recast);
3. Conservation of carbon stocks: Biofuels, bioliquids and biomass fuels produced from agricultural biomass shall not be made from raw material obtained from land with high carbon stock (Article 29(4) of RED recast);

[1] Decision No 768/2008/EC of the European Parliament and of the Council of 9 July 2008 on a common framework for the marketing of products, and repealing Council Decision 93/465/EEC

4. Conservation of peatlands: Biofuels, bioliquids and biomass fuels produced from agricultural biomass shall not be made from raw material obtained from peatland (Article 29(5) of RED recast).

4.2. Greenhouse gas emission savings: the use and production of biofuels, bioliquids and biomass fuels should lead to reductions in greenhouse gas emissions compared to fossil fuels (requirements for mills)

Indicator EU 1.1: Options for the greenhouse gas criterion for biofuels, bioliquids and biomass fuels (mills)

Mills shall use one of the following options for the greenhouse gas criterion for biofuels, bioliquids and biomass fuels:

a. Use of a default value for greenhouse gas emission saving if the production pathway is laid down in Part A or B of Annex V of RED recast for biofuels and bioliquids and in Part A of Annex VI of RED recast for biomass fuels. Default values can only be applied if the e_l value for those biofuels or bioliquids calculated in accordance with point 7 of Part C of Annex V of RED recast and for those biomass fuels calculated in accordance with point 7 of Part B of Annex VI of RED recast is equal or less than zero (e_l are annualised emissions from carbon stock changes caused by land-use change)
b. Use of actual greenhouse gas values to calculate total greenhouse gas savings according to the EU-RED methodology and specified in Part C of Annex V of RED recast for biofuels and bioliquids and in Part B of Annex VI of RED recast for biomass fuels;
c. For biofuels and bioliquids, use of a value calculated as the sum of the formulas referred to in point 1 of Part C of Annex V of RED recast, where disaggregated default values in Part D or E or Annex V of RED recast may be used for some factors and actual value, calculated in accordance with the methodology laid down in Part C of Annex V of RED recast, are used for all other factors;
d. For biomass fuels, use of a value calculated as the sum of the formulas referred to in point 1 of Part B of Annex VI of RED recast, where disaggregated default values in Part C of Annex VI of RED recast may be used for some factors, and actual values, calculated in accordance with the methodology laid down in Part B of Annex VI of RED recast, are used for all other factors.

Detailed requirements and guidance on the use of default values and actual values have been elaborated in Annex 1 of this Standard.

4.3. Conservation of biodiversity: Biofuels, bioliquids and biomass fuels produced from agricultural biomass shall not be made from raw material obtained from land with high biodiversity value

Indicator EU 2.1: Primary forest and other wooded land

Biofuels, bioliquids and biomass fuels produced from agricultural biomass shall not be made from raw material obtained from land that was primary forest or other wooded land in or after January 2008, whether or not the land continues to have that status.

Primary forest and other wooded land are defined as forest and other wooded land of native species, where there is no clearly visible indication of human activity, and the ecological processes are not significantly disturbed.

Indicator EU 2.2: Highly biodiverse forest and other wooded land

Biofuels, bioliquids and biomass fuels produced from agricultural biomass shall not be made from raw material obtained from land that was highly biodiverse or other wooded land in or after January 2008, whether or not the land continues to have that status.

Highly biodiverse forest and other wooded land is defined forest and other wooded land which is species-rich and not degraded, or has been identified as being highly biodiverse by the relevant
competent authority unless evidence is provided that the production of that raw material did not interfere with those nature protection purposes.

The definitions of 'degraded' and 'species-rich' included in Commission Regulation (EU) No 1307/2014 shall be applied in the context of this indicator.

Indicator EU 2.3: Protected areas

Biofuels, bioliquids and biomass fuels produced from agricultural biomass shall not be made from raw material obtained from land that was a protected area in or after January 2008, whether or not the land continues to have that status.

This includes areas designated:

a) by law or by the relevant competent authority for nature protection purposes; or
b) for the protection of rare, threatened, or endangered ecosystems or species recognised by international agreements or included in lists drawn up by intergovernmental organisations or the International Union for the Conservation of Nature, subject to their recognition in accordance with the second subparagraph of Article 30(4) of RED recast.

An exception is possible if evidence is provided that the production of that raw material did not interfere with those nature protection purposes.

Indicator EU 2.4: Highly biodiverse grassland

Biofuels, bioliquids and biomass fuels produced from agricultural biomass shall not be made from raw material obtained from land that was highly biodiverse grassland spanning more than one hectare in or after January 2008, whether or not the land continues to have that status.

Highly biodiverse grassland is defined as:

a) natural, namely grassland that would remain grassland in the absence of human intervention and which maintains the natural species composition and ecological characteristics and processes; or
b) non-natural, namely grassland that would cease to be grassland in the absence of human intervention and which is species-rich and not degraded and has been identified as being highly biodiverse by the relevant competent authority, unless evidence is provided that the harvesting of the raw material is necessary to preserve its status as highly biodiverse grassland.

Where land remains grassland, or would have remained grassland in the absence of human intervention, the auditor shall assess whether the grassland maintains, or would have maintained in the absence of human intervention, the natural species composition and ecological characteristics and processes. Where that is the case, the land shall be considered as being, or having been, natural, highly biodiverse grassland. Where grassland has already been converted to arable land and it is not possible to assess the characteristics of the land itself through information available from the national competent authorities or satellite imagery, the auditor shall consider such land as not having been highly biodiverse grassland at the moment of conversion.

In the context of this requirement the definitions in Chapter 2 for 'grassland', 'human intervention', 'degraded' and 'species rich' apply. These are the definitions laid down in Regulation (EU) No 1307/2014.

Economic operators shall provide evidence that the harvesting of the raw material is necessary to preserve the highly biodiverse grassland status and that management practices do not present a risk of causing biodiversity decline of the grassland.

Where economic operators are unable to provide the evidence referred to in the second subparagraph, they shall provide evidence that they have been granted permission by the relevant competent authority, or designated agency, to harvest the raw material in order to preserve the highly biodiverse grassland status.

The technical assessment of the land shall be conducted by a qualified specialist who is external and independent of the activity being audited and free from conflict of interest, and who may be part of the audit team. The assessment and its result shall be reviewed as part of the audit.

Chapter 6 specifies requirements for audits and experts on highly biodiverse grasslands.

4.4. Conservation of carbon stocks: Biofuels, bioliquids and biomass fuels produced from agricultural biomass shall not be made from raw material obtained from land with high carbon stock

Indicator EU 3.1: Wetlands

Biofuels, bioliquids and biomass fuels produced from agricultural biomass shall not be made from raw material obtained from land that was wetland in January 2008 and no longer has that status.

A wetland is land that is covered with or saturated by water permanently or for a significant part of the year. Evidence of verification should reflect seasonal changes within a year.

These provisions shall not apply if, at the time the raw material was obtained, the land had the same status as it had in January 2008.

Indicator EU 3.2: Continuously forested areas

Biofuels, bioliquids and biomass fuels produced from agricultural biomass shall not be made from raw material obtained from land that was continuously forested in January 2008 and no longer has that status.

Continuously forested areas are defined as land spanning more than one hectare with trees higher than five metres and a canopy cover of more than 30%, or trees able to reach those thresholds in situ.
Continuously forested areas do not include land that is predominantly under agricultural or urban land use. In this context, agricultural land use refers to tree stands in agricultural production systems, such as fruit tree plantations, oil palm plantations and agroforestry systems when crops are grown under tree cover.

These provisions shall not apply if, at the time the raw material was obtained, the land had the same status as it had in January 2008.

Indicator EU 3.3: Forested land with 10-30% canopy cover

Biofuels, bioliquids and biomass fuels shall not be made from raw material obtained from land that was forested with 10-30% canopy cover in January 2008 and no longer has that status.

Forested areas with 10-30% canopy cover are defined as land spanning more than one hectare with trees higher than five metres and a canopy cover of between 10% and 30%, or trees able to reach those thresholds in situ, unless evidence is provided that the carbon stock of the area before and after conversion is such that, when the methodology laid down in part C of Annex V of RED recast is applied, the greenhouse gas threshold as specified in Section 1 of Annex I would still be fulfilled.

These provisions shall not apply if, at the time the raw material was obtained, the land had the same status as it had in January 2008.

4.5. Conservation of peatlands: Biofuels, bioliquids and biomass fuels produced from agricultural biomass shall not be made from raw material obtained from peatland

Indicator EU 4.1: Peatland

Biofuels, bioliquids and biomass fuels produced from agricultural biomass shall not be made from raw material obtained from land that was peatland in January 2008.

An exception is possible if evidence is provided that the cultivation and harvesting of that raw material does not involve drainage of previously undrained soil. For peatland that was partially drained in January 2008, a subsequent deeper drainage, affecting soil that was not fully drained, would constitute a breach of the criterion.

5. Additional Bonsucro EU-RED requirements for the supply chain

5.1. General

This chapter specifies Bonsucro EU-RED requirements for the supply chain. These requirements are additional to the generic requirements for the supply chain laid down in the Bonsucro Mass Balance Chain of Custody. If there is a conflict between the specific Bonsucro EU-RED requirements specified in this chapter and the requirements laid down in the Bonsucro Mass Balance Chain of Custody Standard, the Bonsucro EU-RED requirements shall take precedence.

The additional EU-RED requirements for the supply chain specified in this chapter relate to:

- General EU-RED mass balance requirements (5.2);
- Validating and reconciling Bonsucro EU-RED data (5.3);
- Greenhouse gas requirements (5.4);
- Requirements for Bonsucro EU-RED certification of bagasse (5.5).

5.2. General mass balance requirements

Bonsucro follows a mass balance approach for tracing Bonsucro EU-RED certified material in the supply chain, ensuring that at every point in the supply chain volumes of Bonsucro EU-RED certified outputs match volumes of Bonsucro EU-RED certified inputs.
In mass balance the volume of Bonsucro EU-RED certified output is balanced with a physical volume of Bonsucro EU-RED certified input. This allows the tracing of Bonsucro EU-RED certified material along the entire supply chain from field to mill (including transportation), through various steps of production (for example conversion processing, manufacturing, transformation) to warehousing, transportation and trade up to and including the end product manufacturer.
The mass balance system operates at a level where consignments could normally be in contact, such as a container, processing or logistical facility or site.

More specifically, the Bonsucro EU-RED mass balance system follows the definition and the requirements as specified in Article 30(1) of RED recast and Articles 2(17) and 19 of the Implementing Regulation 2022/996, i.e., a mass balance system which:

a) Allows consignments of raw materials or fuels with differing sustainability and greenhouse gas emission saving characteristics to be mixed for instance in a container, processing or logistical facility or site;

b) Allows consignments of raw material with differing energy content to be mixed for the purposes of further processing, provided that the size of consignments is adjusted according to their energy content. ('further processing' in practice means further processing at the fuel production plant for the purpose of producing biofuels, bioliquids or biomass fuels);
c) Requires information about the sustainability and greenhouse gas emissions saving characteristics and sizes of the consignments referred to in point (a) to remain assigned to the mixture; and
d) 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 and requires that this balance be achieved over an appropriate period of time.

In the Bonsucro EU-RED mass balance system, the transfer of sustainability characteristics must always be accompanied by a physical transfer of material.

For mass balance the Bonsucro EU-RED chain of custody (EU-RED ChoC) requirements laid down in this chapter shall apply to every economic operator throughout the supply chain including farms and mills, that:

- takes legal ownership, and
- physically handles Bonsucro certified products at a location under the control of an economic operator including outsourced contractors.

After the end product manufacturer, when the product has been put in its final form and package there is no further requirement for chain of custody certification. This means that retailers and distributors of finished products do not need chain of custody certification.

The Bonsucro EU-RED ChoC requirements do not allow credit trading of EU-RED compliant material.

Indicator EU 5.1: Overall management responsibility

The economic operator shall establish and document its commitment to implement and maintain the Bonsucro EU-RED ChoC requirements. The commitment of the economic operator shall be made available to its personnel, suppliers, clients, and other stakeholders.

Indicator EU 5.2: Procedures

The economic operator shall have written procedures and/or work instructions or equivalent to ensure the implementation of all elements of the Bonsucro EU-RED ChoC requirements. This shall include at minimum the following:

- Complete and up to date procedures covering the implementation of all the elements of the supply chain model requirements.
- Complete and up to date records and reports that demonstrate compliance with the supply chain model requirements (including training records).
- Identification of the role of the person(s) having overall responsibility for and authority over the implementation of these requirements and compliance with all applicable requirements.

This person(s) shall be able to demonstrate awareness of the economic operator's procedures for the implementation of this standard.

Indicator EU 5.3: Record keeping and reporting to EC

The economic operator shall maintain accurate, complete, up-to-date, and accessible records and reports covering all aspects of the Bonsucro EU-RED ChoC requirements. Retention times for all records and reports shall be a minimum of five (5) years, or longer where it is required by the relevant national authority.

This includes e.g., but is not limited to purchase and sales documents, production records and volume summaries, records of internal procedures and changes thereof, records on training of personnel, records of internal audits. The system for recording data and documents (e.g., software) shall be adequate to the complexity of the economic operator, and be auditable for third parties

Economic operators shall make available to the European Commission and to the competent authorities of the Member States all information needed to fulfil their tasks under RED recast in line with Article 17 of the Implementing Regulation 2022/996[2] on sustainability certification.

Economic operators shall enter all requested information in the Union database. The Union database can be found at: UNION Database Home – UNION Database – EC Extranet Wiki. Also refer to Section 7.6. [hyperlink yet to be included]

Indicator EU 5.4: Training

The economic operator shall have a training plan covering Bonsucro EU-RED ChoC requirements, which is subject to on-going or at least annual review. Appropriate training shall be provided by the economic operator for personnel carrying out the tasks critical to the effective implementation of the EU-RED ChoC requirements. Training shall be specific and relevant to the task(s) performed. Records of participants and content shall be maintained.

Indicator EU 5.5: Internal audits

The economic operator shall conduct an annual internal audit to determine whether the organization:

- Conforms to the requirements in the Bonsucro EU-RED ChoC Standard.
- Effectively implements and maintains the standard requirements within its organisation. Any non-conformities found as part of the internal audit shall be the basis for corrective actions to be taken. The outcomes of the internal audits and all actions taken to correct nonconformities shall be subject to management review at least annually. The economic operator shall maintain the internal audit records and reports.
- Corrective actions taken as a result of any nonconformities identified in the internal audit shall be documented, including dates and descriptions of actions taken to resolve them.

The procedure for the annual internal audit process shall be documented.

[2] Article 17 of the Implementing Regulation 2022/996 specifies i.e. the obligation which Member States have in supervising voluntary schemes, certification bodies and sustainability information.

Indicator EU 5.6: Defining the unit of certification

Under Bonsucro EU-RED ChoC an economic operator has two options for its chosen unit of certification. These are:

1. Single site: a single functional part of an economic operator's operations or a combination of parts situated at one locality, e.g., sugarcane mill, terminal, food processing, storage, tanks.

2. Multi-site: More than one location either within a single legal entity or across legal entities that are related via an ownerships structure (e.g., common holding company). The following conditions apply
   a) Each site in a multi-site certificate shall maintain its own mass balance calculations and records. Mass Balance volumes shall not be transferred between sites.
   b) Multi-site as a unit of certification for facilities that do any processing or transformation is not permitted. Multi-site certification of mills is not permitted.
   c) Multi-site auditing for storage/tanks or any other holding facility is permitted, provided that the sites follow a common Internal Control System (ICS) and that the Central Office is always subject to audit.
   d) One site shall be designated as responsible for maintaining the central administration of the ChoC requirements including the individual site mass balance accounting using an Internal Control System (ICS). This site is designated as the Central Office.

The economic operator shall define and document its unit(s) of certification.

If more than one legal entity operates on a site, then each legal entity shall operate its own mass balance and comply with all Bonsucro EU-RED ChoC requirements.

In the case of multi-site certification, the economic operator shall define and document the legal entities and sites covered by the multi-site Bonsucro EU-RED ChoC certificate, including details on the site designated as the Central Office for administering Bonsucro EU-RED ChoC data. The relationship between the sites shall be described and documented. The economic operator shall document any changes that may occur in the scope of the unit(s) of certification and notify its certification body at least one week before the change goes into effect.

Under Bonsucro EU-RED it is required that all sites which are part of the multi-site certificate are individually audited.

Indicator EU 5.7: Outsourcing activities

In cases where a Bonsucro EU-RED ChoC certified economic operator outsources activities to independent third parties, the certified economic operator shall ensure that the independent third party complies with the Bonsucro EU-RED ChoC requirements.

Examples of outsourced activities under this requirement include storage or transport of Bonsucro certified product(s) by a third party on behalf of the certified economic operator, where the certified economic operator remains the legal owner of the product(s). This requirement is not applicable to outsourced storage facilities where the management of the

Bonsucro certified product(s) and instructions for tank movements are controlled by the certified economic operator (not the tank farm manager).

It is not required to list the contractors performing outsourced activities on the certificate of the Bonsucro certified economic operator. The list of contractors performing outsourced activities shall be specified in the audit report with its respective activities.

A Bonsucro EU-RED certified economic operator which includes outsourcing within the scope of their Bonsucro EU-RED ChoC certificate shall ensure the following:

- The certified economic operator has legal ownership of all input material to be included in outsourced processes;
- The certified economic operator has an agreement or contract covering the outsourced process with each contractor through a signed and enforceable agreement with the contractor. The certified economic operator shall ensure that its certification body has access to the outsourcing contractor or operation if an audit is deemed necessary, including all necessary documentation. If this is not possible, the outsourced contractor shall obtain a Bonsucro EU -RED ChoC certificate independently.
- The economic operator has a documented control system with explicit procedures for the outsourced process which is communicated to the relevant contractor.
- The economic operator shall record the names and contact details of all contractors used for the processing or physical handling of Bonsucro EU-RED certified products. An up to date record shall be made available to the economic operator's certification body at its next audit.

5.3. Validating and reconciling Bonsucro EU-RED data

Indicator EU 6.1: Verification of Bonsucro EU-RED status of the supplier

The receiving economic operator shall verify the current Bonsucro EU-RED status of the supplier at the time of the purchase. No incoming material certified under other schemes can be considered as Bonsucro EU-RED compliant. Incoming material which does not comply with the Bonsucro EU-RED Standard and/or is from a supplier that is not Bonsucro EU-RED certified shall not be considered as Bonsucro EU-RED compliant.

This requirement includes checking the validity of the supplier's Bonsucro EU-RED ChoC certificate. All Bonsucro EU-RED certified entities and certificate numbers are displayed on the Bonsucro website. In cases of uncertainty, the Bonsucro secretariat must be contacted for clarification. No incoming material certified under other schemes can be considered as Bonsucro EU-RED compliant.

Indicator EU 6.2: Verification of data of the incoming Bonsucro EU-RED certified product

The receiving economic operator shall verify that the supplier contract, invoice and/or supporting documentation, including associated sustainability characteristics of consignments of Bonsucro EU-RED certified products meet the following requirements:

- Numbered proof of sustainability showing compliance with the Bonsucro EU-RED requirements and referring to the supplier's valid Bonsucro EU-RED certificate.

- Specification of original raw material or intermediary product: sugarcane, sugarcane juice, sugarcane bagasse. In case of fuel: specification of fuel type.
- Specification of sugar (sugar content in % sucrose), or specification of ethanol (alcohol content in % v/v) or for any other derived products the appropriate measure of purity.
- Country of origin of the sugarcane, i.e., the country where the sugar cane was grown.
- Country of fuel production (for fuels only).
- Date when biofuel, bioliquid or biomass fuel installation started operations. This refers to the date on which the installation that produces the biofuels, bioliquids of biomass fuels first became operational. The term 'installation' includes any processing installation used in the sugar, sugarcane, ethanol, or bagasse biomass fuel production process. This does not include production facilities that might have been intentionally added to the production chain only to qualify for the exemption foreseen in this provision.
- Statement on whether the raw material, intermediary product or fuel complies with the sustainability requirements in Article 29(2) to (7) of RED recast.
- Whenever actual GHG values are used, the actual GHG values in kg $CO_{2\text{-eq}}$ per dry tons (sugarcane, sugar, bagasse, and other intermediary products) or g $CO_{2\text{-eq}}$ per MJ (biofuel or biomass fuel: bioethanol, bagasse pellets) calculated according to the Annex V of RED recast (biofuels) or annex VI of RED recast (biomass fuels). See also Annex I of this Standard for more details.
- Accurate data on all relevant elements of the GHG emission calculation formula (i.e., e_{ec}, e_{sca} e_l, e_p and e_{td}) See also Annex 1 for more details.
- If at any point in the chain of custody emissions have occurred and are not recorded, so that the calculation of an actual value is no longer feasible for operators downstream in the chain of custody, this must be clearly indicated in the delivery notes.
- Whenever default GHG values are used, the mention of the words 'default value', with the exception of bioethanol producer, who shall indicate the default value as per RED recast Annex V or RED recast Annex VI and the corresponding GHG savings, compared to the fossil reference.
- Information on support which has been received for the production of the fuel or fuel precursor and if so, the type of support (e.g., government subsidies or tax benefits). This requirement is only applicable if support has been received.

The above data shall be transmitted through the whole supply chain. In addition, the receiving operator shall verify the following transaction data:

- Supplier company name and address;
- Date of (physical) loading;
- Place of (physical) loading;
- The mass (kg or tonnes) or volume (litres or m^3). For fuels, the energy quantity of the fuel must also be included. For the calculation of the energy quantity, conversion factors in Annex III of RED recast must be used.

All the data shall be entered into the receiving economic operator's administrative system within one month of taking ownership.

The transfer of sustainability characteristics must always be accompanied by a physical transfer of material. In case of discrepancies between the documentation and the material

received, the receiving economic operator shall contact its supplier and require for data correction. Corrected data shall be received and entered into the receiving economic operator's administrative system before sustainability data is passed on to the next economic operator.

Multiple receipts with common supplier and with identical Bonsucro EU-RED sustainability characteristics may administratively be combined as one batch for reporting purposes.

Indicator EU 6.3: Conversion rates

A conversion rate describes the change in quantity of a specific material that occurs due to processing of the respective material at a specific site. Conversion rates and the resulting changes of quantities shall be site-specific and specific for a defined feedstock/product conversion. Conversion rates shall be based on actual data (e.g., processing or production data). The output weight or volume after conversion shall be expressed as 100% sucrose or ethanol equivalents.

Conversion rates used shall be documented and are subject to verification during the audit.

Conversion rates shall be provided by any economic operator that modifies its inputs in any way.

In the case of multi-site certification, the designated Central Office shall keep records of conversion rates realized at each site included in the multi-site certificate and for all products processed on those sites.

Indicator EU 6.4: Mixing of Bonsucro certified products with products which are fungible with sugarcane-derived products

In every case where a batch of Bonsucro EU-RED certified product was physically mixed with other products which are fungible with sugarcane-derived products, the Bonsucro EU-RED data may be allocated to any physical consignment taken from that batch, provided that input and output of Bonsucro EU-RED data match (no overclaiming of Bonsucro EU-RED data).
Fungible products are products which belong to the same product group as sugarcane-derived products, meaning that they have the same physical or chemical characteristics, heating values and/or conversion factors. For example: ethanol from corn is fungible with ethanol from sugarcane, as these products have the same characteristics and can be mixed without losing their original characteristics. For example, biodiesel is not fungible with sugarcane ethanol.

If Bonsucro EU-RED certified biofuels, bioliquids or biomass fuels are blended with fossil fuels, the information about the sustainability and GHG emissions saving characteristics assigned to the blend shall correspond to the physical share of the biofuel, bioliquids or biomass fuels in the blends. For biofuels and bioliquids, EU Member States may further check the veracity of this information in accordance with Article 23 of the Implementing Regulation 2022/996.

Indicator EU 6.5: Supply of Bonsucro EU-RED certified product

The economic operator shall ensure that the delivery contract, invoice and/or supporting documentation, including associated sustainability characteristics of consignments of Bonsucro EU-RED certified products meet the following requirements:

- Numbered proof of sustainability showing compliance with the Bonsucro EU-RED requirements and referring to the supplier's valid Bonsucro EU-RED certificate.
- Specification of original raw material or intermediary product: sugarcane, sugarcane juice, sugarcane bagasse. In case of fuel: specification of fuel type.
- Specification of sugar (sugar content in % sucrose), or specification of ethanol (alcohol content in % v/v) or for any other derived products the appropriate measure of purity.
- Country of origin of the origin, i.e., the country where the sugar cane was grown.
- Country of fuel production (for fuels only).
- Date when biofuel, bioliquid or biomass fuel installation started operations. This refers to the date on which the installation that produces the biofuels, bioliquids of biomass fuels first became operational. The term 'installation' includes any processing installation used in the sugar, sugarcane, ethanol, or bagasse biomass fuel production process. This does not include production facilities that might have been intentionally added to the production chain only to qualify for the exemption foreseen in this provision.
- Whenever actual GHG values are used, the actual GHG values in kg $CO_{2\text{-eq}}$ per dry tons (sugarcane, sugar, bagasse, and other intermediary products) or g $CO_{2\text{-eq}}$ per MJ (biofuel or biomass fuel: bioethanol, bagasse pellets) calculated according to the Annex V of RED recast (biofuels) or Annex VI of RED recast (biomass fuels). See also Annex I of this Standard for more details.
- Accurate data on all relevant elements of the GHG emission calculation formula (i.e. e_{ec}, e_{sca}, e_l, e_p, e_{td} and e_{sca}). See also Annex 1 for more details.
- If at any point in the chain of custody emissions have occurred and are not recorded, so that the calculation of an actual value is no longer feasible for operators downstream in the chain of custody, this must be clearly indicated in the delivery notes.
- Whenever default GHG values are used, the mention of the words 'default value', with the exception of bioethanol producer, who shall indicate the default value as per RED recast Annex V or RED recast Annex VI and the corresponding GHG savings, compared to the fossil reference.
- Statement on whether the raw material, intermediary product or fuel complies with the criteria set out for low indirect land-use change-risk biofuels.
- Information on support which has been received for the production of the fuel or fuel precursor and if so, the type of support (e.g., government subsidies and tax benefits). This requirement is only applicable if support has been received.

If the consignment was processed by the supplier, the supplier shall adjust the sustainability and greenhouse gas emissions saving characteristics of the consignment and assign these to the output consignment in accordance with the following rules:

a. when the processing of a consignment of raw material yields only one output that is intended for the production of biofuels, bioliquids or biomass fuels, the size of the consignment and the related quantities of sustainability and greenhouse gas emissions saving characteristics shall be adjusted applying a conversion factor representing the ratio

between the mass of the output that is intended for such production and the mass of the raw material entering the process;

b. when the processing of a consignment of raw material yields more than one output that is intended for the production of biofuels, bioliquids or biomass fuels, for each output a separate conversion factor shall be applied, and a separate mass balance shall be used.

The above data shall be transmitted through the whole supply chain. In addition, the supplying operator shall supply and document the following information:

- Receiving company name and address
- Date of (physical) loading;
- Place of (physical) loading;
- The mass (kg or tonnes) or volume (litres or m^3). For fuels, the energy quantity of the fuel must also be included. For the calculation of the energy quantity, conversion factors in Annex III of RED recast must be used.

All the data shall be entered into the supplier's administrative system within one month of transfer of ownership.

Indicator EU 6.6: Inventory periods

The economic operator shall undertake inventories of the input/output balance of the Bonsucro EU-RED certified product at fixed regular intervals, for each operation site. The appropriate period of time for achieving the mass balance shall be 12 months for mills and three months for all other economic operators.

The start and end of the period shall be aligned with the calendar year or, where applicable, the four quarters of the calendar year. As an alternative to the calendar year, economic operators may also use the economic year that they use for bookkeeping purposes provided that the choice is clearly indicated and applied consistently.

Fixed inventory periods shall be continuous in time, i.e., gaps between inventory periods shall not occur. During any periods without movement of Bonsucro EU-RED certified material mass balances shall be kept.

The inventory periods for the certification period shall be clearly documented at the beginning of the certification term by the economic operator and shall be verified during the audit. For each inventory period a mass balance calculation including sustainability data transfer to the next period (carry over) must be documented and provided during the audit. The inventory shall be undertaken at individual site level.

Indicator EU 6.7: Balancing Bonsucro EU-RED volumes during and between inventory periods

The volume of Bonsucro EU-RED certified product received shall be greater than or equal to the volume of Bonsucro EU-RED certified product supplied to clients over a fixed inventory period of maximum three months.

Where the balance of inputs and outputs is positive at the end of economic operator's inventory period, sustainability data for the positive balance may be carried into the next inventory period.

This is called carry over. Carry over is only possible from one inventory period to the next if at least the equivalent amount of physical material is in stock in the container, processing or logistical facility or site, as registered in the sustainability data stated in the bookkeeping records. This means it is not possible to have more carry over into the next inventory period than the quantity that is physically in stock at the end of any inventory period.

Note: The Bonsucro Mass Balance ChoC Standard allows to carry over more sustainability data than there is physical material in stock at the end of any given inventory period. This is not allowed under Bonsucro EU-RED requirements.

Indicator EU 6.8: Expiration of Bonsucro sustainability data

Bonsucro EU-RED sustainability data entered into an economic operator's mass balance system shall no longer be attached to outgoing consignments after one year from the date of entry into the system. Carry over is to be adjusted downward to reflect any expiring date of the material. If the economic operator's Bonsucro EU-RED ChoC certificate is no longer valid, any remaining sustainability data in the economic operator's administrative system becomes invalid.

Indicator EU 6.9: Attribution of Bonsucro EU-RED sustainability characteristics

Whenever multiple sugarcane-derived products are produced at a given step in the sugarcane supply chain (e.g., mill), Bonsucro EU-RED sustainability characteristics shall be attributed to all materials equally with the exception of GHG emissions which shall be allocated on an energy basis (refer to Annex 1).

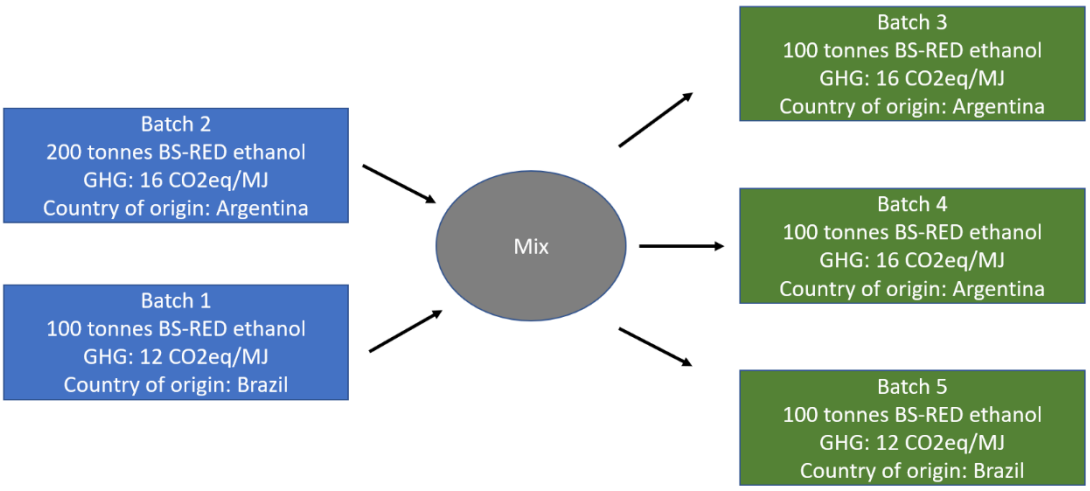
All the sugarcane-derived products produced at a given step shall carry the same sustainability characteristics, in line with the mass balance of entering Bonsucro or Bonsucro EU-RED compliant product (i.e., percentage of Bonsucro/Bonsucro EU-RED entering material + conversion factors). Examples of multiple products include, juice and bagasse following the crushing of sugarcane, sugar following the processing of sugarcane juice and ethanol and vinasse following the fermentation of cane juice.

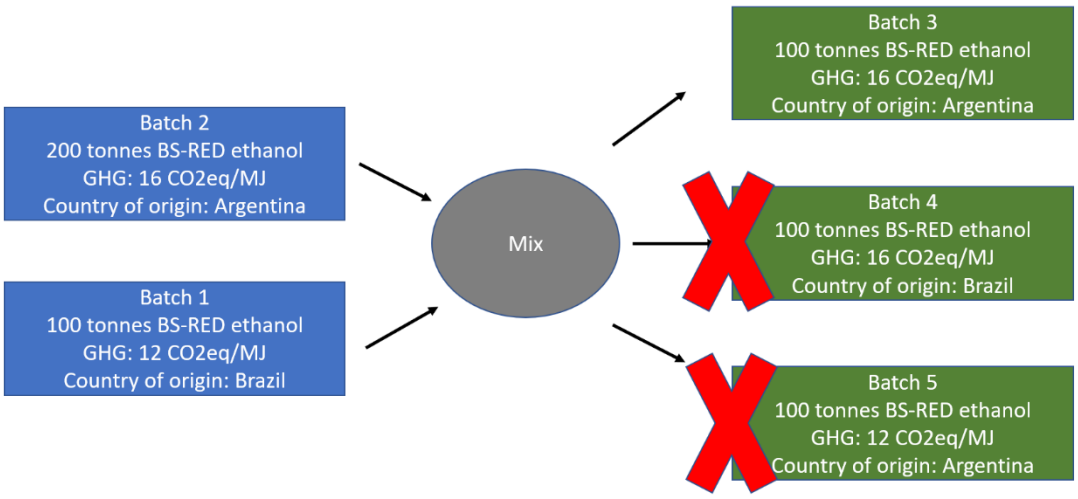
The below examples contain key requirements for attribution of Bonsucro EU-RED sustainability characteristics.

Examples of Attribution of Bonsucro EU-RED Sustainability Characteristics

Example 1: Sets of sustainability characteristics

The sustainability and GHG emissions savings characteristics of a consignment of raw material or fuel shall be considered as a set. Where consignments are withdrawn from a mixture, any of the sets of sustainability characteristics may be assigned to them provided that the sets of sustainability and GHG emissions saving characteristics are not split and the mass balance is achieved over the appropriate period of time. In the first graphic below, the sets of sustainability characteristics are maintained, which is correct. In the second graphic, the sustainability characteristics of both batches going into the batch are split in the outgoing batch 4 and 5. This is not allowed.


Batch 2
200 tonnes BS-RED ethanol
GHG: 16 CO2eq/MJ
Country of origin: Argentina
Batch 1
100 tonnes BS-RED ethanol
GHG: 12 CO2eq/MJ
Country of origin: Brazil
Mix
Batch 3
100 tonnes BS-RED ethanol
GHG: 16 CO2eq/MJ
Country of origin: Argentina
Batch 4
100 tonnes BS-RED ethanol
GHG: 16 CO2eq/MJ
Country of origin: Argentina
Batch 5
100 tonnes BS-RED ethanol
GHG: 12 CO2eq/MJ
Country of origin: Brazil


Batch 2
200 tonnes BS-RED ethanol
GHG: 16 CO2eq/MJ
Country of origin: Argentina
Batch 1
100 tonnes BS-RED ethanol
GHG: 12 CO2eq/MJ
Country of origin: Brazil
Mix
Batch 3
100 tonnes BS-RED ethanol
GHG: 16 CO2eq/MJ
Country of origin: Argentina
Batch 4
100 tonnes BS-RED ethanol
GHG: 16 CO2eq/MJ
Country of origin: Brazil
Batch 5
100 tonnes BS-RED ethanol
GHG: 12 CO2eq/MJ
Country of origin: Argentina

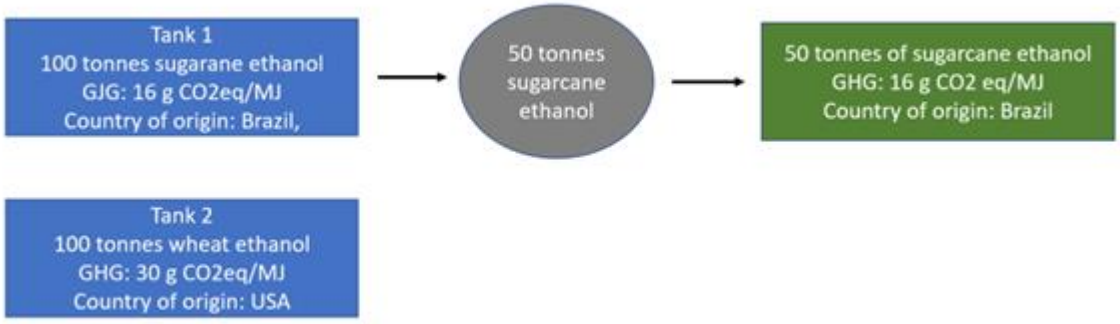
Example 2: Separate sustainability declarations for sugarcane ethanol and wheat ethanol which are not part of a mixture

A consignment of 100 tonnes ethanol from sugarcane and a consignment of 100 tonnes of ethanol from wheat are physically separated at one facility, e.g. in separate tanks.

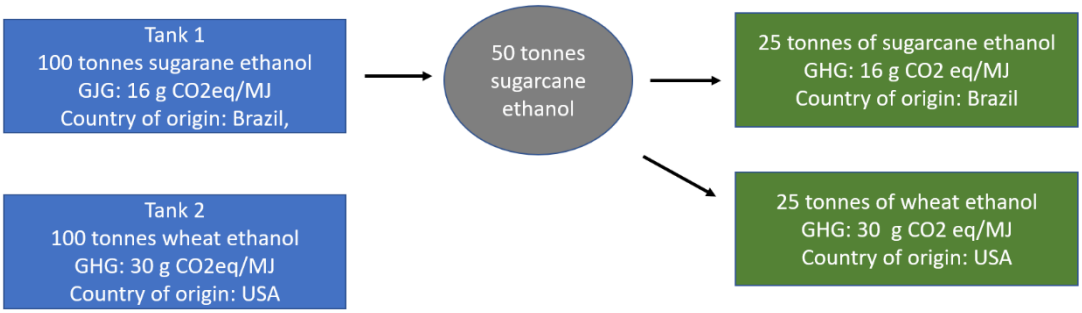
Both ethanol produced from sugarcane and from wheat are final fuels and are physically identical. It is therefore allowed to flexibly allocate sustainability characteristics from the physically separated consignments to outgoing products, as long as the net mass balance requirement is met.

This has been illustrated in the schematic below:

Option 1: Allocate sustainability characteristics based on the physical consignment from which the batch was taken.



Option 2: Allocate sustainability characteristics between physically separated consignments of final fuels, as long as the net overall mass balance requirement is met.



Example 3: Physical mix of BS EU-RED ethanol (sugarcane) and ISCC EU ethanol (wheat)

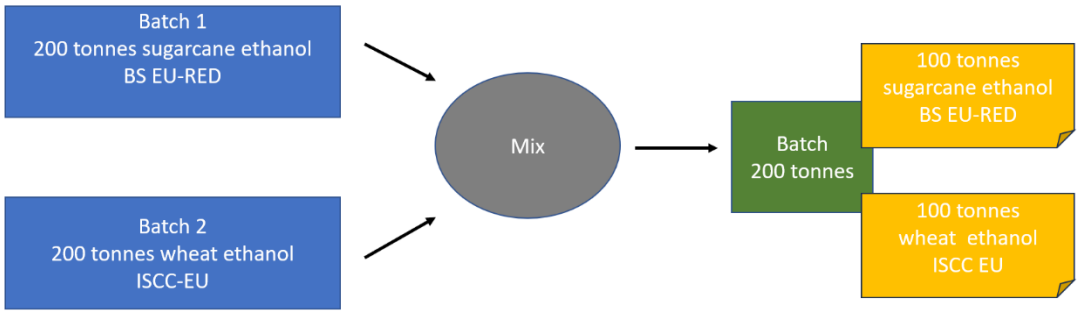
200 tonnes of Bonsucro EU-RED certified ethanol produced from sugarcane is physically mixed with 200 tonnes of ISCC EU certified ethanol produced from wheat. From this mixture, a consignment of 200 tonnes of ethanol is taken and supplied to a third party.

There are two options to allocate sustainability characteristics to the consignment taken from the mixture:

Option 1: The sustainability characteristics are allocated based on the share of biofuels in the mixture. This means that the following two sustainability declarations have to be issued:

- One sustainability declaration for 100 tonnes of Bonsucro EU-RED certified ethanol with sugarcane as raw material, AND
- One sustainability declaration for 100 tonnes of ISCC-EU certified ethanol with wheat as raw material.

As illustrated below:

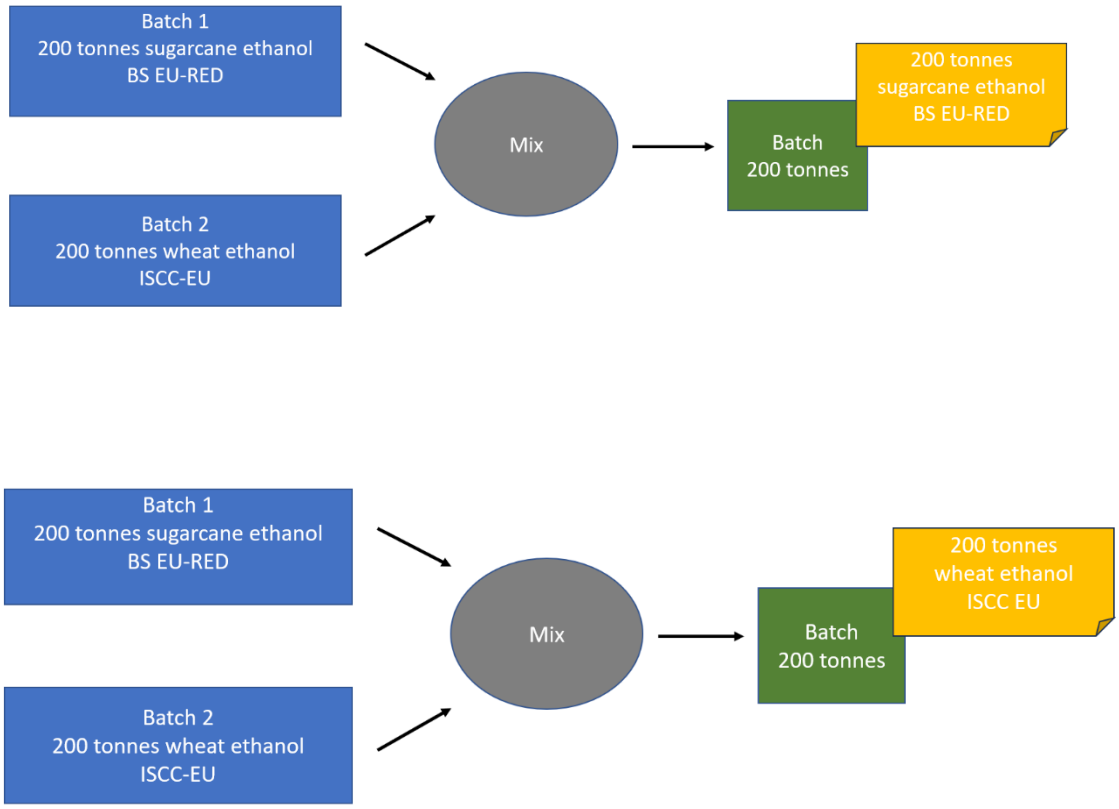


Option 2: The sustainability characteristics are not allocated based on the share of biofuels in the mixture. In this case, any of the sets of sustainability characteristics in the mixture may be assigned to the consignment provided that the sets of sustainability and GHG emissions saving characteristics are not split and the mass balance is achieved over the appropriate period of time.

The sustainability declaration could be the following:

- One sustainability declaration for 200 tonnes of Bonsucro EU-RED certified ethanol with sugarcane as raw material, OR
- One sustainability declaration for 200 tonnes of ISCC-EU certified ethanol with wheat as raw material.

As illustrated below:



Example 4: Allocating sustainability characteristics when extracting juice from sugarcane

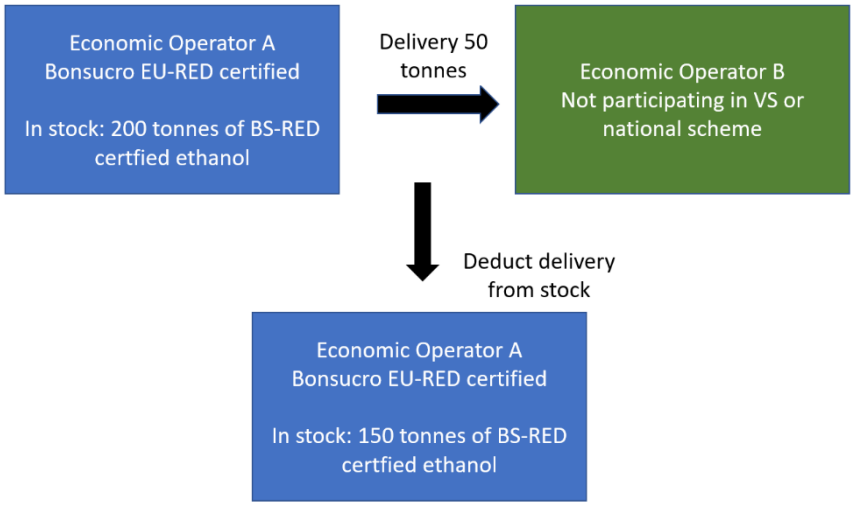
When juice is extracted from sugarcane in a mill, the sustainability characteristics of the sugarcane shall be allocated to the juice as this is the primary (intermediate) product of the mill. Under the RED recast bagasse is considered a processing residue, and the mill is the point of origin where the residue first arises

Relevant sustainability characteristics that shall be allocated to the juice include information on compliance with the land use criteria, the country where the cane was grown, and the greenhouse gas emissions associated with the growing of the cane (eec, potentially esca). Also, the greenhouse gas emissions related to the juice extraction process (ep) shall be allocated to the juice.

As the mill is the point of origin where the bagasse arises, no sustainability characteristics shall be allocated to the bagasse at this point in the supply chain. However, the auditor shall confirm during its audit that the material is indeed bagasse and is not other material that has been intentionally modified to qualify as bagasse (refer to Section 5.5).

Example 5: Deliveries to non-certified operators

If a batch of sugarcane, sugarcane derived products, biofuel or biomass fuel is delivered to an economic operator that is not participating in a voluntary scheme or national scheme, the delivery shall be reflected in the mass balance by withdrawing an equivalent quantity of sugarcane, sugarcane derived products, biofuel, or biomass fuel. The type of material to be booked out shall correspond to the physical nature of the material delivered. This has been illustrated below.



Indicator EU 6.10: Carry over volumes of Bonsucro EU-RED ChoC certified product as Bonsucro ChoC certified

Volumes of Bonsucro EU-RED certified product can only be carried over to the next inventory period if the equivalent physical volume is in stock in the container, processing or logistical facility or site (refer to indicator EU 6.7). This requirement is absent in the Bonsucro Mass Balance ChoC Standard where volumes can be carried over even if there is no equivalent physical volume in stock (indicator 2.1.7. of the Bonsucro Mass Balance ChoC Standard). Therefore, if a Bonsucro EU-RED ChoC certified company ends an inventory period with available volumes in their account system but no more physical stock, that company cannot carry over their volumes as Bonsucro EU-RED ChoC certified but can carry over the volumes as Bonsucro ChoC certified. This ability to transfer volumes from Bonsucro EU-RED ChoC compliant to Bonsucro ChoC compliant provides flexibility and opportunities to Bonsucro EU-RED certified companies. The opposite is strictly forbidden, i.e., transferring Bonsucro Choc certified material to Bonsucro EU-RED ChoC certified if the equivalent amount is in stock.

Bonsucro EU-RED ChoC certified volumes can only be traded in the physical market. Bonsucro ChoC certified volumes can either be traded as certified volumes in the physical market and/or as Bonsucro Credits via Credit Trading Platform.

Indicator EU 6.11: Specific rules for co-processing

Co-processing refers to an oil refinery unit processing biomass feedstock together with fossil feedstock and transforming them into final fuels. In order to allow for the renewable share of fuels produced in a common process from biomass and fossil feedstock to be counted towards the RED recast targets and effectively contribute towards reducing greenhouse gas emissions in

the Union, Article 28(5) of RED recast requires the European Commission to adopt a delegated act specifying the methodology by which to determine the share of biofuel resulting from biomass being processed with fossil fuels in a common process. Economic operators shall apply the methodology set out in this delegated act when determining the share of biofuel resulting from biomass being processed with fossil fuels in a common process.

Economic operators shall thoroughly document the amounts and types of biomasses entering the process as well as the amounts of biofuel that are produced from that biomass. Claims shall be substantiated with evidence including the results of control tests.

The frequency for carrying out the control tests shall be determined by taking into account the complexity and variability of the key parameters of the co-processing, in such a way as to ensure that at any time the share of biofuels claimed reflect its actual status.

Bonsucro will provide further guidance to economic operators once the delegated act has been published.

5.4. Greenhouse gas emission savings: the use and production of biofuels, bioliquids and biomass fuels should lead to reductions in greenhouse gas emissions compared to fossil fuels (requirements for supply chain operators)

Indicator EU 7.1: Options for the greenhouse gas criterion for biofuels, bioliquids and biomass fuels (supply chain operators)

Supply chain operators shall use one of the following options for the greenhouse gas criterion for biofuels, bioliquids and biomass fuels:

a) Use of a default value for greenhouse gas emission saving if the production pathway is laid down in Part A or B of Annex V of RED recast for biofuels and bioliquids and in Part A of Annex VI of RED recast for biomass fuels. Default values can only be applied if the el value for those biofuels or bioliquids calculated in accordance with point 7 of Part C of Annex V of RED recast and for those biomass fuels calculated in accordance with point 7 of Part B of Annex VI of RED recast is equal or less than zero;

b) Use of actual greenhouse gas values to calculate total greenhouse gas savings according to the RED recast methodology and specified in Part C of Annex V of RED recast for biofuels and bioliquids and in Part B of Annex VI of RED recast for biomass fuels;

c) For biofuels and bioliquids, use of a value calculated as the sum of the formulas referred to in point 1 of Part C of Annex V of RED recast, where disaggregated default values in Part D or E of Annex V of RED recast may be used for some factors and actual value, calculated in accordance with the methodology laid down in Part C of Annex V of RED recast, are used for all other factors;

d) For biomass fuels, use of a value calculated as the sum of the formulas referred to in point 1 of Part B of Annex VI of RED recast, where disaggregated default values in Part C of Annex VI of RED recast may be used for some factors, and actual values, calculated in accordance with the methodology laid down in Part B of Annex VI of RED recast, are used for all other factors.

Detailed requirements and guidance on the use of default values and actual values have been elaborated in Annex 1 of this Standard.

5.5. Specific requirements for Bonsucro EU-RED certification of bagasse

This Bonsucro EU-RED Standard covers the production and use of biomass fuels from bagasse. Mills from which bagasse is used as feedstock for biomass fuels must be certified against the Bonsucro EU-RED Standard.

Bagasse is a processing residue. Other processing residues arising in sugarcane to fuel chains are not within the scope of Bonsucro EU-RED. Also, agricultural residues from cane cultivation are not in the scope of Bonsucro EU-RED.

For biomass fuels derived from bagasse the following requirement apply in addition to the greenhouse requirements (requirements EU 1.1 and 7.1), general mass balance requirements (requirements EU 5.1-5.7) and requirements in relation to validating and reconciling Bonsucro EU-RED data (requirements 6.1-6.11).

Indicator EU 8.1: Non-modification

Mills shall have documented evidence substantiating that other biomass streams or agricultural residues have not intentionally been produced or modified to classify as bagasse. This evidence shall include information on the quantities of bagasse and the quantities of juice produced by the mill, and that the ratio between both quantities is within the industry average range. If the ratio is outside this range, i.e., if substantially more bagasse is produced than would be expected on the basis of the juice production, then additional evidence is required to explain this deviation.

6. Requirements for the certification bodies and for the Bonsucro EU-RED certification process

6.1. General

This chapter specifies requirements for certification bodies and auditors that perform Bonsucro EU-RED audits. It also specifies requirements for the Bonsucro EU-RED certification process and for audit reporting.

The requirements laid down in this chapter are additional to the generic requirements laid down in the Bonsucro Certification Protocol, and the Bonsucro Accreditation and Oversight Procedures. If there is a conflict between the specific Bonsucro EU-RED requirements in this chapter and the requirements laid down in the Bonsucro Certification Protocol and/or the Bonsucro Accreditation and Oversight Procedures, the Bonsucro EU-RED requirements shall take precedence.

Note on document/evidence retention times:

The Bonsucro Certification Protocol and the Bonsucro Accreditation and Oversight Procedures specify that 'relevant documentation shall be maintained for a period of at least five years, or longer if mandatory according to prevailing laws and regulation'. In the context of Bonsucro

EU-RED, this requirement shall be read as 'relevant documentation/evidence shall be maintained for a minimum of 5 years, or longer if required by the relevant national authority'.

6.2. Accreditation of certification bodies

6.2.1. Commission Implementing Regulation 2022/996

6.2.1.1. Accreditation of certification bodies (Implementation Regulation 2022/996, Article 11(1))

The certification body office performing the audit shall be accredited to ISO 17065, and to ISO 14065 where it performs audits on actual GHG values.
Certification bodies shall also be accredited by a national accreditation body and in accordance with Regulation (EC) 765/2008 or recognised by a competent authority to cover the scope of Directive (EU) 2018/2001 or the specific scope of the voluntary scheme.
Where no use of such accreditation or recognition is made, Member States may allow voluntary schemes to use a system of independent oversight that covers the scope of Directive (EU) 2018/2001 or the specific scope of the voluntary scheme, for the territory of that Member State.

6.2.2. Bonsucro EU-RED accreditation pathways

The following table summarise the accreditation options identified by Bonsucro for certification bodies intending to become licensed by Bonsucro to perform Bonsucro EU-RED audits and deliver certification decisions (and maintain said licence).

The table is applicable to certification bodies performing audits to the following scope: combination of Bonsucro MB Choc Standard, Bonsucro Production Standard and Bonsucro EU-RED Standard.

The purpose of this table is to structure the pathways according to the areas of competence / knowledge a certification body is expected to demonstrate during the initial onboarding process and subsequent oversight assessments and monitoring.

		Pathway 1	Pathway 2	Pathway 3
A	Valid licence/accreditation contract with Bonsucro	Required	Required	Required
B	ISO 17065 or equivalent	Accreditation to the scope of Bonsucro EU RED	Accreditation to the scope of another RED recast approved voluntary scheme	Accreditation to any scope
C	ISO 14065 or equivalent	Accreditation to any scope	Accreditation to any scope	Accreditation to any scope
D	EU RED	Covered by B	Covered by B	Accreditation to the scope of another RED recast approved voluntary scheme
E	Bonsucro Certification Protocol	Covered by B	Accreditation by Bonsucro or alternative body appointed by Bonsucro – scope shall also cover ISO 17065 requirements.	Accreditation by Bonsucro or alternative body appointed by Bonsucro – scope shall also cover ISO 17065 requirements.
F	Bonsucro Accreditation and Oversight Procedure Requirements	Covered by B	Accreditation by Bonsucro or alternative body appointed by Bonsucro – scope shall also cover ISO 17065 requirements.	Accreditation by Bonsucro or alternative body appointed by Bonsucro – scope shall also cover ISO 17065 requirements.
G	Bonsucro Production Standard	Covered by B	Accreditation by Bonsucro or alternative body appointed by Bonsucro	Accreditation by Bonsucro or alternative body appointed by Bonsucro
H	Bonsucro Mass Balance Chain of Custody Standard	Covered by B	Accreditation by Bonsucro or alternative body appointed by Bonsucro	Accreditation by Bonsucro or alternative body appointed by Bonsucro
I	Bonsucro EU RED Standard	Covered by B	Accreditation by Bonsucro or alternative body appointed by Bonsucro	Accreditation by Bonsucro or alternative body appointed by Bonsucro

Bonsucro recognise:

- Accreditation by a Member State National Accreditation Body, an accreditation body having a bilateral agreement with the European Cooperation for Accreditation (EA); or a national accreditation body affiliated to the International Accreditation Forum (IAF), e.g., CGCRE (INMETRO), ANAB, CNAS, PNAC
- Recognition by a competent national authority in the EU, e.g., BLE
- Independent Oversight programme using the services of an independent body, e.g., ASI

Note: C is only applicable if the Certification Body performs audits of actual GHG values.
Upon request from EU competent authorities, certification bodies performing Bonsucro EU-RED audits shall make relevant information available within the limits of the confidentiality agreement signed with the economic operators they audit.

The Bonsucro website lists certification bodies accredited to perform Bonsucro EU-RED audits. This also includes the entity or national public authority that recognised the certification body and is monitoring it.

Note: In June 2023, Bonsucro discussed with BLE in Germany the possibilities for BLE to recognise Bonsucro accredited certification bodies for performing Bonsucro EU-RED audits. This appeared not to be a viable option, for a number of reasons. Bonsucro is currently in contact with other certification schemes and the European Commission to identify potential other options to comply with EU-RED accreditation. requirements.

6.3. Supervision of operation of certification bodies by the European Commission and EU Member Sates

Certification bodies shall submit to the European Commission and to competent authorities in EU Member States, upon their request, all relevant information necessary to supervise the operation including the exact date, time, and location of audits (as per Article 30(9) of RED recast and Article 17 of the Implementing Regulation 2022/996)[3]. This requirement includes granting access to the premises of economic operators where requested.

This requirement shall be included in contractual arrangement between certification bodies and the economic operators they audit.

Economic operators failing or unwilling to comply with these requirements shall be excluded by their certification bodies from participation in Bonsucro EU-RED. Certification bodies failing or unwilling to comply with these requirements will be excluded from conducting Bonsucro EU-RED audits by Bonsucro.

6.4. Documentation management by certification bodies

Certification bodies performing audits against the Bonsucro EU-RED Standard shall have a documentation management system that addresses each of the following elements:

a) General management system documentation (e.g., manual, policies, definition of responsibilities);
b) control of documents and records;
c) management review of management system;
d) internal auditing/internal monitoring;
e) procedures for identification and management of non-conformities during internal audits; and
f) procedures for taking preventive actions to eliminate the causes of potential non-conformities.

These requirements can be met through accreditation to ISO 17065.

Documentation shall be kept for a minimum of 5 years, or longer if required by the relevant national authority.

[3] Article 17 of the Implementing Regulation 2022/996 specifies i.e. the obligation which Member States have in supervising voluntary schemes, certification bodies and sustainability information.

6.5. Training of certification bodies

Bonsucro holds regular online training courses for certification bodies.

Lead auditors and technical managers shall undergo the Bonsucro qualification exam. Other auditors included in an audit team shall be trained by the certification body but can opt in to undergo the Bonsucro qualification exam.

The Bonsucro Certification Protocol requires the certification body to witness the auditors' performance. Bonsucro checks that the certification body does monitor their auditors during the annual head office and witness assessments.

Lead auditors and technical managers shall undergo refresher training and requalification exam every 3 years. In case a new version of a Bonsucro Standard or Protocol is published, an additional training and exam is required.

Bonsucro keeps a register of qualified certification body staff, including lead auditors, auditors, and technical managers. The monitoring of qualification is the primary responsibility of the certification body technical manager. Bonsucro checks that the certification body monitors its staff qualification during the annual head office and witness assessments.

Bonsucro will provide guidance to certification bodies, as required, on aspects that are relevant to the certification process. This can e.g., include guidance on the assessment of specific Bonsucro EU-RED sustainability requirements for mills and/or the supply chain (greenhouse gas data assessments & calculations, land use criteria, etc.), guidance on the auditing process and on reporting requirements (audit report requirements, reporting requirements to EC, etc.).

Bonsucro may take the initiative to provide guidance to all certification bodies performing Bonsucro and/or Bonsucro EU-RED audits. Alternatively, a certification body can bring a specific case to Bonsucro and check their interpretation of the requirements with Bonsucro. Depending on the case, Bonsucro might redirect the certification body to the correct document (standard, protocol, guidance, external documents from the EC.), or release an interpretation note regarding a specific point of the Bonsucro standards, certification protocol, or related scheme documents.

6.6. General certification body personnel competencies, independence, and impartiality

The certification body shall have a process for selecting and appointing the personnel for the certification activities as set out in ISO 19011, taking into account the requirements needed to achieve the objectives of the audit.
This process shall ensure that the personnel have appropriate competence, independence, and impartiality, including but not limited to those in the Implementation Regulation 2022/996, Article 3 (4-6), 11 and 17 (1-2).

6.6.1. Competencies

The certification body shall ensure that the personnel involved in the certification activities are competent and have the appropriate specific knowledge and skills necessary for conducting

the certification process related to the requirements of Bonsucro EU-RED scheme, and in accordance with the audit scope.

If there is only one auditor, the auditor shall have the competence to perform the duties of an audit team applicable to that audit and of a Lead Auditor.

Technical experts may supplement the audit team, as required, who shall operate under the direction of an auditor. Experts shall not be counted on the man/day for audit days calculation since they do not act independently.

The review and the certification decision shall be made by a technical reviewer and decision maker (that can be the same person) with appropriate competence and that were not part of the audit team.

6.6.2. Independence and impartiality

According to Bonsucro Accreditation and Oversight Procedure the certification body personnel shall be free from conflict of interest. In that sense and according to ISO 17065, the certification body shall require its personnel involved in the certification activities to sign a contract or other document by which they commit themselves to comply with the certification body rules related to confidentiality, independence, and impartiality, including informing the certification body of any situation known to them that may present them or the certification body with a conflict of interest.

The personnel shall be independent of the economic operator participating in the scheme and of the activity being audited. The certification body's personnels' evaluations and decisions must be based on objective evidence of conformity (or non-conformity) and must not be influenced by other interests or by other parties (internal or external) which would cause that the personnel's independence could or will be compromised. Any personnel having a potential conflict of interest shall be excluded from the certification process activities.

Interests can be direct or indirect and can be for example commercial interests, financial/business interests (e.g., owning financial assets related to the activities of the company for which the audit is performed), employment interests, and personnel interests (e.g., family member or close personal associate of the personnel is involved in the activity of the company audited), and other interests or pressures that might affect the personnel's judgment.

Within a period specified by the certification body, personnel shall not be involved in any certification activities for which they shall have a conflict of interest and this period reflects a period that is long enough to ensure impartiality of the certification body and its personnel. This period shall not be inferior to the minimum period set by Bonsucro.

A specific period of two years is applied as a minimum under Bonsucro EU-RED. Irrespective of this minimum period, all previous relationships shall be assessed on a case-by-case basis and the person may not be assigned to these tasks if the potential still exists for any conflicts of interest.

The certification body shall also apply principles of auditors' rotation or other existing best practices in the area. In this respect a maximum period of 3 years continuous Bonsucro EU-RED audits of one company can be undertaken. This includes all audits undertaken in the 3 years period, e.g. (re)certification audits, surveillance audits, and non-conformity follow-up audits.

6.6.3. Monitoring of independence

Certification bodies shall monitor risks to their impartiality and potential conflicts of interest on an ongoing basis. This includes risks related to ownership, governance, management, personnel relations, shared resources, finances, contracts, marketing, and payment of a sales commission or other inducements. Monitoring activities shall be documented, including actions taken to mitigate any potential risk identified during the monitoring. Monitoring activities and results shall be evaluated on an annual basis.

Bonsucro through its Accreditation and Oversight Procedure will monitor and verify possible conflicts during the certification body's annual assessment and during the audit documents review performed by Bonsucro. If possible, conflicts are identified, these will be communicated to the certification body, and Bonsucro will record it in its system (SalesForce) to follow up on the certification body answer and monitor it during its annual assessment.

6.7. Bonsucro EU-RED specific personnel competencies

The certification body personnel shall have the appropriate specific skills necessary for conducting the audit and certification process activities related to the Bonsucro EU-RED Standard, namely:

1. Land use criteria and Low ILUC-risk certification (for low ILUC-risk certification only if this option is applied): Experience in agriculture, agronomy, ecology, natural science, forestry, silviculture, or a related field including specific technical skills needed to verify compliance with the highly biodiverse grasslands and highly biodiverse forest criteria.
2. Greenhouse gas criteria: A minimum of two years' experience in fuels lifecycle assessment, and specific experience in greenhouse gas emission calculations following the RED calculation methodology. Relevant experience is depending on the type of audits to be conducted by the individual auditor. Note that verifying soil organic carbon levels for the purpose of applying the emission saving credit for soil carbon accumulation (e_{sca}) requires specific technical knowledge (e.g., soil science).
3. Chain of Custody criteria: Experience in mass balance systems, supply chain logistics, bookkeeping, traceability, data handling or similar.

6.7.1. Requirements for expert (internal or external) on highly biodiverse grassland

Assessing whether grassland maintains the natural species composition and ecological characteristics and processes and whether grassland is species-rich can only be done by experts (internal or external) who have acquired specific qualifications for this purpose. Audit teams must include at least one member with documented expertise as noted below. These experts must be external to the target of the assessment, independent of the activity being audited, and free from conflict of interest.

The required qualifications of the expert shall entail:

1. Successfully completed tertiary education with a focus on biology and/or biodiversity;
2. A specific qualification for the purpose of assessing the biodiversity of an area, e.g. for assessing whether grassland is species-rich and whether grassland maintains the natural species composition and ecological characteristics and processes;
3. Knowledge about the practical application of biodiversity assessment tools;
4. Knowledge of relevant regional and local conditions;
5. Practical experience with geographic information systems (GIS) and remote sensing tools;
6. Competence in assessing whether harvesting of the raw material is necessary to preserve the highly biodiverse grassland status;
7. Competence in assessing whether management practices do not present a risk of causing biodiversity decline of the grassland

The role of the expert is to establish case by case whether a specific piece of land is, or in case of conversion, was highly biodiverse grassland. Such an assessment does not need to be done annually. Often, it is sufficient that it is done once e.g., if a piece of grassland is converted to sugarcane plantings.

Note: The role of the independent auditor is to assess whether the economic operator has shown compliance with the Bonsucro EU-RED Standard and document such compliance or any identified non-conformities.

Auditors verifying whether land is highly biodiverse grassland as defined in Chapter 2 shall verify whether the land is or has been highly biodiverse grassland at any moment since January 2008.

The auditor shall assess whether the grassland maintains or would have maintained in the absence of human intervention, the natural species composition and ecological characteristics and processes[4]. Where that is the case, the land shall be considered as being, or having been, natural, highly biodiverse grassland. Where grassland has already been converted to arable land and it is not possible to assess the characteristics of the land itself through information available from the national competent authorities or satellite imagery, the auditor shall consider such land as not having been highly biodiverse grassland at the moment of conversion.

Where the land ceased or would have ceased in the absence of human intervention, to be grassland, is species-rich and not degraded and has been identified as being highly biodiverse by the relevant competent authority, then the land shall be considered as non-natural, highly biodiverse grassland.

[4] Regulation (EU) No 1307/2014 specifies geographic ranges of the European Union in which grasslands shall always be regarded as highly biodiverse grasslands. As sugarcane is not grown in the European Union, this requirement is not relevant for Bonsucro EU-RED.

6.8. Management of the audit

All farms, mills and supply chain operators physically handling sugarcane and derived products and taking legal ownership shall be certified against the Bonsucro EU-RED Standard before being allowed to purchase, sell and/or claim in the Bonsucro EU-RED scheme. Economic operators seeking to prolong their Bonsucro EU-RED certification shall undergo recertification prior to the expiry of the Bonsucro EU-RED certificate.

The validity of a Bonsucro EU-RED certificate is three years, with annual surveillance audits after the first and the second year (according to Certification Protocol). The frequency of surveillance audits shall be increased on the basis of the level of overall risk related to the profile of the economic operator, the supply chain and the results of the previous audits. After three years, a full re-certification audit is required.

Audits against the Bonsucro EU-RED Standard shall be in line with ISO 19011 or justified equivalent.

Initial certification audits, annual surveillance audits and recertification audits against Bonsucro EU-RED requirements shall be on site. Certification bodies can only use ((re)certification and surveillance) remote audits in cases where the European Commission has published a force majeure announcement allowing remote audits of voluntary schemes to take place under certain defined conditions, and Bonsucro has published this announcement on its website specifying its applicability for Bonsucro EU-RED.

The audit against the Bonsucro EU-RED Standard shall include:

a. Identification of the activities undertaken by the economic operator which are relevant to the scope of the Bonsucro EU-RED Standard and its requirements;
b. Identification of the relevant systems of the economic operator and its overall economic operator with respect to the Bonsucro EU-RED requirements and checks for the effective implementation of relevant control systems;
c. An assessment of the risks which could lead to a material misstatement by the auditor, based on the verifier's professional knowledge and the information submitted by the economic operator. That analysis shall take into consideration the overall risk profile of the activities, depending on the level of risk of the economic operator and the supply chain. The audit intensity or scope, or both, shall be adapted to the level of overall risk identified;
d. A verification plan which corresponds to the risk analysis and the scope and complexity of the economic operator's activities related to the Bonsucro EU-RED Standard and its requirements, and which defines the sampling methods to be used with respect to that operator's activities;
e. Implementation of the verification plan by gathering evidence in accordance with the defined sampling methods, plus all relevant additional evidence, upon which the verifier's verification conclusion will be based;
f. A request to the operator to provide any missing elements of audit trails, explain variations, or revise claims or calculations, before reaching a final verification conclusion;
g. Verification of the accuracy of data recorded by the economic operators of their representatives in the Union database in line with ISO 19011 records audit approach and principles.

Annex IV of this Standard specifies the minimum content of Bonsucro EU-RED summary of audit reports and certificates.
All audit reports shall be submitted to the Bonsucro Secretariat. Time spent on Bonsucro EU-RED audits (field visit, desk research) shall be documented by certification bodies and is monitored by the Bonsucro secretariat.

6.9. Bonsucro EU-RED requirements for auditing group of farms

This section specifies the requirements for audits of individual farms belonging to a group. These requirements are additional to the requirements in the Bonsucro Certification Protocol.

The certification body shall determine the appropriate sample size for audits of individual farms in the group based on a risk assessment, and then select farms to be audited. This shall be done following a step-wise approach:

1. Determine risk factors;
2. Determine minimum sample size;
3. Application of correction factor for medium and high risk;
4. Selection of farms to be audited.

Step 1: Determine risk factors

In Step 1 the certification body shall determine risk factors. Risk factors shall be classified as low risk, high risk or medium risk.

Low risk factors may include:

- the group is located in an area with no known land use conflicts;
- the group is located in an area with little or no expansion of sugarcane, low levels of clearance of native vegetation in the region;
- there is experience of the group manager of running schemes or systems similar to Bonsucro EU-RED;
- There is a high quality of a documented Internal Control System.

High risk factors may include:

- The group is located in an expansion area for sugarcane, high levels of deforestation or native vegetation clearance for agriculture in the region;
- A certain lack of experience of the group management exists or is considered;
- There is a low quality of a documented Internal Control System.

Medium risk is considered to exist when there is a mix of high risk and low risk factors in the group.

For annual surveillance visits, the following factors shall be considered and may lead to a change on the risk classification in addition to those given above:

- No or few new members (fewer than 5% of the total number of group members) have been added to the group since the previous audit;
- No expansion of land under sugarcane cultivation since the previous audit;
- Very few non-conformities raised during the previous audit.

The certification body shall add in their procedures, their own risk assessment variables to the above risk factors and provide guidance to their auditors for determining the risk.

When determining the sample size (Step 2), the certification body shall document:
a. which is the risk considered to determine the sample,
b. and which are the variables considered to determine such risk (justification).

Step 2: Determine minimum sample size

Once the risk has been determined (Step 1), the minimum sample shall be determined. To determine the **minimum** sampling size, the following formula shall be applied:

nº of farms to visit = √y + group manager

in which:
"y" is the number of members in the group (without including the group manager).
The group manager shall always be audited.

Note: if there are decimals, the number is rounded up from the previous whole number

For groups where the total number of farms exceeds 900, the minimum sample sizes are as follows:

- For groups including between 900 and 3.600 farms, the minimum fixed sample is 30 farms plus the group manager.
- For groups including 3.601 or more farms, the minimum sample size shall be calculated using the following formula:

nº of farms to visit = (√y)/2 + group manager

in which:

"y" is the number of members in the group (without including the group manager).
The group manager shall always be audited.

For surveillance audits, the minimum sampling size shall also be determined following the formula specified above.

Step 3: Application of correction factor for medium and high risk

If the risk identified in Step 1 is medium or high, then a correction factor shall be applied to the above mentioned formula to calculate the sample size.

For **medium risk**, the correction factor of 1.2 is used. Consequently, the formulas to determine the minimum sample size shall be the following:

Number of total members in group	Minimum number of farms to be audited for medium risk
2-899	1+(√y x 1.2)
900-3,600	1+ (30 x 1.2)
3,601 and over	1+(√y/2) x 1.2

In which 1 is the group manager and y is the number of members in the group (excluding the group manager)

For **high risk**, the correction factor of 1.5 is used. Consequently, the formulas to determine the minimum sample size shall be the following:

Number of total members in group	Minimum number of farms to be audited for medium risk
2-899	1+(√y x 1.5)
900-3,600	1+ (30 x 1.5)
3,601 and over	1+(√y/2) x 1.5

In which 1 is the group manager and y is the number of members in the group (excluding the group manager)

For surveillance audits, the correction factors for medium and high risk as specified above shall be applied to determine the sampling size.

Step 4: Selection of farms to be audited

Once the minimum sampling size has been determined (Step 3) the certification body shall perform stratification, i.e., grouping the farms to be audited under certain criteria. Based on the requirements outlined in the box below, the certification body shall identify, when the conditions of the group are heterogeneous, appropriate strata based on the information provided by the group manager on the group members, and on the group manager's risk assessment. Appropriate categories to use for stratification may include for example the categories of risk used by the group manager (e.g., low, medium, high, or other classification), or geographical regions.

6.9.1. Stratified Random Sampling

Stratified random sampling is one of the easiest ways to ensure the representativeness and randomness in the selection of group members to be included in the sample. Once the certification body has identified the sample size according to the risk, and the farms conditions are heterogeneous, for example regarding:

- risk analysis: if the risk analysis carried out by the group manager determines the existence of medium or high risk in some of the farms administered by the manager, it may mean that the certification body may want to stratify by considering it as a stratum within the sample to be audited.
- New farms: the addition of new farms could imply a higher risk due to the lack of mature systems or fully trained people, among others.

The certification body shall perform the necessary stratifications within the sample, even by enlarging the minimum sample, to ensure the representation of the characteristics of the group members to be audited. For this, group members are categorized into 'sets' (strata) according

to the criteria mentioned above Then members from each set (stratum) are chosen at random to be audited by the certification body.

There are different techniques to do it randomly. One way to do this is to give all the members in each stratum a number and use a 'random number generator' to decide which ones to visit. Alternatively, all the farm names in each stratum can be written down and put into a bag to be drawn out at random. Randomness is important - it ensures that the certification body is not unduly influenced by the suggestions of the group manager, or ease of vehicle access etc. The selection of sites or the definition of strata shall not be made for geographic convenience only.

In addition to the stratification requirements outlined above, the following requirements apply when selecting farms for audits:

- the certification body shall include in the assessment all the group members who have any outstanding corrective action from the previous audit;
- for annual surveillance assessments, the certification body shall ensure that a sample of new members who have joined the group since the previous assessment are visited;
- the certification body shall take into account stakeholder concerns, complaints, unusual or unclear records about group members;
- the certification body shall not choose group members/sites to be visited based on convenience of logistics or time constraints.

Section 6.14 specify (the consequences of) non-conformities identified during audits of groups of farms.

6.9.2. Group Manager responsibilities

A Group Manager is the representative of a group of farms that are certified as a group, and that are either independent from a mill or belong to the certification scope of a mill. The Group Manager can be one of the farms. Alternatively, this role can also be performed by the mill which has the farms included in its certification scope.

The Group Manager is responsible for the following tasks:

1. control, monitor and evaluate all group members as to their compliance to the Bonsucro standards and the Bonsucro EU-RED Standard including communicating with them and visiting them at the required frequencies. This includes:
   a) manage the group procedures, planning, and documentation.
   b) define group membership requirements, manage inclusion of new group members and exclusion of group members. Inform new and existing group members about aspects such as Bonsucro and Bonsucro EU-RED requirements, criteria for group membership, rights of certification bodies, requirements to comply to conditions or corrective actions issued by the certification body, costs associated with group membership, sanctions.
   c) ensure compliance with this standard, including internal audits of group members and including that any corrective actions raised by the certification body are adequately addressed within the agreed timeframe.
   d) demonstrate sufficient resources – i.e., human, financial, physical, and other relevant resources – to enable effective and impartial technical and administrative management of the group.

e) ensure group members' training against Bonsucro and Bonsucro EU-RED requirements

2. Responsibility for subcontractors performing certain tasks for the group of farms, i.e. spraying, storage of chemicals, coordination of transport and logistics
3. Administration, i.e., registration at Bonsucro, bookkeeping, supply chain documentation
4. Management of funds (e.g., Bonsucro financial administration, external funds)

The certification body shall verify that the group manager undertakes an internal review of the performance of each farm at least annually to assess the effectiveness of the documented procedures and the conformity of the sites against the Bonsucro EU-RED Standard and that appropriate non-conformities are issued.

When one sampled farm within the group is found not to be in conformity, the auditor, shall determine whether the issue is specific to one farm or applies systematically to the whole group, in which case the certification body may suspend all farms included in the certification. If the issue applies specifically to one or some farms, the certification of the farms concerned shall be suspended.

For group of farms, a systemic non-conformity for a Group Manager or farm is raised if there is a failure to meet a Standard requirement. A farm-specific systemic non-conformity shall also apply to the Group Manager.

For group of farms, an incidental non-conformity for a Group Manager or farm is raised if there is a failure to meet a Standard requirement but which can be considered a temporary lapse or is unusual/non-systemic. A farm-specific incidental non-conformity shall also apply to the Group Manager

6.10. Specific requirements for audits of actual GHG emission calculations

Economic operators can only make actual GHG values claims after the capability to conduct actual value calculations has been verified by an auditor during an audit.

To improve the robustness of the verification procedure, economic operators shall make available to auditors all relevant information concerning the calculation of actual GHG emissions in advance of the planned audit. This includes input data and any relevant evidence, information on the emission factors and standard values applied and their reference sources, GHG emission calculations and evidence relating to the application of GHG emission saving credits (e_{sca}).

Auditors shall verify that operators have the capability to conduct the calculation of actual values according to the GHG calculation methodology specified in Annex I. No actual value shall be used before this verification is completed, i.e. before the capability of the operator has been confirmed by the auditor.

The auditor shall record the emissions occurring at the audited site in the audit report. For the processing of final fuels, the auditor shall record the emissions after allocation and the achieved savings. Should the emissions deviate significantly from typical values (more than 10% deviation) or calculated actual values of emissions savings are abnormally high (more than 30%

deviation from default values) then the report must include information that explains the deviation. The deviation of an actual value is compared to a typical/default value for the same type of feedstock-fuel pathway.
Certification bodies must immediately inform Bonsucro of such deviation.

Audit reports shall include actual value GHG emission calculations including related background evidence on the application of GHG emission saving credits (e_{sca}) where applicable.

Upon request Bonsucro will provide to the European Commission and to national authorities responsible for supervision of the certification bodies timely access to actual GHG calculations certified under the Bonsucro EU-RED Standard.

6.11. Specific requirements for audits of mass balance systems

If requested, economic operators shall make available to auditors all Bonsucro EU-RED mass balance data in advance of the audit.

During an initial certification audit before participation in a scheme, the auditor shall check the existence and functioning of the Bonsucro EU-RED mass balance system.

During subsequent annual audits, the auditor shall check at least the following:

a) List of all sites that are under the scope of Bonsucro EU-RED certification. Each site shall have its own mass balance records;
b) List of all inputs per site, including description of material handled and details of all suppliers.
c) List of all outputs per site, including the description of material handled and details of all customers
d) Conversion factors applied, in particular in the case of processing waste or residues to ensure that the process is not modified to produce more waste or residue material;
e) Any discrepancies between bookkeeping system and inputs, outputs, and balances;
f) Allocation of sustainability characteristics;
g) Equivalence of the sustainability data and the physical stock at the end of the mass balance period.

In addition to points (a) to (g):

- the mass balance records must contain information on both the inputs and the outputs of sustainable and unsustainable material handled by the sites (including where relevant fossil fuels);
- a sample of the calculations (inputs, outputs, conversion factors, and any balances carried forward). All data should be checked against the bookkeeping system.
- Mass balance timeframe should be transparent, documented, and consistent, and an appropriate period of time (refer to Chapter 5 for details);
- Inputs and outputs should be accompanied, where relevant, by a set of sustainability characteristics. Auditors should check that sustainability characteristics have been allocated appropriately. At the end of the mass balance period, the sustainability data carried forward should be equivalent to the physical stock.

Note: The mass balance records must contain information on both the inputs and the outputs of sustainable and unsustainable material (including where relevant fossil fuels) handled by the sites and make a clear distinction between Bonsucro compliant material and Bonsucro EU-RED compliant material.

6.12. Specific requirements for audits of co-processing

Co-processing refers to an oil refinery unit processing biomass feedstock together with fossil feedstock and transforming them into final fuels (also refer to requirement EU 7.11).

In conducting audits of economic operators which apply co-processing, particular emphasis shall be placed on verifying the consistency between the amounts of biomass entering the process and the amounts of biofuel that are recorded as being produced from the biomass. For that purpose, the evidence supplied by the economic operator shall be thoroughly verified and the plausibility of claims shall be checked and compared with industry standards. In carrying out such assessment, particular attention shall be paid to the testing method applied by the economic operator, the system of additional controls put in place, and the calculation method used to incorporate the results of all tests into the calculation of the final share of biofuels. Auditors shall treat as a major non-compliance any identified deviation in the testing method or inaccuracy in incorporating the results of such tests into the final calculation by the economic operator.

6.13. Specific requirements for auditing of bagasse used for biomass fuels

When bagasse is used as a feedstock to produce biomass fuels, the whole supply chain shall be audited starting from the fill where the bagasse arises. All mills from which bagasse is used as a feedstock to produce biomass fuels shall be audited individually. Also, other supply chain operators that take legal ownership of the bagasse or products derived thereof shall be audited independently.

Within six months of the certification audit, the certification body shall carry out a surveillance audit. The second surveillance shall take place within 12 months of the first surveillance audit, followed by 12 months intervals for each following surveillance or recertification audit.

During the audit, the auditor shall ensure that no Bonsucro EU-RED compliant material is intentionally modified or discarded to be considered as a residue (i.e. as bagasse).

The auditor shall pay specific attention to checking of documented evidence substantiating that other biomass streams or agricultural residues have not intentionally been produced or modified to classify as bagasse. This evidence shall include information on the quantities of bagasse and the quantities of juice produced by the mill, and that the ratio between both quantities is within the industry average range. If the ratio is outside this range, i.e. if substantially more bagasse is produced than would be expected on the basis of the juice production, then additional evidence is required to explain this deviation.
If there are reasonable doubts about the nature of the declared bagasse, the auditor is authorized to take samples and have them analysed by an independent laboratory.

6.14. Classification of non-conformities identified during an audit and consequences

6.14.1. Classification of non-conformities

Non-conformities identified during a Bonsucro EU-RED audit shall be classified as critical, major, and minor in accordance with the following criteria:

Critical non-conformity

The intentional violation of the Bonsucro EU-RED standard or any other Bonsucro standard such as fraud, irreversible non-conformity, or a violation that jeopardies the integrity of Bonsucro EU-RED shall be considered to be a critical non-conformity.

Critical nonconformities shall include, but are not limited to, the following:

a. non-compliance with a mandatory requirement of RED recast, such as land conversion which contravenes Article 29(3), (4) and (5) of that Directive;
b. fraudulent issuance of proof of sustainability, for example, intentional duplication of proof of sustainability to seek financial benefit;
c. the deliberate classification as 'bagasse' of crops and residues which are not bagasse, with the intention to use these materials as a feedstock for the production of bagasse derived biomass fuels. For example, by classifying agricultural residues from sugarcane cultivation or milling as bagasse (e.g. leaves and tops).

Major non-conformity

Identified as Systemic non-conformities in the Bonsucro Certification Protocol V6 part 2 paragraph 18.6).

Failure to comply with a mandatory requirement of RED recast, where the non-conformity is potentially reversible, repeated, and systematic problems, or aspects that alone, or in combination with further non-conformities, may result in a fundamental system failure, shall be considered to be a major non-conformity.

Major non-conformities shall include, but are not limited to, the following:

a. systematic problems with mass balance or GHG data reported for example, incorrect documentation is identified in more than 10% of the claims included in the representative sample;
b. the omission of an economic operator to declare its participation in other voluntary schemes during the certification process;
c. failure to provide relevant information to auditors for example, mass balance data and audit reports.

Minor non-conformity

Identified as Incidental non-conformities in the Bonsucro Certification Protocol V6 part 2 paragraph 18.5).

A non-conformity that has a limited impact, constitutes an isolated or temporary lapse, is not systematic and does not result in a fundamental failure if not corrected, shall be considered to be a minor non-conformity.

6.14.2. Consequences of non-conformities

The consequences of non-conformities for economic operators shall be the following:

a. In the case of **critical** non-conformities:
   - The economic operator applying for Bonsucro EU-RED certification shall not be issued a certificate.
   - The economic operator may re-apply for certification after 12 months.
   - Critical non-conformities identified during surveillance or re-certification audits, or through Bonsucro's internal monitoring or complaints process, shall lead to the immediate withdrawal of the economic operator's Bonsucro EU-RED certificate (see Bonsucro Certification Protocol V6 part 2 paragraph 23.9);

b. In the case of **major** non-conformities against a mandatory RED recast requirement:
   - The economic operator applying for Bonsucro EU-RED certification shall not be issued a certificate.
   - Major non-conformities against a mandatory requirement of RED recast identified during surveillance or re-certification audits, or through Bonsucro's internal monitoring or complaints process, shall lead to the immediate suspension of the economic operator's certificate.
   - Where economic operators do not provide a remedy for any major non-conformities within three months from notification, the Bonsucro EU-RED certificate shall be withdrawn.
   - Major non-conformities raised against other requirements (i.e. not mandatory requirements of RED II) shall follow process defined in Bonsucro Certification Protocol V6 part 2 section 19.

c. In the case of **minor** non-conformities:
   - Bonsucro will define the time period for their resolution, not exceeding 12 months from their notification and the date of next surveillance or re-certification audit. See Bonsucro Certification Protocol V6 part 2 section 19.

6.14.3. Non-conformities in case of auditing Group of farms

In case of auditing group of farms, the following additional requirements apply:

- Critical or major non-compliance of individual group members identified during an audit shall be addressed as specified above for the individual group member.
- If a critical or major non-conformity is identified in the whole initial group sample, then an additional sample of group members of the same size shall also be audited.
- Major non-conformities of the majority of the group members across the whole sample shall lead to the suspension or withdrawal of the whole group certification, as applicable.

6.15. Levels of assurance when conducting audits

The initial audit of a new operator in the Bonsucro EU-RED scheme or a re-certification of an existing operator under a revised regulatory framework shall always be on-site and shall as a minimum provide reasonable assurance on the effectiveness of its internal processes.

Depending on the risk profile of the economic operator, a limited assurance level can be applied on the auditor's statement.

A "limited assurance level" implies a reduction in risk to an acceptable level as the basis for a negative form of expression by the auditor such as 'based on our assessment nothing has come to our attention to cause us to believe that there are errors in the evidence'.
A "stronger 'assurance level" is the 'reasonable reassurance level'. Reasonable assurance implies a reduction in risk to an acceptably low level as the basis for a positive form of expression such as 'based on our assessment, the evidence is free from material misstatement'.

The audit statement specifying the level of "limited assurance", shall be included in the auditor's Bonsucro EU-RED audit report.

An example text for the audit statement is the following:
'Based on the assessment findings on-site, we verify that there are no significant issues or intentional errors in the evidence made available.
The findings are reasonably free from any material misstatement.

The assessment findings are limited to accuracy of the data and information as presented by [Operator] which has been sampled and was verified at the time of the assessment for this Bonsucro EU-RED report. Based on the documents and records presented during the on-site verifications made, it is concluded that [Operator] have been able to comply with the requirements of the Bonsucro EU-RED requirements.'

7. RED recast requirements for Bonsucro as a voluntary scheme (owner)

7.1. General

This chapter details RED recast requirements that apply to Bonsucro as voluntary scheme (owner). It specifies the procedures which Bonsucro has in place to comply with these requirements, in particular in relation:

- Documentation management (7.2)
- Recognition of other voluntary schemes and transparency on other scheme participation (7.3);
- Recognition of national schemes (7.4);
- Scheme transparency and reporting to the European Commission (7.5);
- Support for the European Commission in fulfilling its duties set out in Article 30(8) and Article 30(10) of RED recast (7.6);
- Complaint procedure (7.7);
- Internal monitoring (7.8).

7.2. Documentation management by Bonsucro

Bonsucro has a documentation management system in place. In relation to the Bonsucro EU-RED Standard this includes the following elements:

a) General management system documentation (e.g. manual, policies, definition of responsibilities);
b) control of documents and records;
c) management review of management system;
d) internal auditing/internal monitoring;

e) procedures for identification and management of non-conformities during internal audits; and
f) procedures for taking preventive actions to eliminate the causes of potential non-conformities.

Documentation is kept for a minimum of 5 years, or longer if required by the relevant national authority.

7.3. Other EC approved voluntary schemes

7.3.1. Recognition of other voluntary schemes

Bonsucro accepts all voluntary schemes that are recognised by the European Commission in accordance with Article 30(4)of the RED recast regarding the verification of compliance with the sustainability criteria set out in Art. 29 (2) to (5) and (10) as well as the greenhouse gas saving thresholds set out in Art. 25 (2) of the RED recast, where these schemes are used for sugarcane and sugarcane derived products. Sugarcane and sugarcane derived products certified under those schemes can be accepted by Bonsucro EU-RED certified operators only as "**EU-RED compliant**". Acceptance of voluntary schemes is limited to the scope which is recognised by the European Commission.

The Bonsucro EU-RED certified operator shall verify whether the supplier's certificate is valid and whether it is issued based on a voluntary scheme which is recognised by the European Commission. Supplies of sugarcane or sugarcane derived products which have been certified under another European Commission recognised schemed shall be registered by the Bonsucro EU-RED certified operator as "EU-RED compliant".

Outgoing deliveries of these materials shall be claimed as "EU-RED compliant", i.e., these deliveries cannot be claimed to be Bonsucro EU-RED certified. The sales documentation (transaction certificate) shall clearly indicate whether the outgoing delivery (i.e., consignment) is 'EU-RED compliant' or 'Bonsucro EU-RED certified'. No Bonsucro claims, logos etc shall be used for deliveries that are 'EU-RED compliant'.

7.3.2. Transparency on other voluntary scheme participation

Economic operators that wish to apply for Bonsucro EU-RED certification shall upon registration disclose to Bonsucro whether they are a current or previous participant of another voluntary scheme, and also whether they had a different legal form or name in the past 12 months. Bonsucro will cross-check this information against other voluntary scheme certificate lists and also carry out customer Due Diligence/ Know Your Customer (in particular on companies with a limited trading history).

During the Bonsucro EU-RED audit, economic operators shall declare to the auditor the names of all EC approved voluntary biofuel schemes for they participate in. They shall make available all relevant information related to their participation in these schemes, including:

- volumes of sugar products that were produced including supply chain models that were used;
- volumes purchased and/or sold as certified by other EC approved voluntary schemes; and
- the audit reports of these schemes.

The Bonsucro EU-RED audit report shall contain details of all other EC approved voluntary schemes against which the operator has been certified (scheme name, certificate number, scope of certificate, validity period of certificate), as well as volumes of sugar products produced, purchased and/or sold with a certificate of those schemes.

The Bonsucro website (http://www.bonsucro.com/certified-members-3/) contains a list of economic operators that are Bonsucro and Bonsucro EU-RED certified, including details on the scope of certification and the volume certified, and the validity period of the certificate.

Prior to re-certification of any economic operator that was previously found to be in major non-compliance with this requirement, or any other aspect of the mandatory sustainability criteria in this standard, the auditor shall be required to bring this to the attention of Bonsucro (this requirement applies to all voluntary schemes that the economic operator is participating in).

7.4. Recognition of national schemes

The European Commission may recognise national schemes from EU countries as being in compliance with the conditions set out in RED recast. Bonsucro will automatically recognise those schemes as regards the verification of compliance with the sustainability criteria set out in Articles 29(2) to (7) and (10), the GHG savings thresholds set in Article 25(2) of RED recast and with the criteria for certification of low ILUC-risk biofuels, bioliquids and biomass fuels set out in Delegated Regulation EU 2019/807. The recognition will be in accordance with Article 30(4) of RED recast.

A Bonsucro EU-RED certified supply chain operator who receives products verified against an EC recognised national scheme shall consider that product to be in compliance with RED recast sustainability criteria set out in Articles set out in Articles 29(2) to (7) and (10),the GHG savings thresholds set in Article 25(2) and with the criteria for certification of low ILUC-risk biofuels, bioliquids and biomass fuels set out in Delegated Regulation EU 2019/807.

7.5. Transparency

The Bonsucro website (https://bonsucro.com/) contains details on the governance structure of Bonsucro and its ownership structure , the composition and experience of the Board of Directors and the Technical Advisory Board, as well as contact details of the Bonsucro Secretariat. It also contains a list of Bonsucro members and participants in the Bonsucro EU-RED scheme.

The Bonsucro website also lists all approved Bonsucro and Bonsucro EU-RED scheme documentation, including revisions/updates and guidance documentation. Potential revisions are also found there during the time they are open for stakeholder consultation. The website also contains:

- A list of economic operators that are currently Bonsucro and Bonsucro EU-RED, including details on the scope of the certificate and its validity period, and economic operators that no longer participate. The list also includes:
  - ✓ Summary of economic operators' audit reports information (also refer to Certification Protocol V6 part 2 section 21.6.1 and annex 2);

- ✓ up-to-date information on the status of all certificates, i.e. 'valid', 'suspended', 'withdrawn', 'terminated' or 'expired' (Refer to Section 2 of this Standard for definitions). Economic operators whose certificates are withdrawn, terminated, or expired are listed for at least 24 months after the withdrawal, termination, or expiration date;
- ✓ The respective action plan and timing for correction of non-conformities against mandatory RED recast requirements identified during an audit, as agreed with the economic operator.

- Certification bodies which Bonsucro has approved to conduct Bonsucro EU-RED audits, including detailed information on the accreditation and oversight system applicable to the certification body. Certification bodies that are no longer entitled to conduct independent auditing under Bonsucro EU-RED are listed for at least 12 months after the decision to remove EU-RED from the certification body's accreditation scope.
- Names and scope of voluntary schemes recognised by Bonsucro;
- Complaints procedure, including evidence that needs to be provided, scope of the procedure, process and associated timeframe, decision making and consequences;
- An aggregated list of critical and major non-conformities identified during audits, together with a summarised action plan for correction of these non-conformities by the economic operators concerned including timing.
- Bonsucro rules and procedures for identifying and dealing with non-compliance by Bonsucro EU-RED certified economic operators, i.e. non-compliance against the Bonsucro EU-RED Standard.
- The results of the annual monitoring activities carried out by Bonsucro as summarised in the annual activity report.

7.6. Annual reporting to the European Commission

Bonsucro will submit an annual report to the European Commission by 30 April every year, covering the previous calendar year, including information concerning (the operation of) the Bonsucro EU-RED scheme as set out in Annex III of the Implementing Regulation 2022/996. More in particular, the report will contain information in relation to:

a) rules on the independence, method and frequency of audits as approved by the Commission upon accreditation of the voluntary scheme and any changes to them over time to reflect Commission guidance, the modified regulatory framework, findings from internal monitoring on the auditing process of certification bodies and evolving industry best practice;
b) rules and procedures for identifying and dealing with non-compliance by economic operators and members of the scheme;
c) evidence of fulfilling the legal requirements on transparency and publication of information in line with the first section of this paragraph (transparency of information on Bonsucro website);
d) stakeholder involvement, in particular on the consultation of indigenous and local communities prior to decision-making during the drafting and review of the scheme as well as during audits and the response to their contributions;
e) overview of the activities carried out by the voluntary scheme in cooperation with the certification bodies in order to improve the overall certification process and the qualification and independence of auditors and relevant scheme bodies;

f) market updates of the scheme, the amount of feedstock, biofuels, bioliquids and biomass fuels certified, by country of origin and type, and the number of participants;
g) detailed statistical information and qualitative feedback on the implementation of the esca methodology, including the use of the RothC model;
h) overview of the effectiveness of the implementing system put in place by the governance body of the voluntary scheme in order to track proof of conformity with the sustainability criteria that the scheme gives to its member(s). This shall cover, in particular, how the system effectively prevents fraudulent activities by ensuring timely detection, treatment and follow-up of suspected fraud and other irregularities and where appropriate, the number of cases of fraud or irregularities detected;
i) criteria for the recognition of certification bodies;
j) rules on how the internal monitoring system is conducted and the results of its periodic review, specifically on oversight of the work of certification bodies and their auditors as well as on the system of handling complaints against economic operators and certification bodies;
k) possibilities to facilitate or improve the promotion of best practices.

The report will be prepared by the Bonsucro Secretariat in accordance with the requirements set by the European Commission (as outline above or otherwise updated by EC). For the preparation of this report, including collection of market data information, the Bonsucro Secretariat will make use of Bonsucro members' Annual Reports on Continuous Improvement', Bonsucro's Monitoring & Evaluation System (www.bonsucro.com/monitoring-evaluation), Bonsucro EU RED audit reports and other resources.

7.7. Support for the European Commission in fulfilling its duties set out in Article 30(8) and Article 30(10) of RED recast

Upon request of a Member State, or its own initiative, the European Commission may be required to investigate whether voluntary schemes operate according to the rules or to examine whether the sustainability and greenhouse gas emissions saving criteria in relation to a particular consignment are met.

Bonsucro will support the Commission in this effort and will ensure via procedures as well as contractual arrangements with participating operators and certification bodies that relevant data can be made available upon request, such as audit reports and actual greenhouse gas calculations. In addition, Bonsucro will ensure via certification procedures as well as contractual arrangements with participating certification bodies and certification bodies' contractual arrangements with economic operator that Member States can supervise the operation of certification bodies, including granting access to the premises of economic operators where requested. Bonsucro will fully comply with the requirements on supervision by the Member States and the Commission as laid down in Article 17 of the Implementing Regulation 2022/996.

Upon request, Bonsucro will provide to the European Commission and national authorities responsible for supervision of the certification bodies access to actual GHG calculations certified under Bonsucro EU-RED or information required to comply with Article 30(8) and Article 30(10) of RED recast and article 31(a) of REDIII.

Bonsucro will provide Bonsucro EU-RED certified economic operators with training and support to enter all relevant requested information correctly in the Union Certification bodies are required to verify, as part of the audit process cycle, the accuracy of information entered into the Union database or relevant national database by Bonsucro EU-RED certified economic operators in line with ISO 19011 records auditing approach and principles.

Auditors need to verify that the entries in the Union Database of the certified economic operator correspond with the figures that are part of the economic operator's bookkeeping and net mass balance data or other encoded information on their entities or sites. Any deviations between data that have been registered in the Union Database and the respective data from the economic operator's documentation shall be immediately flagged in the audit report and to Bonsucro. Such discrepancies can lead to major non-conformities identified in the audit report and trigger a suspension of the certificate of the economic operator (refer to Section 6.13 for more information on classification of non-conformities).

7.8. Complaint procedure

The Bonsucro Complaints and Grievance Management System has been detailed on the Bonsucro website (https://bonsucro.com/complaints-and-grievances/).
The table below summarises the Complaints and Grievance Management System.

The annual report to the European Commission will contain information on the type of complaints received in relation to Bonsucro EU-RED and/or Bonsucro EU-RED certified economic operators (refer to Section 7.4). Upon request by the European Commission or a Member State, Bonsucro will provide all documents related to a complaint concerning Bonsucro EU-RED and its handling.

3 pathways to complain / appeal about: Bonsucro Member (or applicant)'s actions | Certification Body' actions | Bonsucro actions

Option	Managed by	Filing	Applicable Case	Scope	Process Website link	Link to audit process	Conflict of Interest Management	Cases Records / Registry maintained by
Candidacy public consultation	Bonsucro (Secretariat, Membership Committee and Board)	Online form	Complaining about an organisation applying for Bonsucro membership	Code of Conduct	https://www.bonsucro.com/complaints-and-grievances/organisation-applying-for-bonsucro-membership/	Bonsucro Membership is a pre-requisite to applying for certification	See Bonsucro Membership procedure	Bonsucro Secretariat
Bonsucro Member' own Grievance Mechanism	Bonsucro Member	No info	Complaining about an organisation that is a Bonsucro member (regardless if certified, applying for certification, or not certified)	Code of Conduct	https://www.bonsucro.com/complaints-and-grievances/organisation-is-a-bonsucro-member/ First option on the list	n/a	No info	Bonsucro member
Bonsucro Grievance Mechanism Rules	CEDR	Email	Complaining about an organisation that is a Bonsucro member (regardless if certified, applying for certification, or not certified)	Code of Conduct Bonsucro Standards	http://www.bonsucro.com/complaints-and-grievances/bonsucro-grievance-mechanism/	See Grievance Mechanism Rules: interaction with Certification Body is outlined in one of the steps	See Grievance Mechanism Rules: Independently managed by CEDR	CEDR + Cases published on Bonsucro website at specific points in the process.

Option	Managed by	Filing	Applicable Case	Scope	Process Website link	Link to audit process	Conflict of Interest Management	Cases Records / Registry maintained by
Certification Body Complaint and Allegation Procedure	Certification Body	Email (1)	Complaining about an organisation that is a Bonsucro member and is applying for certification	Bonsucro Standards	List of certification bodies procedures: http://www.bonsucro.com/complaints-and-grievances/complaining-to-certification-body/	See Certification Bodies' individual procedures	See Certification Bodies' individual procedures. Certification bodies shall take into account complaints received from third parties when developing the risk assessment of the auditee, the audit plan and during the audit itself. It can for example lead to an audit approach in which certain sustainability risks are assessed in more depth taking into account the complaints filed in relation to those risks. Complaints may be filed at the Bonsucro member, and complaints/allegations communicated to the CB by Bonsucro or a third party.	Certification Bodies
Certification Body Complaint and Allegation Procedure	Certification Body	Email	Complaining about an organisation that is a Bonsucro member and holds a Bonsucro certificate	Bonsucro Standards	List of certification bodies procedures: http://www.bonsucro.com/complaints-and-grievances/complaining-to-certification-body/	See Certification Bodies' individual procedures	See Certification Bodies' individual procedures Certification bodies shall take into account complaints received from third parties when developing the audit plan and during the audit itself. This includes complaints filed at the Bonsucro member, and complaints/allegations communicated to the CB by Bonsucro or a third party.	Certification Bodies
Bonsucro Survey	Bonsucro	Online Form	Client raising concerns about their Certification Body	Certification Protocol	http://www.bonsucro.com/complaints-and-grievances/client-of-bonsucro-licensed-certification-body/ First option on the list	Can inform CBs' oversight process (and indirectly audit if applicable)	Will be integrated in next version of Accreditation and Oversight Procedure	Bonsucro

Option	Managed by	Filing	Applicable Case	Scope	Process Website link	Link to audit process	Conflict of Interest Management	Cases Records / Registry maintained by
Certification Body Appeal and Complaint Procedure	Certification Body	Email	Client complaining about their Certification Body or appealing decision	Certification Protocol	List of certification bodies procedures: http://www.bonsucro.com/complaints-and-grievances/complaining-to-certification-body/	See Certification Bodies' individual procedures	See Certification Bodies' individual procedures	Certification Bodies
Escalation to Bonsucro	Bonsucro	Email	Client complaining about their Certification Body or appealing decision	Certification Protocol	http://www.bonsucro.com/complaints-and-grievances/client-of-bonsucro-licensed-certification-body/ Third option on the list	Can inform CBs' oversight process (and indirectly audit if applicable)	Will be integrated in next version of Accreditation and Oversight Procedure	Bonsucro
Certification Body Complaint and Allegation Procedure	Certification Body	Email	Third Party complaining about a Certification Body	Certification Protocol	List of certification bodies procedures: http://www.bonsucro.com/complaints-and-grievances/complaining-to-certification-body/	See Certification Bodies' individual procedures	See Certification Bodies' individual procedures	Certification Bodies
Escalation to Bonsucro	Bonsucro	Email	Third Party complaining about a Certification Body	Certification Protocol	http://www.bonsucro.com/complaints-and-grievances/third-party-organisation-or-individual/ Second option on the list	Can inform CBs' oversight process (and indirectly audit if applicable)	Will be integrated in the next version of the Accreditation and Oversight Procedure	Bonsucro
Complaining about membership procedure	Bonsucro	Email	Candidate Member complaining about Bonsucro not follow its membership procedure	Membership procedure	http://www.bonsucro.com/complaints-and-grievances/bonsucro-candidate-member/	n/a	See Membership procedure	Bonsucro

Option	Managed by	Filing	Applicable Case	Scope	Process Website link	Link to audit process	Conflict of Interest Management	Cases Records / Registry maintained by
Appealing a decision taken by Bonsucro or Complaining about Bonsucro Service	Bonsucro	Email	Bonsucro Member appealing a decision taken by Bonsucro or Complaining about Bonsucro Service	Applicable procedure or project agreement	http://www.bonsucro.com/complaints-and-grievances/bonsucro-member/	n/a	See Applicable procedure or project agreement	Bonsucro
Appealing a decision by Bonsucro to suspend or terminate a Certification Body licence	Bonsucro	Email	Bonsucro Licensed Certification Body appealing a decision by Bonsucro to suspend or terminate a Certification Body licence	Accreditation and Oversight Procedure	http://www.bonsucro.com/complaints-and-grievances/bonsucro-certification-body/ First option on the list	n/a	Will be integrated in next version of Accreditation and Oversight Procedure	Bonsucro
Appealing a decision by Bonsucro to deny an exemption application	Bonsucro	Email	Bonsucro Licensed Certification appealing a decision by Bonsucro to deny an exemption application	Exemption Procedure	http://www.bonsucro.com/complaints-and-grievances/bonsucro-certification-body/ Second option on the list	Yes	See Exemption Procedure	Bonsucro
Appealing a decision taken by Bonsucro or Complaining about Bonsucro Service	Bonsucro	Email	Bonsucro Licensed Certification Body (or applicant) appealing a decision by Bonsucro or Complaining about Bonsucro Service	Accreditation and Oversight Procedure or other applicable / Agreement	http://www.bonsucro.com/complaints-and-grievances/bonsucro-certification-body/ Third option on the list	Potentially	Will be integrated in next version of Accreditation and Oversight Procedure	Bonsucro

Option	Managed by	Filing	Applicable Case	Scope	Process Website link	Link to audit process	Conflict of Interest Management	Cases Records / Registry maintained by
Appealing a decision by Bonsucro to suspend or terminate a Training Provider Licence	Bonsucro	Email	Bonsucro Licensed Training Provider appealing a decision by Bonsucro to suspend or terminate a Training Provider licence	Applicable procedure /agreement	http://www.bonsucro.com/complaints-and-grievances/a-bonsucro-licensed-training-provider/ First option on the list	n/a	Will be integrated in next version of Applicable procedure /agreement	Bonsucro
Appealing a decision taken by Bonsucro or Complaining about Bonsucro Service	Bonsucro	Email	Bonsucro Licensed Training Provider appealing a decision by Bonsucro or Complaining about Bonsucro Service	Applicable procedure /agreement	http://www.bonsucro.com/complaints-and-grievances/a-bonsucro-licensed-training-provider/ Second option on the list	n/a	Will be integrated in next version of Applicable procedure /agreement	Bonsucro
Appealing a decision taken by Bonsucro or Complaining about Bonsucro Service	Bonsucro	Email	Third Party appealing a decision by Bonsucro or Complaining about Bonsucro Service	Applicable procedure or project agreement	http://www.bonsucro.com/complaints-and-grievances/complaining-about-bonsucro-as-a-third-party/	n/a	Applicable procedure or project agreement	Bonsucro
Reporting / Complaining to ISEAL	ISEAL	Email	Complain about the outcome of a complaint to Bonsucro related to the operation of ISEAL system	Applicable ISEAL Code	http://www.bonsucro.com/complaints-and-grievances/reporting-to-a-third-party-organisation/ First option on the list	n/a	Independently managed by ISEAL	ISEAL

Option	Managed by	Filing	Applicable Case	Scope	Process Website link	Link to audit process	Conflict of Interest Management	Cases Records / Registry maintained by
Contacting the European Commission	ISEAL	Email	Voicing your concerns regarding Bonsucro's implementation of RED recast	RED recast publication	http://www.bonsucro.com/complaints-and-grievances/reporting-to-a-third-party-organisation/ Second option on the list	Potentially	Independently managed by the European Commission	European Commission

Although this is expected to change in the future, Bonsucro does not currently publish the date of upcoming audits and associated applicant and certification body's name. For this reason, when using this option, the complainant is given the option to email Bonsucro requesting for Bonsucro to forward their complaint / allegation to the relevant certification body. See http://www.bonsucro.com/complaints-and-grievances/organisation-is-a-bonsucro-member-and-is-applying-for-bonsucro-certification/ Second option on the list.

Additional clarification on the Bonsucro Grievance Mechanism: appointment of the Adjudicator/Administrator, and procedure to avoid conflict of interest in decision making

The Bonsucro Grievance Mechanism (GM) is one of the options offered to complain about a Bonsucro member. This mechanism is managed by CEDR (Centre for Effective Dispute Resolution), an independent third party (independent from Bonsucro, the certification bodies, the members etc.). CEDR is a well-established and highly respected organisation, at the forefront of providing mediation services for commercial disputes. CEDR's partnership with Bonsucro is aligned with its development of alternative dispute mechanisms in the field of human rights.

The partnership between Bonsucro and CEDR is in response to the strong demand from stakeholders that Bonsucro's newly developed Grievance Mechanism offers mediation, with a fair and independent process to determine the validity of allegations and any subsequent action to be taken.

The independence of the adjudicator/administrator and the procedure to avoid conflict of interest in decision making has been detailed in grievance mechanism rules paragraphs 1.2 and 1.3. More information on this point is contained in the service contract between Bonsucro and CEDR (confidential).

Protection of complainants in the Bonsucro Complaints and Grievance Management System

A complainant raising a concern may request the administrator of the grievance to maintain his/her anonymity through the entire conflict resolution process when submitting the complaint, explaining the reasons for this request.

Complaints must be received according to the table on item 7.7 Complaint procedure. The authorised Bonsucro staff members or its representative to handle grievances assess the complaint and decide on granting anonymity. If anonymity is granted, the complainant is given a code name to facilitate further communications.

If anonymity is granted, Bonsucro or its representative will ensure that the identity of the complainant will not be disclosed throughout the process. Information about the complainant will not be accessible for non-authorised Bonsucro staff members, Bonsucro board members and others. This applies to report related to the complaint, and to any other information from which the identity of the complainant may be directly or indirectly deduced.

Except from legal obligations to disclose information to authorities or courts, Bonsucro will not share any specific information regarding a conflict with any party not involved in the conflict resolution process while the investigation is ongoing. If there is a legal obligation to disclose information to authorities or courts, the complainant will be informed before the identity is disclosed, unless such information would jeopardise the related investigations or judicial proceedings. When informing the complainant, Bonsucro will send them an explanation in writing of the reasons for the disclosure of the confidential data concerned.

7.9. Internal monitoring

Bonsucro operates a system of internal monitoring to verify compliance of economic operators with the provisions of the scheme and to ensure the quality of the work carried out by the auditors of the certification bodies.

Bonsucro's system for internal monitoring has been detailed in the following documents:

- The Bonsucro Certification Protocol;
- The Bonsucro Accreditation and Oversight Procedures;

- The Bonsucro Complaints & Grievance Management System .

As part of the monitoring process, Bonsucro requires certification bodies to submit to the Bonsucro secretariat all Bonsucro EU-RED audit reports, and actual value GHG emission calculations including related background evidence on the application of GHG emission saving credits (e_{sca}) where applicable. The time spent on audits shall also be provided (also refer to Certification Protocol V6 Part 2 section 21 (audit documentation) and annex 2).

Results of the internal monitoring activities are evaluated on an annual basis by the Bonsucro secretariat. Depending on results and key issues identified, this may lead to one or more of the following actions:

- Publication of guidance documents for economic operators (producers and/or supply chain) and/or for certification bodies, providing guidance & clarification on specific aspects of the Bonsucro standards;
- Trainings for economic operators or certification bodies, providing guidance & clarification on specific aspects of the Bonsucro standards;
- Harmonisation meetings for certification bodies, to ensure harmonized auditing practices.

Guidance documents, trainings and other meetings may apply globally, or be developed for specific countries/regions (depending on needs assessment based on internal monitoring results).

The results of the annual monitoring activities will be summarized in Bonsucro's annual activity report submitted to the European Commission.

Customer Due Diligence/Know your Customer

Bonsucro performs a due diligence of all organisations applying for Bonsucro membership, including a public consultation process.

The sources of information considered by Bonsucro include the following:

- Information submitted by the company (self-assessment questionnaire against Bonsucro Code of Conduct and evidence);
- Comments submitted during the 30 day-public consultation period (for applicant members only);
- Publicly available news/information in connection with the company;
- Online media checks to find out any news stories and/or human rights issues being publicly reported on that might raise the risk rating.

The information collected is checked by the Bonsucro against a risk-assessment framework developed in line with the Code of Conduct and taking into account any comments received during the public consultation process.

The risk assessment informs the Bonsucro decision on membership based on a grading of risk which takes account of the following:

- Company is / is applying for a single membership or membership cohort;
- Company's human rights policy;

- Company's commitments to international/sector-specific standards;
- Company's risk identification & assessment;
- Company's risk management;
- Company's remediation / grievance mechanism;
- Findings or allegations of non-compliance with applicable laws;
- Adverse findings by a court, or other judicial body;
- Complaints to a non-judicial grievance process;
- Existence of any previous complaints or comments/rejections;
- Location of the organization;
- Online searches for any publicly available stories/news in connection with the company and relevant to the risk assessment;
- Comments received for 30 days candidacy period;
- Any other information gathered through informal communications, social media, networks.

Note: Please note that Bonsucro periodically reviews its due diligence process to improve it, which might lead to an updated of the above list of information which is being considered.

Transparency on other voluntary scheme participation by economic operator

When an economic operator (Bonsucro member) applies for Bonsucro EU-RED certification, Bonsucro requires that the economic operator discloses the following information it is application:

- Whether the economic operator or its predecessor are currently participating in another voluntary scheme or have participated in another voluntary scheme in the last 5 years;
- All relevant information, including the mass balance data and the auditing reports and, where applicable, any decisions to suspend or withdraw its certificates in the last 5 years;
- Whether they withdrew from a scheme before the first surveillance audit.

Bonsucro will exclude economic operators from Bonsucro EU-RED if they do not disclose the information listed above, or if the certification body of the economic operator concludes that one of the following cases applies to the economic operator:

- The economic operator or its legal predecessor failed the initial audit under another scheme, unless such audit took place more than 3 years before the application or if in the meantime the other scheme ceased its certification activities, which prevented the economic operator for reapplying.
- The economic operator or its legal predecessor withdrew from another scheme before the first surveillance audit took place, unless the operator can prove that it had a valid reason for doing so.
- The economic operator is suspended from participation in another voluntary scheme. Where the participation of an economic operator, or its predecessors, in a voluntary scheme is suspended or terminated by the withdrawal of its certificate following an audit which confirmed critical non-conformity, Bonsucro may refuse the participation of that economic operator for at least 2 years following the suspension or termination of participation.

Where an economic operator that was previously found to be in critical or major non-conformity applies for recertification to the Bonsucro EU-RED scheme, the auditor shall bring

that fact to the attention of all voluntary schemes in which the economic operator is currently participating, or to which it has applied for recertification.

7.10. Bonsucro governance

The governance structure of Bonsucro is detailed on the Bonsucro website. The technical capacity in Bonsucro's governance is covered by the Technical Advisory Board (TAB). The legal capacity is with the Bonsucro Board of Directors, who are not Bonsucro Members, independent and all registered in the UK.

The role of the Members Council is to provide views, advice, recommendations, and informed opinions to the Bonsucro Board of Directors and to the Technical Advisory Board on strategy, strategic plan and operations, standards, emerging Issues and risks, communications with members and Bonsucro's constituencies, etc. In addition, the Members Council provides views on any individual recommended by the Governance & Nominations Committee to be appointed to the Bonsucro Board of Directors, with the power to veto any such recommendations, and may request, from time to time, a performance review of the Bonsucro Board of Directors and follow up action.

Composition of the Members Council

The Members Council comprises of 15 elected members, 3 from each Bonsucro membership class. In addition, there are up to 10 co-opted members, based on skills needs, representation needs etc. Candidates from each Bonsucro membership class can freely apply, and then each category will vote online for the member(s) they want as their Members Council representative. There is no geographic restriction because whoever is elected will represent that category globally.
There is also no specific rule for the sectors, other than the 5 Bonsucro membership class. Bonsucro tries its best to have all sectors represented in relation to the sugarcane product and its derivatives.

Independence and conflict of interest

Bonsucro does not allow financial, commercial, or other pressures to compromise its independence as a certification scheme. All members of the Board, the Technical Advisory Board, and the Members Council as well as all Bonsucro employees have to sign the policies related to Conflict of interest, anti-corruption and confidentiality.
Persons having a potential conflict of interest are excluded from decision-making in any of the governing bodies of Bonsucro.

Bonsucro monitors risks to its impartiality and potential conflicts of interest on an ongoing basis. This includes risks related to ownership, governance, management, personnel relations, shared resources, finances, contracts, marketing, and payment of a sales commission or other inducements. Monitoring activities are documented, including actions taken to mitigate any potential risk identified during the monitoring. Monitoring activities and results are evaluated on an annual basis.

Annex I. Bonsucro EU-RED GHG calculation methodology

1. Introduction

One of the key requirements in EU-RED is a minimum level of greenhouse gas savings for final biofuels, bioliquids and biomass fuels compared to fossil fuel alternatives. The greenhouse gas emission savings from the use of biofuels, bioliquids and biomass fuels shall be:

a. at least 50 % for biofuels, biogas consumed in the transport sector, and bioliquids produced in installations in operation on or before 5 October 2015;
b. at least 60 % for biofuels, biogas consumed in the transport sector, and bioliquids produced in installations starting operation from 6 October 2015 until 31 December 2020;
c. at least 65 % for biofuels, biogas consumed in the transport sector, and bioliquids produced in installations starting operation from 1 January 2021;
d. at least 70 % for electricity, heating and cooling production from biomass fuels used in installations starting operation from 1 January 2021 until 31 December 2025,
e. and 80 % for installations starting operation from 1 January 2026.

An installation shall be considered to be in operation once the physical production of fuel, heat or cooling, or electricity has started (i.e. once the production of fuels including biofuels, biogas or bioliquids, or production of heat, cooling or electricity from biomass fuels has started).

EU-RED allows three options to comply with the greenhouse requirement: use of default values, calculation of actual values, or using a combination of disaggregated default values and calculated actual values.

This annex specifies how operators which wish to become or remain Bonsucro EU-RED certified can comply with the greenhouse gas criterion. Section 2 specifies general GHG requirements. Section 3 details the GHG calculation methodology for biofuels and bioliquids, and Section 4 details the GHG calculation methodology for biomass fuels.

2. General requirements

2.1. Options for the Bonsucro EU-RED GHG requirements

Supply chain operators shall use one of the following options for the greenhouse gas criterion for biofuels, bioliquids and biomass fuels:

a. Use of a default value for greenhouse gas emission saving if the production pathway is laid down in Part A or B of Annex V of RED recast for biofuels and bioliquids and in Part A of Annex VI of EU-RED for biomass fuels. Default values can only be applied if the "el" value for those biofuels or bioliquids calculated in accordance with point 7 of Part C of Annex V of RED recast and for those biomass fuels calculated in accordance with point 7 of Part B of Annex VI of -RED recast is equal or less than zero;
b. Use of actual greenhouse gas values to calculate total greenhouse gas savings according to the RED recast methodology and specified in Part C of Annex V of RED recast for biofuels and bioliquids and in Part B of Annex VI of RED recast for biomass fuels;
c. For biofuels and bioliquids, use of a value calculated as the sum of the formulas referred to in point 1 of Part C of Annex V of RED recast, where disaggregated default values in Part D or E or Annex V of RED recast may be used for some factors and actual value, calculated in

accordance with the methodology laid down in Part C of Annex V of RED recast, are used for all other factors;

d. For biomass fuels, use of a value calculated as the sum of the formulas referred to in point 1 of Part B of Annex VI of RED recast, where disaggregated default values in Part C of Annex VI of RED recast may be used for some factors, and actual values, calculated in accordance with the methodology laid down in Part B of Annex VI, are used for all other factors.

Detailed requirements and guidance on the use of default values and actual values have been elaborated below:

Use of default values

Default values listed in Annexes V and VI of RED recast can only be applied if the process technology and feedstock used for the production of the fuel match their description and scope, and in the case of biomass fuels the transport distance. In case specific technologies are set out, the default values can only be used if those technologies were actually applied.

Note: Some of the default values were subject to minor revisions and updates were published in the RED recast corrigenda published on 25 September 2020[5]. The default values in Annex V and Annex VI of RED recast may be subject to further revisions in future. Any updates by the European Commission will become valid under Bonsucro EU-RED requirements. It is the responsibility of the auditor to check that economic operators are using the most up to date default values.

Use of disaggregated default values

Annex V and Annex VI of RED recast also list disaggregated default values. Disaggregated default values relate to GHG emissions in part of the supply chain/biofuel production pathway and can be used in combination with actual values to calculate overall GHG emissions and emission savings.

Producers and supply chain operators may use disaggregated default values for cultivation (e_{ec}) processing (e_p) and/or transport and distribution (e_{td}) specified in Annex V and Annex VI of RED recast.

These disaggregated default values can be combined with other disaggregated default values representing other parts of the supply chain, or with actual values for that part of the supply chain.

Annex V and Annex VI of EU-RED do not provide default emission values for land use change (e_l). This means that if a disaggregated default value is used for cultivation (e_{ec}), an actual GHG emission value for land use change will need to be added.

If supply chain operators use a combination of disaggregated default values and actual values and/or change from disaggregated default values to actual values this shall be done in accordance with the methodology presented in this document (refer to Chapter 4).

[5] eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L2001R(04)

Producers and supply chain operators shall clearly communicate to the next economic operator that disaggregated default values or a combination of disaggregated default values and actual values is used for the RED recast GHG criterion.

Note: Some of the disaggregated default values were subject to minor revisions and updates were published in the RED recast corrigenda published on 25 September 2020[6]. The disaggregated default values in Annex V and Annex VI of RED recast may be subject to further revisions in future. Any updates by the European Commission will become valid under Bonsucro EU-RED requirements. It is the responsibility of the auditor to check that economic operators are using the most up to date disaggregated default values.

Use of actual values

Producers are only allowed to use actual GHG values after the capability to conduct GHG emission calculations has been verified by an auditor. Such a verification shall be performed during the audit of the producer prior to this issuance of the first Bonsucro EU-RED certification.

Information on actual GHG emissions has to be provided for all relevant elements of the GHG emission calculation formula. 'Relevant' refers in this context to elements for which reporting is obligatory (e.g. e_l in case of land use change), all elements for which actual values should be used instead of disaggregated default values and all elements related to emission savings (if applicable).
If at any point of the chain of custody emissions have occurred and are not recorded, so that the calculation of an actual value is no longer feasible for operators downstream in the chain of custody, this must be clearly indicated in the delivery notes.

When using actual values, at each step of the chain of custody, GHG emission estimates shall be added to the GHG value included in the documentation to the consignment purchased from the previous operator in the chain of custody.
The following GHG emissions shall be considered:

- Emissions from any land use change that has occurred since 1 January 2008 (refer to section 3 and 4 for details).
- Additional emissions from transport and/or processing have to be added to ep and/or etd respectively.
- Energy losses occurred during processing or if relevant transportation or storage have to be taken into account using a 'feedstock factor'. This applies to each processing step but can be also relevant for other steps in the chain of custody e.g. drying of feedstock (refer to section 3 and 4 for details).
- Whenever a processing step yields co-products, emissions need to be allocated using an 'allocation factor' following the rules set out in the GHG emission calculation methodology (refer to section 3 and 4 for details).
- The actual greenhouse gas data shall be communicated to the next economic operator. The greenhouse gas intensity shall be expressed as kg $CO_{2\text{-eq}}$/dry-tonne feedstock or intermediary product, or as g $CO_{2\text{-eq}}$/MJ biofuel, bioliquid or biomass fuel. This means that at

[6] eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L2001R(04)

the last processing step the emission estimate needs to be converted into the unit g CO_{2-eq}/MJ of final biofuel, bioliquid or biomass fuel.

Actual values can only be calculated when all relevant information is available and transmitted through the chain of custody:

a. Actual values of emissions from cultivation can only be determined at the origin of the chain of custody.
b. Actual values of emissions from transport can only be determined if emissions of all transport steps are recorded and transmitted through the chain of custody.
c. Actual values of emissions from processing can only be determined if emissions of all processing steps are recorded and transmitted through the chain of custody.

Whenever information which is relevant for the calculation of actual emissions is not available, default values must be used

Standard calculation values published in Annex IX of the Implementing Regulation 2022/996 shall be applied whenever available. Alternative values may be used but must be appropriately and fully justified and noted in the calculation documentation to facilitate verification by auditors.

For the calculation of actual GHG emissions, all relevant input data shall be collected on site, documented, and made available to the auditor. Section 3-5 specify which data shall be collected at every step of the supply chain. It is not necessary to include in the calculation data which will have little or no effect on the result, such as chemicals used in low amounts in processing.

Input data used for actual GHG calculation shall cover a full year (12 months calculation period). This shall be as recent as possible, or alternatively cover the previous calendar year or financial year of the operations. The calculation period covered must be notified on the calculation sheet.

Records of greenhouse gas data and calculations shall be kept for a minimum of 5 years, or longer if required by the relevant national authority.

Use of an EU approved GHG calculation tool

It is recommended that the GHG calculations are executed by using an EU approved calculation tool (if available). Such tool contains emission factors, conversion factors and formulas which have been approved by the EU. If an EU approved tool is not used for the calculations the auditor is required to verify both the inputs and the calculations used (emission factors, conversion factors and formulas).

If an EU approved tool is used the auditor is required to verify:

- That the correct version of the tool has been used;
- That the tool has been applied correctly, including a correct selection of the pathway;
- If any modifications to the pre-defined pathway were made, and that these modifications have been done correctly if made;
- That all relevant GHG information has been taken into account in the correct way.

The tool used for the calculations shall be reported in the audit report.

2.2. Transfer of GHG data through the supply chain

Each consignment transacted shall contain information on GHG emissions, including accurate data on all relevant elements of the emission calculation formula (i.e. e_{ec}, e_l, e_p, e_{td} , e_{sca}).

In case actual values are not used, information on the amount of GHG emissions shall not be transmitted through the chain of custody before the last processing step. If at any point of the chain of custody emissions have occurred and are not recorded, so that the calculation of an actual value is no longer feasible for operators downstream in the chain of custody, this must be clearly indicated in the delivery notes.

Averaging of GHG data

Where a combined consignment is supplied to a client, averaging GHG data is not allowed. The original GHG value of each component of the consignment can be allocated to a similar amount of outgoing material. Alternatively, a group consignment can use the worst GHG performance.

Each separate GHG value must be reported on the documents going to the client (buyer) or the highest (worst) GHG value can be used for the entire consignment. Other sustainability data such as country of origin and feedstock type can be grouped if identical.

Reporting GHG emissions

GHG emissions shall be reported using appropriate units. These are:

a. g CO_2eq/dry-ton for raw materials and intermediary products
b. g CO_2eq/MJ for final fuels

When default values are used, information on GHG emissions should only be reported for final fuels and can be reported as an aggregate. If relevant, both, the process technology and the raw material used need to be specified.

Actual values can only be calculated when all relevant information is available and transmitted through the chain of custody:

a. Actual values of emissions from cultivation can only be determined at the origin of the chain of custody.
b. Actual values of emissions from transport can only be determined if emissions of all transport steps are recorded and transmitted through the chain of custody.
c. Actual values of emissions from processing can only be determined if emissions of all processing steps are recorded and transmitted through the chain of custody.

If at any point of the chain of custody emissions have occurred and are not recorded, so that the calculation of an actual value is no longer feasible for operators downstream in the chain of custody, this must be clearly indicated in the delivery notes.

Information on actual GHG emissions has to be provided for all relevant elements of the GHG emission calculation formula. 'Relevant' refers in this context to elements for which reporting is obligatory (e.g. e_l in case of land use change), all elements for which actual values should be

used instead of disaggregated default values and all elements related to emission savings (if applicable).

2.3. Use of typical emissions from cultivation published by EC

Member States, or competent authorities of third countries, may submit to the Commission reports including data on typical emissions from cultivation of feedstock (Article 31(2) of RED recast). Bonsucro allows operators to apply these values as an alternative to actual values provided these have been published in the unit g $CO_{2\text{-}eq}$/dry-ton of feedstock on the European Commission website.

3. Methodology for the calculation of GHG emissions from production and use of biofuels and bioliquids

3.1. Calculation of greenhouse gas emissions from the production and use of biofuels and bioliquids

Greenhouse gas emissions from the production and use of biofuels shall be calculated as:

$$E = e_{ec} + e_l + e_p + e_{td} + e_u - e_{sca} - e_{ccs} - e_{ccr}$$

Where:

E = total emissions from the use of biofuels
e_{ec} = emissions from the extraction or cultivation of raw materials
e_l = annualised emissions from carbon stock changes caused by land-use change
e_p = emissions from processing
e_{td} = emissions from transport and distribution
e_u = emissions from the use of the biofuel
e_{sca} = emission saving from soil carbon accumulation via improved agricultural management
e_{ccs} = emission saving from carbon capture and geological storage
e_{ccr} = emission saving from carbon capture and replacement

Under Bonsucro EU-RED, emission saving from carbon capture and geological storage (e_{ccs}) and emission saving from carbon capture and replacement (e_{ccr}) cannot be applied.

Emissions from the manufacture of machinery and equipment shall not be taken into account.

Greenhouse gas emissions from the production and use of bioliquids shall be calculated as for biofuels (E), but with the extension necessary for including the energy conversion to electricity and/or heat and cooling produced, as follows:

(i) For energy installations delivering only heat:

$$EC_h = \frac{E}{\eta_h}$$

(ii) For energy installations delivering only electricity:

$$EC_{el} = \frac{E}{\eta_{el}}$$

Where

EC h,el = Total greenhouse gas emissions from the final energy commodity;
E = total greenhouse gas emissions of the bioliquid before end-conversion
η_{el} = the electrical efficiency, defined as the annual electricity produced divided by the annual bioliquid input based on its energy content
η_h = The heat efficiency, defined as the annual useful heat output divided by the annual bioliquid input based on its energy content

(iii) For the electricity or mechanical energy coming from energy installations delivering useful heat together with electricity and/or mechanical energy:

$$EC_{el} = \frac{E}{\eta_{el}} \left(\frac{C_{el} \cdot \eta_{el}}{C_{el} \cdot \eta_{el} + C_h \cdot \eta_h} \right)$$

(iv) For the useful heat coming from energy installations delivering heat together with electricity and/or mechanical energy:

$$EC_h = \frac{E}{\eta_h} \left(\frac{C_h \cdot \eta_h}{C_{el} \cdot \eta_{el} + C_h \cdot \eta_h} \right)$$

where:

$EC_{h,el}$ = Total greenhouse gas emissions from the final energy commodity.
ETotal = greenhouse gas emissions of the bioliquid before end-conversion.
η_{el} = The electrical efficiency, defined as the annual electricity produced divided by the annual fuel input based on its energy content.
η_h = The heat efficiency, defined as the annual useful heat output divided by the annual fuel input based on its energy content.
C_{el} = Fraction of exergy in the electricity, and/or mechanical energy, set to 100% (C_{el} = 1).
C_h Carnot = efficiency (fraction of exergy in the useful heat).

The Carnot efficiency, C_h, for useful heat at different temperatures is defined as:

$$C_h = \frac{T_h - T_0}{T_h}$$

Where:

Th = Temperature, measured in absolute temperature (kelvin) of the useful heat at point of delivery.
T0 = Temperature of surroundings, set at 273,15 kelvin (equal to 0 °C)

If the excess heat is exported for heating of buildings, at a temperature below 150 °C (423,15 kelvin), C_h can alternatively be defined as follows:

C_h = Carnot efficiency in heat at 150 °C (423,15 kelvin), which is: 0,3546

For the purposes of that calculation, the following definitions apply:
(a) Cogeneration: means the simultaneous generation in one process of thermal energy and electricity and/or mechanical energy;
(b) useful heat: means heat generated to satisfy an economical justifiable demand for heat, for heating and cooling purposes;
(c) economically justifiable demand: means the demand that does not exceed the needs for heat or cooling, and which would otherwise be satisfied at market conditions.

3.2. Expression of greenhouse gas emissions from biofuels and bioliquids

Greenhouse gas emissions from biofuels and bioliquids shall be expressed as follows:
(a) greenhouse gas emissions from biofuels, E, shall be expressed in terms of grams of CO_2 equivalent per MJ of fuel, g $CO_{2\text{-eq}}$/MJ.
(b) greenhouse gas emissions from bioliquids, EC, in terms of grams of CO_2 equivalent per MJ of final energy commodity (heat or electricity), g $CO_{2\text{-eq}}$/MJ.

When heating and cooling are co-generated with electricity, emissions shall be allocated between heat and electricity (as under 1(b)), irrespective if the heat is used for actual heating purposes or for cooling (Note: Heat or waste heat is used to generate cooling (chilled air or water) through absorption chillers. Therefore, it is appropriate to calculate only the emissions associated to the heat produced per MJ of heat, irrespectively if the end-use of the heat is actual heating or cooling via absorption chillers).

Where the greenhouse gas emissions from the extraction or cultivation of raw materials e_{ec} are expressed in unit g $CO_{2\text{-eq}}$/dry-ton of feedstock, the conversion to grams of CO_2 equivalent per MJ of fuel, g $CO_{2\text{-eq}}$/MJ, shall be calculated as follows:

$$e_{ec}\text{fuel}_a \left[\frac{gCO_2eq}{MJfuel}\right]_{ec} = \frac{e_{ec}\text{feedstock}_a \left[\frac{gCO_2eq}{t_{dry}}\right]}{LHV_a \left[\frac{MJfeedstock}{tdry\ feedstock}\right]} \cdot \text{Fuel feedstock factor}_a \cdot \text{Allocation factor fuel}_a$$

Where:

$$\text{Allocation factor fuel}_a = \left[\frac{\text{Energy in fuel}}{\text{Energy fuel} + \text{Energy in co-products}}\right]$$

$$\text{Fuel feedstock factor}_a = [\text{Ratio of MJ feedstock required to make 1 MJ fuel}]$$

Emissions per dry-ton feedstock shall be calculated as follows:

$$e_{ec}\text{feedstock}_a \left[\frac{gCO_2eq}{t_{dry}}\right] = \frac{e_{ec}\text{feedstock}_a \left[\frac{gCO_2eq}{t_{moist}}\right]}{(1 - \text{moisture content})}$$

Note: the formula for calculating greenhouse gas emissions from the extraction or cultivation of raw materials e_{ec} describes cases where feedstock is converted into biofuels in one step. For more complex supply chains, adjustments are needed for calculating greenhouse gas emissions from the extraction or cultivation of raw materials e_{ec} for intermediate products.

3.3. Calculation of greenhouse gas emissions savings from biofuels and bioliquids

Greenhouse gas emissions savings from biofuels shall be calculated as follows:

$SAVING = (E_{F(t)} - E_B)/E_{F(t)}$

Where:
E_B = total emissions from the biofuel; and
$E_{F(t)}$ = total emissions from the fossil fuel comparator for transport

Greenhouse gas emissions savings from heat and cooling, and electricity being generated from bioliquids biofuels shall be calculated as:

$SAVING = (EC_{F(h\&c,el)} - EC_{B(h\&c,el)})/EC_{F(h\&c,el)}$,

Where:
$EC_{B(h\&c,el)}$ = total emissions from the heat or electricity; and
$EC_{F(h\&c,el)}$ = total emissions from the fossil fuel comparator for useful heat or electricity

3.4. CO2-intensity of greenhouse gases

The greenhouse gases taken into account for the purposes of point 1 shall be CO_2, N_2O and CH_4. For the purposes of calculating CO_2 equivalence, those gases shall be valued as follows:
CO_2: 1
N_2O: 298
CH_4: 25

3.5. Emissions from the extraction or cultivation of raw materials (e_{ec})

Emissions from the cultivation of raw materials (e_{ec}) shall include the following:

- emissions from the cultivation process, and from inputs used (e.g. chemicals);
- emissions related to the harvesting and collection of sugarcane.

Capture of CO_2 in the cultivation of raw materials shall be excluded.

Emissions related to the crushing and further processing shall be accounted for under 'emissions from processing (e_p)'

Actual values of emissions from cultivation shall be calculated at the origin of the chain of custody and shall be transmitted through the chain of custody up to the last interface. Actual emissions from cultivation can only be calculated if all relevant GHG information is available and has been passed along the supply chain. Emissions shall be expressed in kg $CO_{2\text{-eq}}$/dry tonne feedstock.

To calculate e_{ec} at least the following data shall be collected:

- quantities of mineral and organic fertilisers used (N, P, K, Ca fertilisers), in kg/ha in year of sugarcane harvest considered;
- quantity of other chemicals used (e.g. pesticides), in kg/ha in year of sugarcane harvest considered;
- fuel and electricity consumption, in l/ha and kWh/ha in year of sugarcane harvest considered;
- yield of harvest, i.e. the quantity of sugarcane in the year of sugarcane harvest considered (kg dry feedstock/ha*a).

Other emission relevant data not listed above shall be included in the calculation (e.g. other inputs for the cultivation).

Annex II of this Standard contains additional requirements on data that shall be included in the calculation of e_{ec}. These requirements shall be followed in addition to the requirements specified in this section.

The procedure for data measurement, collection and GHG emission calculation shall be documented.

Producers of sugarcane shall use the following formula to calculate emissions from cultivation:

$$\text{eec} = \frac{\text{EMfertilizer} + \text{EMfield} + \text{EMpesticide} + \text{EMfuel} + \text{EMelectricity}}{\text{yield main product}}$$

Emissions shall be expressed per yield dry product (kg $sugarcane_{dry}$/ha*a). The following formula shall be used to convert emissions per tonne of moist product to emissions per tonne of dry product:

$e_{ec\ dry} = e_{ec\ moist}$ / (1 - moisture content)

Emissions caused by fertiliser use ($EM_{fertiliser}$)

Emissions caused by use of fertilisers ($EM_{fertiliser}$) shall be calculated using the following formula:

$EM_{fertiliser}$ = fertiliser use * $EF_{production\ fertilisers}$

In which:
$EM_{fertilizer}$ = GHG emissions from fertilizer use (kg $CO_{2\text{-}eq}$/ha*a)
Fertiliser use = fertiliser use in kg/ha*a
$EF_{production\ fertilizer}$ = emission factor for fertilizer production (kg $CO_{2\text{-}eq}$/kg fertiliser)

Field emissions (EM_{field})

Field emissions (N_2O) caused by use of nitrogen fertilisers (EM_{field}) shall be calculated using the following formula:

EM_{field} = fertiliser use * EF_{field}

In which:
EM_{field} = GHG field emissions from fertilizer use (kg $CO_{2\text{-}eq}$/ha*a)
Fertiliser use = fertiliser use in kg/ha*a
EF_{field} = emission factor for field emissions of N-fertiliser (i.e. the emission of nitrous oxide (N_2O, expressed in kg $CO_{2\text{-}eq}$/kg N fertiliser):

Emissions caused by pesticide use ($EM_{pesticide}$)

Emissions caused by use of fertilisers ($EM_{pesticide}$) shall be calculated using the following formula:

$EM_{pesticide}$ = pesticide use * $EF_{production\ pesticide}$

In which:
$EM_{pesticides}$ = GHG emissions from pesticides use (kg $CO_{2\text{-}eq}$/ha*a)
Pesticide use = pesticide use in kg/ha*a
$Ef_{production\ pesticides}$ = GHG emission factor for pesticide production (kg $CO_{2\text{-}eq}$/kg pesticide)

Emissions caused by fuel use

Emissions caused by use of fuel (EM_{fuel}) shall be calculated using the following formula:

EM_{fuel} = fuel use *EF_{fuel}

In which:
EM_{fuel} = GHG emissions from fuel use (kg CO_{2-eq}/ha*a)
Fuel use = fuel use in liter/ha*a
EF_{fuel} = GHG emission factor of the fuel (kg CO_{2-eq}/liter)

Emissions caused by electricity use

Emissions caused by electricity use ($EM_{electricity}$) shall be calculated using the following formula:

$EM_{electricity}$ = electricity use * $EF_{electricity}$

In which:
$EM_{electricity}$ = GHG emissions caused by electricity use (kg CO_{2-eq}/ha*a)
Electricity use = electricity use in kWh/ha*a
$EF_{electricity}$ = the emission factor for electricity (in kg CO_{2-eq}/kWh, e.g. based on the national electricity mix in the country where cultivation takes place)

Standard values for emission factors shall be taken from Annex IX of the Implementing Regulation 2022/996.
Emission factors for fertiliser and pesticide production and for fuel and electricity shall be taken from Annex IX of the Implementing Regulation 2022/996, or, if not provided in that Annex, shall be taken from other scientifically recognised databases (e.g. EcoInvent) or scientific literature sources.

Following RED recast, agricultural residues are considered to have zero GHG emissions until the point of collection.

Note: Estimates of emissions from agriculture biomass cultivation may be derived from the use of regional averages for cultivation emissions included in the reports referred to in Article 31(4) of RED recast or the information on the disaggregated default values for cultivation emissions included in this Annex, as an alternative to using actual values. At this time, REDII NUTS2 (or equivalent) are available for Argentina.
In the absence of relevant information in those reports it is allowed to calculate averages based on local farming practices based for instance on data of a group of farms, as an alternative to using actual values.
Emission factors for fertiliser and pesticide production and for fuel and electricity shall be taken from Annex IX of the implementing Regulation 2022/996, or, if not provided in that Annex, shall be taken from other scientifically recognised databases (e.g. EcoInvent) or scientific literature sources.

3.6. Emissions savings from improved agricultural management (esca)

For the purposes of the calculation referred to in point 1(a), greenhouse gas emissions savings from improved agriculture management, e_{sca}, such as shifting to reduced or zero-tillage, improved crop/rotation, the use of cover crops, including crop residue management, and the use of organic soil improver (e.g. compost, manure fermentation digestate), shall be taken into account only if solid and verifiable evidence is provided that the soil carbon has increased or that it is reasonable to expect to have increased over the period in which the raw materials

concerned were cultivated while taking into account the emissions where such practices lead to increased fertiliser and herbicide use.

Annex III of this Standard contains the methodology that shall be followed for determining the emission savings from soil carbon accumulation via improved agricultural management.

Evidence of soil carbon increases shall be provided by means of calculations of carbon stock changes using the Roth-C model. The data used for the Roth-C model calculations and the calculation results shall be documented. This shall, as a minimum, include:

- Data on the plots of land that were considered in the calculation. The time period over which the calculation of carbon stock change was executed;
- Agronomic data that were used as inputs in the Roth-C model calculation (e.g. the use of organic soil improvers, no tillage practices, use of fertilisers and herbicide use);
- The Roth-C model calculations, i.e. digital files with the respective calculations (using the latest version of the Roth-C model);
- Calculations showing how the results of Roth-C model calculations were used in calculating esca. Evidence that the e_{sca} factor was only used for sugarcane grown on the plots of land considered in the Roth-C calculation, and during the time period considered.

Note: It is **not** allowed to use field measurements of soil organic carbon as evidence for changes in soil carbon stocks and calculation of e_{sca}, as results of field measurements tend to be insufficiently reliable (in particular when periods of not more than a year or a couple of years are considered).

The improved agricultural management practices must be applied continuously for at least three years successively if the economic operators would like to account for e_{sca}. This means that it is not allowed to change management practices during the years in which e_{sca} is claimed. If management practices are changed, this will be considered a critical non-conformity of the greenhouse gas criterion which shall be penalized accordingly by the certification body.

About the RothC model

RothC is a dynamic model for the degradation of carbon in non-waterlogged topsoils. The model has been developed to simulate carbon dynamics in mineral souls and takes account of the temperature, precipitation, evaporation, clay content and soil cover. RothC has been calibrated on the basis of long-term experiments from Rothamsted. Originally the model was developed for cropland, but later extended for use on grassland and in forestry.

The latest version of the RothC model, including a use guide and related information can be downloaded from: Rothamsted Carbon Model (RothC) | Rothamsted Research

In case of certification of group of farms, the following additional requirements apply:

- The actual values for e_{sca} have to be calculated at individual farm level, i.e. it is not allowed to calculate an average over the group of farms. This may result in different e_{sca} values per farmer.
- Averaging of emission values from farmers applying e_{sca} and farmers not applying e_{sca} is not allowed, and only those farmers who apply e_{sca} measures are allowed to forward respective values together with the batch of sustainable material.
- Solid and verifiable evidence for each individual farmer who claims e_{sca} must be provided that soil carbon has increased or that they are implemented in best practice so that an increase in soil carbon can be expected over the period in which the raw materials concerned were cultivated.

3.7. Emissions from carbon stock changes caused by land-use change (el)

Annualised emissions from carbon stock changes caused by land-use change, e_l, shall be calculated by dividing total emissions equally over 20 years. For the calculation of those emissions, the following rule shall be applied:

$$e_l = (CS_R - CS_A) \times 3{,}664 \times 1/20 \times 1/P - e_B$$

in which:

e_l = annualised greenhouse gas emissions from carbon stock change due to land-use change (measured as mass (grams) of CO_2-equivalent per unit of biofuel or bioliquid energy (megajoules)). 'Cropland' and 'perennial cropland' shall be regarded as one land use ('Cropland' as defined by IPCC, 'Perennial crops' are defined as multi-annual crops, the stem of which is usually not annually harvested such as short rotation coppice);

CS_R = the carbon stock per unit area associated with the reference land-use (measured as mass (tonnes) of carbon per unit area, including both soil and vegetation). The reference land-use shall be the land-use in January 2008 or 20 years before the raw material was obtained, whichever was the later;

CS_A = the carbon stock per unit area associated with the actual land-use (measured as mass (tonnes) of carbon per unit area, including both soil and vegetation). In cases where the carbon stock accumulates over more than one year, the value attributed to CS_A shall be the estimated stock per unit area after 20 years or when the crop reaches maturity, whichever the earlier;

The factor 3,664 is the quotient obtained by dividing the molecular weight of CO_2 (44,010 g/mol) by the molecular weight of carbon (12,011 g/mol)

P = the productivity of the crop (measured as biofuel or bioliquid energy per unit area per year) and

e_B = bonus of 29 g $CO_{2\text{-eq}}$/MJ biofuel or bioliquid if biomass is obtained from restored degraded land under the condition that evidence is provided that the land:

- was not in use for agriculture or any other activity in January 2008; and

- is severely degraded land, including such land that was formerly in agricultural use. Severely degraded land' means land that, for a significant period of time, has either been significantly salinated or presented significantly low organic matter content and has been severely eroded.

The bonus of 29 g $CO_{2\text{-}eq}$/MJ shall apply for a period of up to 20 years from the date of conversion of the land to agricultural use, provided that a steady increase in carbon stocks as well as a sizable reduction in erosion phenomena for land falling under (b) are ensured.

Note: The Commission shall review, by 31 December 2020, guidelines for the calculation of land carbon stocks drawing on the 2006 IPCC Guidelines for National Greenhouse Gas Inventories – volume 4 and in accordance with Regulation (EU) No 525/2013 and Regulation (EU) 2018/841 of the European Parliament and of the Council. The Commission guidelines shall serve as the basis for the calculation of land carbon stocks for the purposes of this Directive.

3.8. Emissions from processing (ep)

Actual values of emissions from processing shall be determined by recording emissions of all processing steps and transmitting processing emission information through the chain of custody up to the last processing step.

All GHG emission from processing shall be included, including emissions from the processing itself, from waste(water) and leakage and from the production of chemicals or feedstocks used in the processing including the CO_2 emissions corresponding to the carbon contents of fossil inputs (whether or not actually combusted in the process). Emissions from processing shall include emissions from drying of interim products and materials where relevant.

Supply chain operators shall use the following formula to calculate emissions from a processing step (e_p, in kg $CO_{2\text{-}eq}$/dry-tonne):

$$\mathrm{ep} = \frac{\mathrm{EMelectricity} + \mathrm{EMheat} + \mathrm{EMinputs} = \mathrm{EMwastewater}}{\text{yield intermediate product}}$$

In which the 'yield intermediate product' (tonnes/a) shall refer to dry tonnages. In case e_p was calculated on moist tonnage basis, it shall be converted to dry tonnage basis using the following formula:

$e_{p\ \text{dry tonnage}} = e_{p\ \text{moist tonnage}}$ / (1- moisture content)

GHG emissions from electricity ($EM_{electricity}$), heat (EM_{heat}), inputs (EM_{inputs}) and wastewater ($EM_{wastewater}$) shall be calculated following the formula specified below:

Electricity

To calculate emissions from electricity use ($EM_{electricity}$, in kg $CO_{2\text{-}eq}$/a), the following formula shall be used:

$EM_{electricity}$ = electricity consumption * $EF_{energy\ mix}$

In which the electricity consumption is in kWh/a, and EF is the electricity emission factor (kg $CO_{2\text{-}eq}$/kWh).

Producers may use an average value for an individual electricity production plant for electricity produced by that plant if that plant is not connected to the electricity grid.

Heat production

To calculate emissions from heat production (EM_{heat}, in kg $CO_{2\text{-}eq}$/a), the following formula shall be used:

EM heat = fuel consumption * Ef_{fuel}

In which the fuel consumption is in kg/a, and EF is the fuel emission factor (kg $CO_{2\text{-}eq}$/kg).

Inputs production

To calculate emissions from inputs in the processing ($EM_{input,}$ in kg $CO_{2\text{-}eq}$/a), the following formula shall be used:

EM_{inputs} = input consumption * EF_{inputs}

In which 'inputs consumption' is in kg or liter per annum, and EF_{inputs} is the emission factor for the inputs (kg $CO_{2\text{-}eq}$ per kg or per liter)

Wastewater

To calculate emissions from processing wastewater ($EM_{wastewater,}$ in kg $CO_{2\text{-}eq}$/a), the following formula shall be used:

$EM_{wastewater}$ = volume of wastewater * $EF_{wastewater}$

In which 'volume of wastewater' is in cbm/a, and $EF_{wastewater}$ is the emission factor for the wastewater generated (kg $CO_{2\text{-}eq}$/cbm wastewater)

To calculate e_p, the following data shall be collected at all processing units:

- Quantity of main products and co-products (t/a);
- Quantity of waste and wastewater generated (kg/a);
- Quantity of chemicals and other inputs to the process (kg/a or l/a);
- Electricity consumption (kWh/a) including the source of electricity;
- Heat consumption (MJ/a), the fuel used for heat production, and the type of heating system used (e.g. boiler or CHP).

Input data for GHG emission calculations shall be measured or be based on the technical specifications of the processing facility.

Emissions shall be calculated for every processing step individually and be summed up by the processor to calculate e_p. Actual emissions from transport and distribution can only be calculated if all relevant GHG information from all processing is available and has been passed along the supply chain. Emissions shall be expressed in kg $CO_{2\text{-eq}}$/dry tonne feedstock .

Standard values for emission factors shall be taken from Annex IX of the Implementing Regulation 2022/996.

3.9. Emissions from transport and distribution (etd)

Emissions from transport and distribution (e_{td}, in kg $CO_{2\text{-eq}}$/dry-tonne feedstock) shall include emissions from the transport and storage of raw material and intermediate products, and from storage and distribution of finished biofuels (including emissions from filling stations and depots).
Supply chain operators shall use the following formula to calculate emissions from transport and distribution.

$$etd = \frac{\text{Tneeded} * (\text{dloaded} * \text{Kloaded} + \text{dempty} * \text{Kempty}) * \text{EFfuel}}{quantity\ transported\ input\ material}$$

In which:

T_{needed} = number of transports (total quantity transported divided by load per transport)
d_{loaded} = transport distance of loaded transport system (km)
d_{empty} = transport distance of empty transport system (km)
K_{loaded} = fuel use/km of loaded transport system (l/km)
K_{empty} = fuel use per km of empty transport system (l/km)
EF_{fuel} = greenhouse gas emission factor for fuel used(g $CO_{2\text{-eq}}$/liter)

Emissions shall be calculated for every transport step individually and be summed up by the last interface to calculate e_{td}. Actual emissions from transport and distribution can only be calculated if all relevant GHG information from all transport steps is available and has been passed along the supply chain. Emissions shall be expressed in kg $CO_{2\text{-eq}}$/dry tonne feedstock. The following formula shall be used to convert emissions per tonne of moist product to emissions per tonne of dry product:

$e_{td\ dry} = e_{td\ moist}$ / (1 - moisture content)

To calculate e_{td}, the following data shall be collected at all processing units:

- transport distances (km) of loaded and empty freights (loaded return freights do not have to be taken into account);
- mode of transport (e.g. diesel truck, 40t);
- amount of feedstock transported per load.

If upstream transport is calculated, the calculated GHG emissions shall be divided by the amount of input material applying a feedstock factor and an allocation factor. This is because processing plants calculate upstream transport emissions in kg $CO_{2\text{-eq}}$/kg of dry matter of the transported feedstock.

In addition, GHG emissions from filling stations and depots shall be taken into account following the guidelines and data laid down in the European Commission note on GHG emissions from filling stations and depots (refer to the Box below). If more than one depot is used, GHG emissions of all depots shall be taken into account.
Other factors for calculation shall include fuel consumption of the used transport mode, when loaded and empty (liter/km), emission factor of the fuel ($CO_{2\text{-eq}}$/liter).
Standard values for emission factors shall be taken from Annex IX of the Implementing Regulation 2022/996.

3.10. Emissions of the fuel in use (eu)

Emissions of the fuel in use, e_u, shall be taken to be zero for biofuels and bioliquids.

Emissions of non-CO_2 greenhouse gases (N_2O and CH_4) of the fuel in use shall be included in the e_u factor for bioliquids.

3.11. Cogeneration of heat and/or electricity

Where a cogeneration unit – providing heat and/or electricity to a fuel production process for which emissions are being calculated – produces excess electricity and/or excess useful heat, the greenhouse gas emissions shall be divided between the electricity and the useful heat according to the temperature of the heat (which reflects the usefulness (utility) of the heat). The useful part of the heat is found by multiplying its energy content with the Carnot efficiency, C_h, calculated as follows:

$$C_h = \frac{T_h - T_0}{T_h}$$

In which:
T_h = Temperature, measured in absolute temperature (kelvin) of the useful heat at point of delivery.
T_0 = Temperature of surroundings, set at 273,15 kelvin (equal to 0ºC)

If the excess heat is exported for heating of buildings, at a temperature below 150ºC (423,15 kelvin), C_h can alternatively be defined as follows:

C_h = Carnot efficiency in heat at 150ºC (423,15 kelvin), which is: 0,3546

For the purposes of that calculation, the actual efficiencies shall be used, defined as the annual mechanical energy, electricity and heat produced respectively divided by the annual energy input.

For the purposes of that calculation, the following definitions apply:

(a) cogeneration: shall mean the simultaneous generation in one process of thermal energy and electrical and/or mechanical energy;

(b) useful heat: shall mean heat generated to satisfy an economical justifiable demand for heat, for heating or cooling purposes;

(c) economically justifiable demand: shall mean the demand that does not exceed the needs for heat or cooling, and which would otherwise be satisfied at market conditions.

3.12. Adjusting GHG emissions throughout the supply chain

General

At every step of the supply chain, additional emissions from transport and/or processing shall be added to e_p and/or e_{td}, respectively.

Application of the feedstock factor

Additionally, a feedstock factor shall be applied to all emissions to take the mass losses occurred into account. A feedstock factor shall be applied at every processing step but may also be relevant at other steps where mass losses occur (e.g. storage). This means that all GHG emissions that are linked with the incoming feedstock (upstream emissions from e_{sca} , e_l, e_p and e_{td}) shall be adjusted to the respective intermediate product using the feedstock factor.

The feedstock factor shall be calculated using the following formula:

Feedstock factor = feedstock (kg_{dry}) / intermediate product (kg_{dry})

Where 'feedstock' is the input material of the processing step considered, and 'intermediate product' is the output material of the processing step considered. The calculation of the feedstock factor shall be based on actual plant data.

After application of the feedstock factor to the upstream emissions, the additional emissions occurring at the recipient (i.e. the supply chain operator where the feedstock factor is calculated) shall be included.

Note: For the application of the feedstock factor the LHV values per dry tonne need to be applied while for the calculation of the allocation factor LHV values for wet biomass need to be used as this approach was also applied for the calculation of the default values.

Application of the allocation factor

Allocation of GHG emissions shall take place at every processing step in the supply chain where a co-product(s) is produced. The GHG emissions up to this processing step shall be distributed to the main product and the co-product proportional to their energy content and weight. GHG emissions downstream of the processing step (e.g. further downstream processing or transport & distribution) shall not be included in the allocation, as these emissions are not related to the co-product.

The allocation shall include the emissions from e_{ec} + e_l + e_{sca} + those fractions of e_p and e_{td} that take place up to and including the process step at which a co-product is produced. If any allocation to co-products has taken place at an earlier process step in the life-cycle, the fraction of those emissions assigned in the last such process step to the intermediate fuel product shall be used for those purposes instead of the total of those emissions.

In the case of biofuels and bioliquids, all co-products shall be taken into account for the purposes of the calculation. No emissions shall be allocated to wastes and residues. Co-products that have a negative energy content shall be considered to have an energy content of zero for the purposes of the calculation.

Processing wastes and residues including bagasse shall be considered to have zero life-cycle greenhouse gas emissions up to the process of collection of those materials irrespectively of whether they are processed to interim products before being transformed into the final product.

In the case of fuels produced in refineries, other than the combination of processing plants with boilers or cogeneration units providing heat and/or electricity to the processing plant, the unit of analysis for the purposes of the calculation shall be the refinery.

The following formula shall be used to calculate the allocation factor for intermediate products and biofuels, respectively (with e_{ec} here used as an example):

e_{ec} intermediate product, allocated = e_{ec} intermediate product, non-allocated * allocation factor intermediate product

with e_{ec} in kg $CO_{2\text{-}eq}$/tonne dry product

$$\text{Allocation factor intermediate product} = \frac{\text{Energy content intermediate product}}{(\text{Energy content intermediate product} + \text{Energy content co} - \text{product})}$$

In which:
Energy content intermediate product = $\text{Yield}_{\text{intermediate product}}$ * $\text{LHV}_{\text{intermediate product}}$

And:
Energy content co-product = $\text{Yield}_{\text{co-product}}$ * $\text{LHV}_{\text{co-product}}$

With energy contents in MJ, yields in kg dry/a and LHVs in MJ/kg.

The energy content shall be calculated using the lower heating value (LHV) and the yield. The LHV shall refer to the entire (moist) (co-)product, not only to the dry fraction of the (co-) product. This 'wet definition LHV' shall be calculated by subtracting from the LHV of the dry matter, the energy needed to evaporate the water in the wet material.

The energy content of co-products with a negative energy content shall be set at zero.
To calculate the allocation, factor the following data shall be used:

- Mass/yield data for products and co-products shall be calculated from on-site mass balance data (kg dry);
- LHV data for products and co-products shall come from published sources.

Calculating emissions from cultivation when processing intermediate products

The following formula shall be applied to emissions from cultivation when processing intermediate products:

e_{ec} intermediate product$_a$ = e_{ec} feedstock$_a$ * feedstock factor$_a$ * allocation factor intermediate product$_a$

with: e_{ec} intermediate product$_a$ and e_{ec} feedstock$_a$ in g $CO_{2\text{-}eq}/kg_{dry}$

and:
Feedstock factor = ratio of kg dry feedstock required to make 1 kg dry intermediate product.
Allocation factor intermediate product = (Energy content intermediate product /(Energy content intermediate product + Energy content co–products))

3.13. Fossil fuel comparator

For biofuels, for the purposes of the calculation referred to in section 3.3 of this Annex, the fossil fuel comparator $E_{F(t)}$ shall be 94 g $CO_{2\text{-}eq}$/MJ.

For bioliquids used for the production of electricity, for the purposes of the calculation referred to in section 3.3 of this Annex, the fossil fuel comparator $EC_{F(e)}$ shall be 183 g $CO_{2\text{-}eq}$/MJ.

For bioliquids used for the production of useful heat, as well as for the production of heating and/or cooling, for the purposes of the calculation referred to in section 3.3 of this Annex, the fossil fuel comparator $EC_{F(h\&c)}$ shall be 80 g $CO_{2\text{-}eq}$/MJ.

4. Methodology for the calculation of GHG emissions from production and use of biomass fuels

4.1. Calculation of greenhouse gas emissions from the production and use of biomass fuels

Greenhouse gas emissions from the production and use of biomass fuels before conversion into electricity, heating, and cooling, shall be calculated as:

$E = e_{ec} + e_l + e_p + e_{td} + e_u - e_{sca} - e_{ccs} - e_{ccr}$,

Where
E = total emissions from the use of biofuels
e_{ec} = emissions from the extraction or cultivation of raw materials
e_l = annualised emissions from carbon stock changes caused by land-use change
e_p = emissions from processing

e_{td} = emissions from transport and distribution
e_u = emissions from the use of the biofuel
e_{sca} = emission saving from soil carbon accumulation via improved agricultural management
e_{ccs} = emission saving from carbon capture and geological storage
e_{ccr} = emission saving from carbon capture and replacement

Under Bonsucro EU-RED, emission saving from carbon capture and geological storage (e_{ccs}) and emission saving from carbon capture and replacement (e_{ccr}) cannot be applied.

Emissions from the manufacture of machinery and equipment shall not be taken into account.

Greenhouse gas emissions from the use of biomass fuels in producing electricity, heating, and cooling, including the energy conversion to electricity and/or heat or cooling produced, shall be calculated as follows:

(i) For energy installations delivering only heat:

$$EC_h = \frac{E}{\eta_h}$$

(ii) For energy installations delivering only electricity:

$$EC_{el} = \frac{E}{\eta_{el}}$$

Where:
ECh,el = Total greenhouse gas emissions from the final energy commodity.
E = Total greenhouse gas emissions of the fuel before end-conversion.
ηel = The electrical efficiency, defined as the annual electricity produced divided by the annual fuel input, based on its energy content.
ηh = The heat efficiency, defined as the annual useful heat output divided by the annual fuel input, based on its energy content.

(iii) For the electricity or mechanical energy coming from energy installations delivering useful heat together with electricity and/or mechanical energy:

$$EC_{el} = \frac{E}{\eta_{el}} \left(\frac{C_{el} \cdot \eta_{el}}{C_{el} \cdot \eta_{el} + C_h \cdot \eta_h} \right)$$

(iv) For the useful heat coming from energy installations delivering heat together with electricity and/or mechanical energy:

$$EC_h = \frac{E}{\eta_h}\left(\frac{C_h \cdot \eta_h}{C_{el} \cdot \eta_{el} + C_h \cdot \eta_h}\right)$$

where:
$EC_{h,el}$ = Total greenhouse gas emissions from the final energy commodity.
E = Total greenhouse gas emissions of the fuel before end-conversion.
η_{el} = The electrical efficiency, defined as the annual electricity produced divided by the annual energy input, based on its energy content.
η_h = The heat efficiency, defined as the annual useful heat output divided by the annual energy input, based on its energy content.
C_{el} = Fraction of exergy in the electricity, and/or mechanical energy, set to 100 % (C_{el} = 1).
C_h = Carnot efficiency (fraction of exergy in the useful heat).

The Carnot efficiency, C_h, for useful heat at different temperatures is defined as:

$$C_h = \frac{T_h - T_0}{T_h}$$

where:
T_h = Temperature, measured in absolute temperature (kelvin) of the useful heat at point of delivery.
T_0 = Temperature of surroundings, set at 273,15 kelvin (equal to 0 °C).

If the excess heat is exported for heating of buildings, at a temperature below 150ºC (423,15 kelvin), C_h can alternatively be defined as follows:

C_h = Carnot efficiency in heat at 150ºC (423,15 kelvin), which is: 0,3546

For the purposes of that calculation, the following definitions apply:
(i) Cogeneration: shall mean the simultaneous generation in one process of thermal energy and electricity and/or mechanical energy;
(ii) useful heat: shall mean heat generated to satisfy an economical justifiable demand for heat, for heating or cooling purposes;
(iii) economically justifiable demand: shall mean the demand that does not exceed the needs for heat or cooling, and which would otherwise be satisfied at market conditions.

4.2. Expression of greenhouse gas emissions from biofuels and bioliquids

Greenhouse gas emissions from biomass fuels shall be expressed as follows:
(a) greenhouse gas emissions from biomass fuels, E, shall be expressed in terms of grams of CO_2 equivalent per MJ of biomass fuel, g $CO_{2\text{-eq}}$/MJ;

(b) greenhouse gas emissions from heating or electricity, produced from biomass fuels, EC, shall be expressed in terms of grams of CO_2 equivalent per MJ of final energy commodity (heat or electricity), g $CO_{2\text{-}eq}$/MJ.

When heating and cooling are co-generated with electricity, emissions shall be allocated between heat and electricity (as under point 1(d)), irrespective if the heat is used for actual heating purposes or for cooling. (Note: Heat or waste heat is used to generate cooling (chilled air or water) through absorption chillers. Therefore, it is appropriate to calculate only the emissions associated to the heat produced per MJ of heat, irrespectively if the end-use of the heat is actual heating or cooling via absorption chillers).

Where the greenhouse gas emissions from the extraction or cultivation of raw materials e_{ec} are expressed in unit g $CO_{2\text{-}eq}$/dry-ton of feedstock, the conversion to grams of CO_2 equivalent per MJ of fuel, g $CO_{2\text{-}eq}$/MJ, shall be calculated as follows:

$$e_{ec}\text{fuel}_a \left[\frac{gCO_2eq}{MJfuel}\right]_{ec} = \frac{e_{ec}\text{feedstock}_a \left[\frac{gCO_2eq}{t_{dry}}\right]}{LHV_a \left[\frac{MJfeedstock}{tdry\ feedstock}\right]} \cdot \text{Fuel feedstock factor}_a \cdot \text{Allocation factor fuel}_a$$

Where

$$\text{Allocation factor fuel}_a = \left[\frac{\text{Energy in fuel}}{\text{Energy fuel} + \text{Energy in co-products}}\right]$$

$$\text{Fuel feedstock factor}_a = [\text{Ratio of MJ feedstock required to make 1 MJ fuel}]$$

Emissions per dry-ton feedstock shall be calculated as follows:

$$e_{ec}\text{feedstock}_a \left[\frac{gCO_2eq}{t_{dry}}\right] = \frac{e_{ec}\text{feedstock}_a \left[\frac{gCO_2eq}{t_{moist}}\right]}{(1 - \text{moisture content})}$$

Note: the formula for calculating greenhouse gas emissions from the extraction or cultivation of raw materials e_{ec} describes cases where feedstock is converted into biofuels in one step. For more complex supply chains, adjustments are needed for calculating greenhouse gas emissions from the extraction or cultivation of raw materials e_{ec} for intermediate products.

4.3. Calculation of greenhouse gas emissions savings from biomass fuels

Greenhouse gas emissions savings from biomass fuels used as transport fuels shall be calculated as follows:

SAVING = $(E_{F(t)} - E_B)/E_{F(t)}$

where
E_B = total emissions from biomass fuels used as transport fuels; and
$E_{F(t)}$ = total emissions from the fossil fuel comparator for transport

Greenhouse gas emissions savings from heat and cooling, and electricity being generated from biomass fuels shall be calculated as follows:

$SAVING = (EC_{F(h\&c,el)} - EC_{B(h\&c,el)})/EC_{F\ (h\&c,el)}$,

where
$EC_{B(h\&c,el)}$total emissions from the heat or electricity,
$EC_{F(h\&c,el)}$total emissions from the fossil fuel comparator for useful heat or electricity.

4.4. CO2-intensity of greenhouse gases

The greenhouse gases taken into account for the purposes outlined in section 4.1 of this annex shall be CO_2, N_2O and CH_4. For the purposes of calculating CO_2 equivalence, those gases shall be valued as follows:

CO_2: 1
CH_4: 25
N_2O: 298

4.5. Emissions from the extraction, harvesting or cultivation of raw materials (eec)

Emissions from the cultivation of raw materials (e_{ec}) shall include the following:

- emissions from the cultivation process, and from inputs used (e.g. chemicals);
- emissions related to the harvesting and collection of sugarcane.

Capture of CO_2 in the cultivation of raw materials shall be excluded.

Emissions related to the crushing and further processing shall be accounted for under 'emissions from processing (e_p)'

Actual values of emissions from cultivation shall be calculated at the origin of the chain of custody and shall be transmitted through the chain of custody up to the last interface. Actual emissions from cultivation can only be calculated if all relevant GHG information is available and has been passed along the supply chain. Emissions shall be expressed in kg $CO_{2\text{-}eq}$/dry tonne feedstock.

To calculate e_{ec} at least the following data shall be collected:

- quantities of mineral and organic fertilisers used (N, P, K, Ca fertilisers), in kg/ha in year of sugarcane harvest considered;
- quantity of other chemicals used (e.g. pesticides), in kg/ha in year of sugarcane harvest considered;
- fuel and electricity consumption, in l/ha and kWh/ha in year of sugarcane harvest considered;
- yield of harvest, i.e. the quantity of sugarcane in the year of sugarcane harvest considered (kg dry feedstock/ha*a).

Other emission relevant data not listed above shall be included in the calculation (e.g. other inputs for the cultivation).
Annex II of this Standard contains additional requirements on data that shall be included in the calculation of e_{ec}. These requirements shall be followed in addition to the requirements specified in this section.

The procedure for data measurement, collection and GHG emission calculation shall be documented.

Producers of sugarcane shall use the following formula to calculate emissions from cultivation:

$$eec = \frac{\text{EMfertilizer} + \text{EMfield} + \text{EMpesticide} + \text{EMfuel} + \text{EMelectricity}}{\text{yield main product}}$$

Emissions shall be expressed per yield dry product (kg sugarcane_{dry}/ha*a). The following formula shall be used to convert emissions per tonne of moist product to emissions per tonne of dry product:

$e_{ec\ dry} = e_{ec\ moist}$ / (1 - moisture content)

Emissions caused by fertiliser use ($EM_{fertiliser}$)

Emissions caused by use of fertilisers ($EM_{fertiliser}$) shall be calculated using the following formula:

$EM_{fertiliser}$ = fertiliser use * $EF_{production\ fertilisers}$

In which:
$EM_{fertilizer}$ = GHG emissions from fertilizer use (kg $CO_{2\text{-}eq}$/ha*a)
Fertiliser use = fertiliser use in kg/ha*a
$EF_{production\ fertilizer}$ = emission factor for fertilizer production (kg $CO_{2\text{-}eq}$/kg fertiliser)

Field emissions (EM_{field})

Field emissions (N_2O) caused by use of nitrogen fertilisers (EM_{field}) shall be calculated using the following formula:

EM_{field} = fertiliser use * EF_{field}

In which:
EM_{field} = GHG field emissions from fertilizer use (kg $CO_{2\text{-}eq}$/ha*a)
Fertiliser use = fertiliser use in kg/ha*a
EF_{field} = emission factor for field emissions of N-fertiliser (i.e. the emission of nitrous oxide (N_2O, expressed in kg $CO_{2\text{-}eq}$/kg N fertiliser):

N_2O field emissions must be calculated for synthetic and organic nitrogen fertilisers as well as for crop residues left at the sugarcane plantings. N_2O emissions from soils shall be calculated using the IPPC methodology[7], including what are described as 'direct' and 'indirect' N_2O emissions. All three IPCC Tiers can be used. Calculations using Tier 1 can be done using the BioGrace calculation tool. Tier 3 requires detailed measurements and/or modelling of N_2O emissions.

Emissions caused by pesticide use ($EM_{pesticide}$)

Emissions caused by use of fertilisers ($EM_{pesticide}$) shall be calculated using the following formula:

$EM_{pesticide}$ = pesticide use * $EF_{production\ pesticide}$

In which:
$EM_{pesticides}$ = GHG emissions from pesticides use (kg $CO_{2\text{-}eq}$/ha*a)
Pesticide use = pesticide use in kg/ha*a
$Ef_{production\ pesticides}$ = GHG emission factor for pesticide production (kg $CO_{2\text{-}eq}$/kg pesticide)

Emissions caused by fuel use

Emissions caused by use of fuel (EM_{fuel}) shall be calculated using the following formula:

EM_{fuel} = fuel use *EF_{fuel}

In which:
EM_{fuel} = GHG emissions from fuel use (kg $CO_{2\text{-}eq}$/ha*a)
Fuel use = fuel use in liter/ha*a
EF_{fuel} = GHG emission factor of the fuel (kg $CO_{2\text{-}eq}$/liter)

Emissions caused by electricity use

Emissions caused by electricity use ($EM_{electricity}$) shall be calculated using the following formula:

$EM_{electricity}$ = electricity use * $EF_{electricity}$

In which:
$EM_{electricity}$ = GHG emissions caused by electricity use (kg $CO_{2\text{-}eq}$/ha*a)
Electricity use = electricity use in kWh/ha*a
$EF_{electricity}$ = the emission factor for electricity (in kg $CO_{2\text{-}eq}$/kWh, e.g. based on the national electricity mix in the country where cultivation takes place)

Emission factors for fertiliser and pesticide production and for fuel and electricity shall be taken from Annex IX of the implementing Regulation 2022/996, or, if not provided in that Annex, shall be taken from other scientifically recognised databases (e.g. EcoInvent) or scientific literature sources.

[7] Refer to 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 11 (http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_11_Ch11_N2O&CO2.pdf)

Following RED recast, agricultural residues are considered to have zero GHG emissions until the point of collection.

Note: Estimates of emissions from agriculture biomass cultivation may be derived from the use of regional averages for cultivation emissions included in the reports referred to in Article 31(4) of EU-RED or the information on the disaggregated default values for cultivation emissions included in this Annex, as an alternative to using actual values. In the absence of relevant information in those reports it is allowed to calculate averages based on local farming practises based for instance on data of a group of farms, as an alternative to using actual values.

4.6. Emissions savings from improved agricultural management (e_{sca})

For the purposes of the calculation referred to in section 4.1 of this annex, greenhouse gas emissions savings from improved agriculture management, esca, such as shifting to reduced or zero-tillage, improved crop/rotation, the use of cover crops, including crop residue management, and the use of organic soil improver (e.g. compost, manure fermentation digestate), shall be taken into account only if solid and verifiable evidence is provided that the soil carbon has increased or that it is reasonable to expect to have increased over the period in which the raw materials concerned were cultivated while taking into account the emissions where such practices lead to increased fertiliser and herbicide use.

Annex III of this Standard contains the methodology that shall be followed for determining the emission savings from soil carbon accumulation via improved agricultural management.

Evidence of soil carbon increases shall be provided by means of calculations of carbon stock changes using the Roth-C model. The data used for the Roth-C model calculations and the calculation results shall be documented. This shall, as a minimum, include:

- Data on the plots of land that were considered in the calculation. The time period over which the calculation of carbon stock change was executed;
- Agronomic data that were used as inputs in the Roth-C model calculation (e.g. the use of organic soil improvers, no tillage practices, use of fertilisers and herbicide use);
- The Roth-C model calculations, i.e. digital files with the respective calculations (using the latest version of the Roth-C model);
- Calculations showing how the results of Roth-C model calculations were used in calculating esca. Evidence that the esca factor was only used for sugarcane grown on the plots of land considered in the Roth-C calculation, and during the time period considered.

Note: It is **not** allowed to use field measurements of soil organic carbon as evidence for changes in soil carbon stocks and calculation of esca, as results of field measurements tend to be insufficiently reliable (in particular when periods of not more than a year or a couple of years are considered).

The Improved agricultural management practices must be applied continuously for at least three years successively if the economic operators would like to account for esca. This means that it is not allowed to change management practices during the years in which esca is claimed. If management practices are changed, this will be considered a critical non-

conformity of the greenhouse gas criterion which shall be penalized accordingly by the certification body.

About the RothC model

RothC is a dynamic model for the degradation of carbon in non-waterlogged topsoils. The model has been developed to simulate carbon dynamics in mineral souls and takes account of the temperature, precipitation, evaporation, clay content and soil cover. RothC has been calibrated on the basis of long-term experiments from Rothamsted. Originally the model was developed for cropland, but later extended for use on grassland and in forestry.

The latest version of the RothC model, including a use guide and related information can be downloaded from: Rothamsted Carbon Model (RothC) | Rothamsted Research

In case of group certification of farms, the following additional requirements apply:

- The actual values for esca have to be calculated at individual farm level, i.e. it is not allowed to calculate an average over the group of farms. This may result in different esca values per farmer.
- Averaging of emission values from farmers applying esca and farmers not applying esca is not allowed, and only those farmers who apply esca measures are allowed to forward respective values together with the batch of sustainable material.
- Solid and verifiable evidence for each individual farmer who claims esca must be provided that soil carbon has increased or that they are implemented in best practice so that an increase in soil carbon can be expected over the period in which the raw materials concerned were cultivated.

4.7. Emissions from carbon stock changes caused by land-use change (el)

Annualised emissions from carbon stock changes caused by land-use change, e_l, shall be calculated by dividing total emissions equally over 20 years. For the calculation of those emissions, the following rule shall be applied:

$$e_l = (CS_R - CS_A) \times 3{,}664 \times 1/20 \times 1/P - e_B$$

in which:

e_l = annualised greenhouse gas emissions from carbon stock change due to land-use change (measured as mass (grams) of CO_2-equivalent per unit of biofuel or bioliquid energy (megajoules)). 'Cropland' and 'perennial cropland' shall be regarded as one land use ('Cropland' as defined by IPCC, 'Perennial crops' are defined as multi-annual crops, the stem of which is usually not annually harvested such as short rotation coppice);

CS_R = the carbon stock per unit area associated with the reference land-use (measured as mass (tonnes) of carbon per unit area, including both soil and vegetation). The reference land-use shall be the land-use in January 2008 or 20 years before the raw material was obtained, whichever was the later;

CS_A = the carbon stock per unit area associated with the actual land-use (measured as mass (tonnes) of carbon per unit area, including both soil and vegetation). In cases where the carbon

stock accumulates over more than one year, the value attributed to CS_A shall be the estimated stock per unit area after 20 years or when the crop reaches maturity, whichever the earlier;

The factor 3,664 is the quotient obtained by dividing the molecular weight of CO_2 (44,010 g/mol) by the molecular weight of carbon (12,011 g/mol)

P = the productivity of the crop (measured as biofuel or bioliquid energy per unit area per year) and

e_B = bonus of 29 g $CO_{2\text{-eq}}$/MJ biofuel or bioliquid if biomass is obtained from restored degraded land under the condition that evidence is provided that the land:

- was not in use for agriculture or any other activity in January 2008; and
- is severely degraded land, including such land that was formerly in agricultural use. Severely degraded land' means land that, for a significant period of time, has either been significantly salinated or presented significantly low organic matter content and has been severely eroded.

The bonus of 29g $CO_{2\text{-eq}}$/MJ shall apply for a period of up to 20 years from the date of conversion of the land to agricultural use, provided that a steady increase in carbon stocks as well as a sizable reduction in erosion phenomena for land falling under (b) are ensured.

Note: The Commission shall review, by 31 December 2020, guidelines for the calculation of land carbon stocks drawing on the 2006 IPCC Guidelines for National Greenhouse Gas Inventories – volume 4 and in accordance with Regulation (EU) No 525/2013 and Regulation (EU) 2018/841 of the European Parliament and of the Council. The Commission guidelines shall serve as the basis for the calculation of land carbon stocks for the purposes of this Directive.

4.8. Emissions from processing (ep)

Actual values of emissions from processing shall be determined by recording emissions of all processing steps and transmitting processing emission information through the chain of custody up to the last processing step.

All GHG emission from processing shall be included, including emissions from the processing itself, from waste(water) and leakage and from the production of chemicals or feedstocks used in the processing including the CO_2 emissions corresponding to the carbon contents of fossil inputs (whether or not actually combusted in the process). Emissions from processing shall include emissions from drying of interim products and materials where relevant.

Supply chain operators shall use the following formula to calculate emissions from a processing step (e_p, in kg $CO_{2\text{-eq}}$/dry-tonne):

$$ep = \frac{\text{EMelectricity} + \text{EMheat} + \text{EMinputs} = \text{EMwastewater}}{\text{yield intermediate product}}$$

In which the 'yield intermediate product' (tonnes/a) shall refer to dry tonnages. In case e_p was calculated on moist tonnage basis, it shall be converted to dry tonnage basis using the following formula:

$e_{p\ dry\ tonnage} = e_{p\ moist\ tonnage} / (1- \text{moisture content})$

GHG emissions from electricity ($EM_{electricity}$), heat (EM_{heat}), inputs (EM_{inputs}) and wastewater ($EM_{wastewater}$) shall be calculated following the formula specified below:

Electricity

To calculate emissions from electricity use ($EM_{electricity}$, in kg $CO_{2\text{-}eq}$/a), the following formula shall be used:

$EM_{electricity} = \text{electricity consumption} * EF_{energy\ mix}$

In which the electricity consumption is in kWh/a, and EF is the electricity emission factor (kg $CO_{2\text{-}eq}$/kWh).

In accounting for the consumption of electricity not produced within the fuel production plant, the greenhouse gas emissions intensity of the production and distribution of that electricity shall be assumed to be equal to the average emission intensity of the production and distribution of electricity in a defined region. For processing units in the EU, the most logical choice is the EU (EU average GHG intensity of electricity). For processing units outside the EU, the national average could be an appropriate choice.

Producers may use an average value for an individual electricity production plant for electricity produced by that plant if that plant is not connected to the electricity grid.

Heat production

To calculate emissions from heat production (EM_{heat}, in kg $CO_{2\text{-}eq}$/a), the following formula shall be used:

$EM\ heat = \text{fuel consumption} * Ef_{fuel}$

In which the fuel consumption is in kg/a, and EF is the fuel emission factor (kg $CO_{2\text{-}eq}$/kg).

Inputs production

To calculate emissions from inputs in the processing ($EM_{input,}$ in kg $CO_{2\text{-}eq}$/a), the following formula shall be used:

$EM_{inputs} = \text{input consumption} * EF_{inputs}$

In which 'inputs consumption' is in kg or liter per annum, and EF_{inputs} is the emission factor for the inputs (kg $CO_{2\text{-}eq}$ per kg or per liter).

Wastewater

To calculate emissions from processing wastewater ($EM_{wastewater}$, in kg $CO_{2\text{-}eq}$/a), the following formula shall be used:

$EM_{wastewater}$ = volume of wastewater * $EF_{wastewater}$

In which 'volume of wastewater' is in cbm/a, and EFwastewater is the emission factor for the wastewater generated (kg $CO_{2\text{-}eq}$/cbm wastewater)

To calculate e_p, the following data shall be collected at all processing units:

- Quantity of main products and co-products (t/a);
- Quantity of waste and wastewater generated (kg/a);
- Quantity of chemicals and other inputs to the process (kg/a or l/a);
- Electricity consumption (kWh/a) including the source of electricity;
- Heat consumption (MJ/a), the fuel used for heat production, and the type of heating system used (e.g. boiler or CHP).

Input data for GHG emission calculations shall be measured or be based on the technical specifications of the processing facility.

Emissions shall be calculated for every processing step individually and be summed up by the processor to calculate e_p. Actual emissions from transport and distribution can only be calculated if all relevant GHG information from all processing is available and has been passed along the supply chain. Emissions shall be expressed in kg $CO_{2\text{-}eq}$/dry tonne feedstock .

Standard values for emission factors shall be taken from Annex IX of the Implementing Regulation 2022/996.

4.9. Emissions from transport and distribution (etd)

Emissions from transport and distribution (e_{td}, in kg $CO_{2\text{-}eq}$/dry-tonne feedstock) shall include emissions from the transport and storage of raw material and intermediate products, and from storage and distribution of finished biofuels (including emissions from filling stations and depots).

Supply chain operators shall use the following formula to calculate emissions from transport and distribution.

$$etd = \frac{\text{Tneeded} * (\text{dloaded} * \text{Kloaded} + \text{dempty} * \text{Kempty}) * \text{EFfuel}}{quantity\ transported\ input\ material}$$

In which:

T_{needed} = number of transports (total quantity transported divided by load per transport)
d_{loaded} = transport distance of loaded transport system (km)
d_{empty} = transport distance of empty transport system (km)
K_{loaded} = fuel use/km of loaded transport system (l/km)
K_{empty} = fuel use per km of empty transport system (l/km)
EF_{fuel} = greenhouse gas emission factor for fuel used(g $CO_{2\text{-}eq}$/liter)

Emissions shall be calculated for every transport step individually and be summed up by the last interface to calculate e_{td}. Actual emissions from transport and distribution can only be calculated if all relevant GHG information from all transport steps is available and has been passed along the supply chain. Emissions shall be expressed in kg $CO_{2\text{-eq}}$/dry tonne feedstock. The following formula shall be used to convert emissions per tonne of moist product to emissions per tonne of dry product:

$e_{td\ dry} = e_{td\ moist}$ / (1 - moisture content)

To calculate e_{td}, the following data shall be collected at all processing units:

- transport distances (km) of loaded and empty freights (loaded return freights do not have to be taken into account);
- mode of transport (e.g. diesel truck, 40t);
- amount of feedstock transported per load.

If upstream transport is calculated, the calculated GHG emissions shall be divided by the amount of input material applying a feedstock factor and an allocation factor. This is because processing plants calculate upstream transport emissions in kg $CO_{2\text{-eq}}$/kg of dry matter of the transported feedstock.

Other factors for calculation shall include fuel consumption of the used transport mode, when loaded and empty (liter/km), emission factor of the fuel ($CO_{2\text{-eq}}$/liter).
Standard values for emission factors shall be taken from Annex IX of the Implementing Regulation 2022/996.

4.10. Emissions of the fuel in use (e_u)

Emissions of CO_2 from fuel in use, e_u, shall be taken to be zero for biomass fuels.

Emissions of non-CO_2 greenhouse gases (CH_4 and N_2O) from the fuel in use shall be included in the e_u factor.

4.11. Cogeneration of heat and/or electricity

Where a cogeneration unit – providing heat and/or electricity to a biomass fuel production process for which emissions are being calculated – produces excess electricity and/or excess useful heat, the greenhouse gas emissions shall be divided between the electricity and the useful heat according to the temperature of the heat (which reflects the usefulness (utility) of the heat). The useful part of the heat is found by multiplying its energy content with the Carnot efficiency, C_h, calculated as follows:

$$C_h = \frac{T_h - T_0}{T_h}$$

In which:
T_h = Temperature, measured in absolute temperature (kelvin) of the useful heat at point of delivery.
T_0 = Temperature of surroundings, set at 273,15 kelvins (equal to 0°C).

If the excess heat is exported for heating of buildings, at a temperature below 150°C (423,15 kelvin), C_h can alternatively be defined as follows:

C_h = Carnot efficiency in heat at 150°C (423,15 kelvin), which is: 0,3546

For the purposes of that calculation, the actual efficiencies shall be used, defined as the annual mechanical energy, electricity and heat produced respectively divided by the annual energy input.

For the purposes of that calculation, the following definitions apply:
(a) 'cogeneration' shall mean the simultaneous generation in one process of thermal energy and electrical and/or mechanical energy;
(b) useful heat' shall mean heat generated to satisfy an economical justifiable demand for heat, for heating or cooling purposes
(c) useful heat' shall mean heat generated to satisfy an economical justifiable demand for heat, for heating or cooling purposes

4.12. Adjusting GHG emissions throughout the supply chain

General

At every step of the supply chain, additional emissions from transport and/or processing shall be added to e_p and/or e_{td}, respectively.

Application of the feedstock factor

Additionally, a feedstock factor shall be applied to all emissions to take the mass losses occurred into account. A feedstock factor shall be applied at every processing step but may also be relevant at other steps where mass losses occur (e.g. storage). This means that all GHG emissions that are linked with the incoming feedstock (upstream emissions from e_{sca} e_i, e_p, e_{td} and e_e) shall be adjusted to the respective intermediate product using the feedstock factor.

The feedstock factor shall be calculated using the following formula:

Feedstock factor = feedstock (kg_{dry}) / intermediate product (kg_{dry})

Where 'feedstock' is the input material of the processing step considered, and 'intermediate product' is the output material of the processing step considered. The calculation of the feedstock factor shall be based on actual plant data.

After application of the feedstock factor to the upstream emissions, the additional emissions occurring at the recipient (i.e. the supply chain operator where the feedstock factor is calculated) shall be included.

Note: For the application of the feedstock factor the LHV values per dry tonne need to be applied while for the calculation of the allocation factor LHV values for wet biomass need to be used as this approach was also applied for the calculation of the default values.

Application of the allocation factor

Allocation of GHG emissions shall take place at every processing step in the supply chain where a co-product(s) is produced. The GHG emissions up to this processing step shall be distributed to the main product and the co-product proportional to their energy content and weight. GHG emissions downstream of the processing step (e.g. further downstream processing or transport & distribution) shall not be included in the allocation, as these emissions are not related to the co-product.
The allocation shall include the emissions from e_{ec} + e_l + e_{sca} + those fractions of e_p and e_{td} that take place up to and including the process step at which a co-product is produced. If any allocation to co-products has taken place at an earlier process step in the life-cycle, the fraction of those emissions assigned in the last such process step to the intermediate fuel product shall be used for those purposes instead of the total of those emissions.

In the case of biogas and biomethane, all co-products that do not fall under the scope of e_l shall be taken into account for the purpose of that calculation. No emissions shall be calculated to wastes and residues. Co-products that have a negative energy content shall be considered to have an energy content of zero for the purpose of the calculation.

Wastes and residues from processing including bagasse, shall be considered to have zero life-cycle greenhouse gas emissions up to the process of collection of those materials irrespectively of whether they are processed to interim products before being transformed into the final product.
In the case of fuels produced in refineries, other than the combination of processing plants with boilers or cogeneration units providing heat and/or electricity to the processing plant, the unit of analysis for the purposes of the calculation shall be the refinery.

The following formula shall be used to calculate the allocation factor for intermediate products and biofuels, respectively (with eec here used as an example):

eec intermediate product, allocated = eec intermediate product, non-allocated * allocation factor intermediate product

with eec in kg $CO_{2\text{-}eq}$/tonne dry product

$$\text{Allocation factor intermediate product} = \frac{\text{Energy content intermediate product}}{(\text{Energy content intermediate product} + \text{Energy content co} - \text{product})}$$

In which:
Energy content intermediate product = $\text{Yield}_{\text{intermediate product}}$ * $\text{LHV}_{\text{intermediate product}}$

And:
Energy content co-product = $Yield_{co\text{-}product}$ * $LHV_{co\text{-}product}$

With energy contents in MJ, yields in kg dry/a and LHVs in MJ/kg.

The energy content shall be calculated using the lower heating value (LHV) and the yield. The LHV shall refer to the entire (moist) (co-)product, not only to the dry fraction of the (co-) product. This 'wet definition LHV' shall be calculated by subtracting from the LHV of the dry matter, the energy needed to evaporate the water in the wet material.

The energy content of co-products with a negative energy content shall be set at zero.
To calculate the allocation factor the following data shall be used:

- Mass/yield data for products and co-products shall be calculated from on-site mass balance data (kg dry);
- LHV data for products and co-products shall come from published sources.

Calculating emissions from cultivation when processing intermediate products

The following formula shall be applied to emissions from cultivation when processing intermediate products:

e_{ec} intermediate $product_a$ = e_{ec} $feedstock_a$ * feedstock $factor_a$ * allocation factor intermediate $product_a$

with: e_{ec} intermediate $product_a$ and e_{ec} $feedstock_a$ in g $CO_{2\text{-}eq}/kg_{dry}$

and:
Feedstock factor = ratio of kg dry feedstock required to make 1 kg dry intermediate product
Allocation factor intermediate product=(Energy content intermediate product /(Energy content intermediate product+Energy content co−products))

4.13. Fossil fuel comparator

For biomass fuels used for the production of electricity, for the purposes of the calculation referred to in section 4.3 of this annex, the fossil fuel comparator $EC_{F(el)}$ shall be 183 g $CO_{2\text{-}eq}$/MJ electricity or 212 g $CO_{2\text{-}eq}$/MJ electricity for the outermost regions.

For biomass fuels used for the production of useful heat, as well as for the production of heating and/or cooling, for the purposes of the calculation referred to in section 4.3 of this annex, the fossil fuel comparator $EC_{F(h)}$ shall be 80 g $CO_{2\text{-}eq}$/MJ heat.

For biomass fuels used for the production of useful heat, in which a direct physical substitution of coal can be demonstrated, for the purposes of the calculation referred to in section 4.3 of this annex, the fossil fuel comparator $EC_{F(h)}$ shall be 124 g $CO_{2\text{-}eq}$/MJ heat.

For biomass fuels used as transport fuels, for the purposes of the calculation referred to in section 4.3 of this annex, the fossil fuel comparator $EC_{F(h)}$ shall be 94 g $CO_{2\text{-}eq}$/MJ.

Annex II Methodology for determining the emissions from the cultivation of sugarcane

To calculate the emissions from the cultivation of sugarcane, Part C, point 5 of Annex V to RED recast states that the calculation shall include the sum of all emissions from the extraction or cultivation process itself; from the collection, drying and storage of raw materials; from waste and leakages; and from the production of chemicals or products used in extraction or cultivation.

The capture of CO_2 in the cultivation of sugarcane shall be excluded. Estimates of emissions from sugarcane cultivation may be derived from the use of regional averages for cultivation emissions included in the reports referred to in Article 31(4) of RED recast or the information on the disaggregated default values for cultivation emissions included in this Annex, as an alternative to using actual values. In the absence of relevant information in those reports, averages can be calculated based on local farming practices, for instance on data of a group of farms, as an alternative to using actual values

1. Emissions from the cultivation process itself

The emissions from the cultivation process itself shall include all emissions from

(i) the provision of the fuels for farm machinery used;
(ii) the production of seeding material for crop cultivation;
(iii) the production of fertilisers and pesticides;
(iv) fertiliser acidification and liming application; and
(v) soil emissions from crop cultivation.

1.1. Fuel use (diesel oil, gasoline, heavy fuel oil, biofuels, or other fuels) for farm machinery

The GHG emissions from crop cultivation (field preparation, seeding, fertiliser and pesticide application, harvesting, collection) shall include all emissions from the use of fuels (such as diesel oil, gasoline, heavy fuel oil, biofuels, or other fuels) in farm machinery. The amount of fuel use in farm machinery shall be duly documented. Appropriate emission factors of the fuels must be used in accordance with Annex IX of RED recast. Where biofuels are used, the default GHG emissions set out in RED recast must be used.

1.2. Chemical fertilisers and pesticides

The emissions from the use of chemical fertilisers and pesticides[8] for the cultivation of sugarcane shall include all related emissions from the manufacture of chemical fertilisers and pesticides. The amount of the chemical fertilisers and pesticides, depending on the crop, local conditions, and farming practices, shall be duly documented. Appropriate emission factors, including upstream emissions, must be used to account for the emissions from the production of chemical fertilisers and pesticides pursuant to Annex IX of RED recast. If the economic operator knows the factory producing the fertiliser and it falls under the EU Emissions Trading System (ETS), then the economic operator can use the production emissions declared under ETS, adding the upstream emissions for natural gas etc. Transport of the fertilisers shall also be included, using the emissions from transport modes listed in Annex IX of RED recast. If the

[8] Pesticides means all plant protection products, including herbicides, fungicides, etc.

economic operator does not know the factory supplying the fertiliser, it should use the standard values provided for in Annex IX of RED recast.

1.3. Seeding material

The calculation of cultivation emissions from the production of seeding material for crop cultivation shall be based on actual data on the seeding material used. Emission factors for the production and supply of seeding material can be used to account for emissions associated with the production of seeds. The standard values for emission factors set out in Annex IX of RED recast must be used. For other seeds, literature values from the following hierarchy must be used:

a) version 5 of JEC-WTW report;
b) ECOINVENT database;
c) 'official' sources, such as Intergovernmental Panel on Climate Change (IPCC), International Energy Agency (IEA) or governments;
d) other reviewed sources of data, such as E3 database, GEMIS database;
e) peer-reviewed publications;
f) duly documented own estimates

1.4. Emissions from fertiliser acidification and liming application

The emissions from the neutralisation of fertiliser acidification and application of aglime shall account for the CO_2 emissions from neutralisation of acidity from nitrogen fertilisers or from aglime reactions in the soil.

1.4.1. Emissions from neutralisation of fertiliser acidification

The emissions resulting from acidification caused by nitrogen fertiliser use in the field shall be accounted for in the emission calculation, based on the amount of nitrogen fertilisers used. For nitrate fertilisers, the emissions from the neutralisation of nitrogen fertilisers in the soil shall be 0.783 kg CO_2/kg N; for urea fertilisers, the neutralisation emissions shall be 0.806 kg CO_2/kg N.

1.4.2. Soil emissions from liming (aglime)

If aglime is applied to neutralise the acid from nitrogen fertilisers, the net CO_2 emissions shall be included in the calculation. The amount of aglime use shall be duly documented. If data on actual lime use is not available, data on aglime use by crop can be estimated on the basis of cropping, measured soil pH, soil type and liming material to be applied. The theoretically required lime input (t/ha) can be established based on cropping, measured soil pH, soil type and liming material to be applied according to the Agricultural Lime Association.

- On acid soils, where pH is less than 6.4, aglime is dissolved by soil acids to form predominantly CO_2 rather than bicarbonate, releasing almost all of the CO_2 into the aglime (0.44 kg CO_2/kg aglime).

- If soil pH > 6.4, an emission factor of 0.98/12.44 = 0.079 kg CO_2/ kg aglime applied shall be taken into account in the calculation, in addition to the emissions due to the neutralisation of acidification caused by the fertiliser.

When aglime is used to counter acidity from nitrogen fertilisers, the CO_2 emissions from acidification caused by the nitrogen fertiliser must be subtracted from the estimates of emissions from liming. The remaining net emissions from liming then shall represent the emissions from the agricultural lime that are used to counter naturally-occurring acidity in the soil.

1.5. Soil (nitrous oxide/N_2O) emissions from crop cultivation

The calculation of N_2O emissions from managed soils shall follow the IPCC methodology. The use of disaggregated crop-specific emission factors for different environmental conditions (corresponding to Tier 2 of the IPCC methodology) shall be used to calculate the N_2O emissions resulting from crop cultivation. Specific emission factors for different environmental conditions, soil conditions and different crops should be taken into account. Economic operators could use validated models to calculate those emission factors provided that the models take these aspects into account. In line with the IPCC guidelines[9], both direct and indirect N_2O emissions shall be taken into account. The GNOC tool shall be used, which is based on the formulas below, following the naming conventions in the IPCC (2006) guidelines:

$$N_2O_{total}\text{–}N = N_2O_{direct} - N + N_2O_{indirect} - N$$

Where:
For mineral soils:

$$N_2O_{Direct}\text{–}N = [(F_{SN} + F_{ON}) \bullet EF_{1ij}] + [F_{CR} \bullet EF_1]$$

For organic soils:

$$N_2O_{Direct}\text{–}N = [(F_{SN} + F_{ON}) \bullet EF_1] + [F_{CR} \bullet EF_1] + [(F_{OS,CG,Temp} \bullet EF2_{CG,\ Temp}] + [F_{CROS,CG,Trop} \bullet E_{2CG,Trop}]$$

For both mineral and organic soils:

$$N_2O_{Direct}\text{–}N = [((F_{SN} \bullet Frac_{GASF}) + (F_{ON} \bullet Erac_{GASM}) \bullet EF_4] + [(F_{SN} + F_{ON} + F_{CR}) \bullet Frac_{Leach\text{-}(H)} \bullet EF_5]$$

1.5.1. Crop residue N input

For sugarcane it must be calculated according to IPCC (2006) Vol. 4 Chapter 11 Eq. 11.6, not considering below-ground residues and with the addition of N input from vignasse and filter cake:

$$F_{CR} = Yield \bullet DRY \bullet (1\text{–}Frac_{Burnt} \bullet C_f) \bullet [R_{AG} \bullet N_{AG} \bullet (1 - Frac_{Remove})] + F_{VF}$$

Where:
N_2O_{total} - N = direct and indirect annual N_2O–N emissions produced from managed soils.
kg N_2O–N ha^{-1} a^{-1}

N_2Odirect - N = annual direct N_2O–N emissions produced from managed soils; kg N_2O–N ha^{-1} a^{-1}

[9] IPCC (2006). Vol 4, Chapter 11: N2O emissions from managed soils, and CO_2 emissions from lime and urea application.

N_2Oindirect - N = annual indirect N_2O–N emissions (that is to say, the annual amount of N_2O–N produced from atmospheric deposition of N volatilised from managed soils and annual amount of N_2O–N produced from leaching and run-off of N additions to managed soils in regions where leaching/run-off occurs); kg N_2O–N ha^{-1} a^{-1}

F_{SN} = annual synthetic nitrogen fertiliser input; kg N ha^{-1} a^{-1}

F_{ON} = annual animal manure N applied as fertiliser; kg N ha^{-1} a^{-1}

F_{CR} = annual amount of N in crop residues (above ground and below ground); kg N ha^{-1} a^{-1}

$F_{OS,\ CG,Temp}$ = annual area of managed/drained organic soils under cropland in temperate climate;
ha^{-1} a^{-1}

$F_{OS,CG,Trop}$ = annual area of managed/drained organic soils under cropland in tropical climate; ha^{-1}

$Frac_{GASF}$ = 0.10 (kg N NH_3–N + NO_x–N) $(kg\ N\ applied)^{-1}$. Volatilisation from synthetic fertiliser

$Frac_{GASM}$ = 0.20 (kg N NH_3–N + NO_x–N) $(kg\ N\ applied)^{-1}$. Volatilisation from all organic nitrogen fertilisers applied

$Frac_{Leach-(H)}$ = 0.30 kg N (kg N additions) $^{-1}$. N losses by leaching/run-off for regions where leaching/run-off occurs

EF_{1ij} = Crop and site-specific emission factors for N_2O emissions from synthetic fertiliser and organic N application to mineral soils (kg N_2O–N $(kg\ N\ input)^{-1}$).

EF_1 = 0.01 [kg N_2O–N $(kg\ N\ input)^{-1}$]

$EF_{2CG,Temp}$ = 8 kg N ha^{-1} a^{-1} for temperate organic crop and grassland soils

$EF_{2CG,Trop}$ = 16 kg N ha^{-1} a^{-1} for tropical organic crop and grassland soils

EF_4 = 0.01 [kg N_2O–N (kg N NH_3–N + NO_x–N volatilised)$^{-1}$]

EF_5 = 0.0075 [kg N_2O–N $(kg\ N\ leaching/run\text{-}off)^{-1}$]

Yield = annual fresh yield of the crop (kg ha^{-1})

DRY = dry matter fraction of harvested product [kg d.m. $(kg\ fresh\ weight)^{-1}$] (see Table 1)

$Frac_{Burnt}$ = Fraction of crop area burnt annually [ha $(ha)^{-1}$]

Cf = Combustion factor [dimensionless] (see Table 1)

R_{AG} = Ratio of above-ground residues, dry matter to harvested dry matter yield, for the crop [kg d.m. (kg d.m.)$^{-1}$] (see Table 3)

N_{AG} = N content of above-ground residues [kg N (kg d.m.)$^{-1}$] (see Table 1)

$Frac_{Remove}$ = Fraction of above-ground residues removed from field [kg d.m. (kg AGDM)$^{-1}$]

F_{VF} = Annual amount of N in sugar cane vignasse and filter cake returned to the field [kg N ha^{-1}], calculated as Yield * 0.000508.

AG = Above-ground residue dry matter [kg d.m. ha^{-1}]

1.5.2. Crop and site-specific emission factors for N2O emissions from synthetic fertiliser and organic N application

N_2O emissions from soils under agricultural use, in different agricultural fields under different environmental conditions and agricultural land use classes can be determined following the Stehfest and Bouwman (2006) statistical model (hereinafter referred to as 'the S&B model'):

$$E = exp(-1.516 + \sum ev)$$

Where:
E = N_2O emission (in kg N_2O-N ha^{-1} a^{-1})

ev = effect value for different drivers (see Table 2)

The EF_{1ij} for the biofuel crop i at location j is calculated (S&B model) as:

$$EF_{1ij} = (E_{fert,ij} - E_{unfert,ij}) / N_{appl,ij}$$

The IPCC (2006) factor (EF1) for direct N_2O emissions from fertiliser input based on a global mean shall be replaced by the crop- and site-specific EF1ij for direct emissions from mineral fertiliser and manure N input, based on the crop- and site-specific EF1ij, applying the S&B model.

Where:
$E_{fert,ij}$ = N_2O emission (in kg N_2O-N ha^{-1} a^{-1}) based on S&B, where the fertiliser input is the actual N application rate (mineral fertiliser and manure) to the crop i at location j

$E_{unfert,ij}$ = N_2O emission of the crop i at location j (in kg N_2O-N ha^{-1} a^{-1}) based on S&B. The N application rate is set to 0, all the other parameters are kept the same.

$N_{appl,ij}$ = N input from mineral fertiliser and manure (in kg N ha^{-1} a^{-1}) to the crop i at location j

Table 1. Crop-specific parameters to calculate N input from crop residues[10]

Crop	Calculation method	DRY	LHV	N_{AG}	slope	intercept	R_{BG_BIO}	N_{BG}	Cf	R_{AG}	Fixed amount of N in crop residues (kg N ha^{-1})	Data sources*
Barley	IPCC (2006) Vol. 4 Ch. 11 Eq. 11.7a	0.865	17	0.007	0.98	0.59	0.22	0.014	0.8			1, 2
Cassava	IPCC (2006) Vol. 4 Ch. 11 Eq. 11.7a	0.302	16.15	0.019	0.1	1.06	0.2	0.014	0.8			1, 2
Coconuts	Fixed N from crop residues	0.94	32.07								44	1, 3
Cotton	No inform. on crop residues	0.91	22.64									
Maize	IPCC (2006) Vol. 4 Ch. 11 Eq. 11.7a	0.86	17.3	0.006	1.03	0.61	0.22	0.007	0.8			1, 2
Oil palm fruit	Fixed N from crop residues	0.66	24								159	1, 4
Rapeseed	IPCC (2006) Vol. 4 Ch. 11 Eq. 11.7a	0.91	26.976	0.011	1.5	0	0.19	0.017	0.8			1, 5
Rye	IPCC (2006) Vol. 4 Ch. 11 Eq. 11.7a	0.86	17.1	0.005	1.09	0.88	0.22	0.011	0.8			1, 6
Safflower seed	No inform.on crop residues	0.91	25.9									
Sorghum (grain)	IPCC (2006) Vol. 4 Ch. 11 Eq. 11.7a	0.89	17.3	0.007	0.88	1.33	0.22	0.006	0.8			1, 7
Soybeans	IPCC (2006) Vol. 4 Ch. 11 Eq. 11.7a	0.87	23	0.008	0.93	1.35	0.19	0.087	0.8			1, 8
Sugar beets	IPCC (2006) Vol. 4 Ch. 11 Eq. 11.6	0.25	16.3	0.004					0.8	0.5		1, 9
Sugar cane	IPCC (2006) Vol. 4 Ch. 11 Eq. 11.6	0.275	19.6	0.004					0.8	0.43		1, 10
Sunflower seed	IPCC (2006) Vol. 4 Ch. 11 Eq. 11.7a	0.9	26.4	0.007	2.1	0	0.22	0.007	0.8			1, 11
Triticale	IPCC (2006) Vol. 4 Ch. 11 Eq. 11.7a	0.86	16.9	0.006	1.09	0.88	0.22	0.009	0.8			1, 2
Wheat	IPCC (2006) Vol. 4 Ch. 11 Eq. 11.7a	0.84	17	0.006	1.51	0.52	0.24	0.009	0.9			1, 2

Table 2 Constant and effect values for calculating N2O emissions from agricultural fields based on the S&B model.

Constant value	-1.516	
Parameter	**Parameter class or unit**	**Effect value (ev)**
Fertilizer input		0.0038 * N application rate in kg N ha^{-1} a^{-1}
Soil organic C content	<1 %	0
	1-3 %	0.0526
	>3 %	0.6334
pH	<5.5	0
	5.5-7.3	-0.0693
	>7.3	-0.4836
Soil texture	Coarse	0
	Medium	-0.1528
	Fine	0.4312
Climate	Subtropical climate	0.6117
	Temperate continental climate	0
	Temperate oceanic climate	0.0226
	Tropical climate	-0.3022
Vegetation	Cereals	0
	Grass	-0.3502
	Legume	0.3783
	None	0.5870
	Other	0.4420
	Wetland rice	-0.8850
Length of experiment	1 yr	1.9910

[10] European Commission, Joint Research Centre, Padella, M., O'Connell, A., Giuntoli, J. et al., *Definition of input data to assess GHG default emissions from biofuels in EU legislation – Version 1d - 2019*, Publications Office, 2019, https://data.europa.eu/doi/10.2760/69179

2. Emissions from the collection, drying and storage of sugarcane

Emissions from the collection, drying and storage of sugarcane include all emissions related to fuel use in the collection, drying and storage of sugarcane.

2.1. Emissions from collection

Emissions from the collection of sugarcane include all the emissions resulting from the collection of sugarcane and their transport to storage. The emissions are calculated using appropriate emission factors for the type of fuel used (diesel oil, gasoline, heavy fuel oil, biofuels, or other fuels).

2.2. Biomass drying

The cultivation emissions shall include emissions from drying before storage as well as from storage and handling of biomass feedstock. Data on energy use for drying before storage shall include actual data on the drying process used to comply with the requirements of storage, depending on the biomass type, particle size, moisture content, weather conditions, etc. Appropriate emission factors, including upstream emissions, shall be used to account for the 18 emissions from the use of fuels to produce heat or electricity used for drying. Emissions for drying include only emissions for the drying process needed to ensure adequate storage of raw materials and does not include drying of materials during processing.

3. Accounting for emissions for electricity used in farming operations

When accounting for the consumption of electricity not produced within the fuel production plant, the GHG emissions intensity of the produced and distributed electricity shall be assumed to be equal to the average emission intensity of the produced and distributed electricity in a defined region. By way of derogation from this rule, producers may use an average value for an individual electricity production plant for electricity produced by that plant if it is not connected to the electricity grid and sufficient information are available to derive an emission factor.

Annex III Methodology for determining the emission savings from soil carbon accumulation via improved agricultural management

Economic operators seeking to claim emission savings from soil carbon accumulation via improved agricultural management (e_{sca}) in terms of g CO2eq/MJ should use the following formula to calculate their actual values:

$$e_{sca} = (CS_A - CS_R) \text{ X } 3.664 \times 10^6 \text{ X } 1/n \times 1/P - e_f$$

in which:

CS_R is the mass of soil carbon stock per unit area associated with the reference crop management practice.

CS_A is the mass of soil estimated carbon stock per unit area associated with the actual crop management practices after at least 10 years of application.

3.664 is the quotient obtained by dividing the molecular weight of CO2 (44.010g/mol) by the molecular weight of carbon (12.011g/mol).

n is the period (in years) of the cultivation of the crop considered.

P is the productivity of the crop (measured as biofuel or bioliquid energy per unit area per year).

e_f emissions from the increased fertilisers or herbicide use.

Improved agriculture management practices, accepted for the purpose of achieving emission savings from soil carbon accumulation, include shifting to reduced or zero-tillage, improved crop/rotation, the use of cover crops, including crop residue management, and the use of organic soil improver (e.g., compost, manure fermentation, digestate, biochar etc.).

The calculation of the actual values of CSR and CSA shall be based on measurements of soil carbon stocks. The measurement of CSR shall be carried out at farm level before the management practice changes in order to establish a baseline, and then the CSA shall be measured at regular intervals no later than 5 years apart.

The entire area for which the soil carbon stocks are calculated shall have a similar climate and soil type as well as similar management history in terms of tillage and carbon input to soil. If the improved management practices are only applied to part of the farm, the GHG emissions savings can only be claimed for the area covered by them. If different improved management practices are applied on a single farm, a claim of GHG emission savings shall be calculated and claimed individually for each esca practice.

To ensure reduced year-to-year fluctuations in the measured soil carbon stocks and to reduce associated errors, fields that have the same soil and climate characteristics, similar management history in terms of tillage and carbon input to soil and that will be subject to the same improved management practice may be grouped, including those fields belonging to different farmers.

After the first measurement of the baseline, the increase in soil carbon can be estimated based on representative experiments or soil models, before a second measurement of the increase in carbon stock is made. From the second measurement onwards, the measurements shall constitute the ultimate basis for determining the actual values of the increase in soil carbon stock.

However, after the second measurement, modelling to enable economic operators to estimate the Annual increase in soil carbon stocks may only be permitted until the next measurement if the models used have been calibrated, based on the real values measured. Economic operators shall be obliged to use only models that have been validated by Bonsucro. Bonsucro will inform the economic operators and the certification bodies, performing audits on their behalf, about the models that they have validated for such use.

The models used shall take into account the different soil, climate and field management history to Simulate carbon dynamics in soil. Bonsucro will present any modelling method it has validated in a detailed report, including the model's underlying assumptions. The related final actual values that are established based on the soil measurement results, shall be used to adjust the annual claims of emissions savings from soil carbon accumulation via agricultural management (esca), made on the basis of modelling.

To claim emissions savings from soil carbon accumulation via agricultural management (esca), measurements of soil carbon stocks shall be performed by certified laboratories and samples shall be retained for a period of at least 5 years for auditing purposes.

A long-term commitment by the farmer or economic operator to continue applying the improved Management practice for a minimum of 10 years is required in order for GHG emission savings to be taken into account. Such commitment may be implemented as a 5-years renewable commitment.

Failure to meet this criterion will lead to all esca values of the current year for the farmer or economic operator being added as emissions to the overall GHG emissions of the energy crop delivered, instead of being deducted as a GHG emission savings and a prohibition to include an esca value in the GHG calculations for 5 years, whatever the certification scheme used. If a commitment has been signed in the name of an economic operator on behalf of several farmers and one of these farmers withdraws early, the above-mentioned penalties shall apply only to the farmer concerned and not to all the commitments of the economic operator. Bonsucro will enforce these penalties and duly inform all other voluntary schemes as well as to publish this information on its website and included it in the annual activity reports to be sent to the Commission.

In addition, a continuous minimum period of 3 years for the application of the improved management practice shall be required before a claim can be made.

The maximum possible total value of the annual claim of emission savings from soil carbon Accumulation due to improved agricultural management (esca) shall be capped to 45 g CO2eq/MJ biofuel or bioliquid for the entire period of application of the Esca practices, if

biochar is used as organic soil improver alone or in combination with other eligible esca practices. In all other cases, the cap referred to above shall be 25 g CO2eq/MJ biofuel or bioliquid for the entire period of application of the esca practices.

Primary producers or economic operators, who are already engaged in eligible esca practices and have made respective Esca claims before the entry into force of this Implementing Regulation 2022/996, may apply a cap of 45 g CO2eq/MJ biofuel or bioliquid in a transition period until the first measurement of the carbon stock increase is made at the 5th year. In such a case, the measured carbon stock increase at the 5th year will become a cap for the annual claims to be made in the following period of 5 years. If the first measurement of the carbon stock increase at the 5th year shows higher total annual carbon stock increase, compared to the annual claims made, the annual difference can be claimed by primary producers or economic operators in subsequent years to compensate for lower carbon stock increases. Respectively, if the first measurement of the carbon stock increase at the 5th year shows lower total annual soil carbon stock increase, compared to the annual claims made, the annual difference has to be deducted accordingly by farmers or economic operators from their claims in the subsequent five years.

If the application of eligible improved agricultural management practices (esca) started in the past but no previous Esca claims were made, annual retroactive Esca claims can be made but for no longer than 3 years prior to the moment of esca certification. The economic operator shall be obliged to provide adequate evidence about the start of the application of the improved farming practices. In such a case, the estimate of the CSR value can be based on a comparative measurement of a neighbouring or other field with similar climatic and soil conditions as well as similar field management history. If there is no available data from such a field, the CSR estimated value can be based on modelling. In that case, a first measurement shall be done immediately, at the moment of commitment. The next measurement of carbon stock increase will have to be made 5 years later.

The increased emissions resulting from the increased fertilisers or herbicide use due to the application of improved agricultural practices, shall be considered. For this purpose, adequate evidence shall be provided on the historic use of fertilisers or herbicide that shall be counted as the average for the three years before the application of the new agricultural practices. The contribution of nitrogen fixation crops used to reduce the need for additional fertilisers can be considered in the calculations.

The following rules shall be applied to sampling:

1. Representative sampling method:
   (a) sampling shall be made for each plot or field;
   (b) at least one grab sample of 15 well distributed sub-samples per every 5 hectares or per field, whichever is smaller (taking into account the heterogeneity of the plot's carbon content), shall be taken;
   (c) smaller fields with same climatic conditions, soil type, reference farming practice, and esca practice can be grouped;

(d) sampling shall be done either in spring before soil cultivation and fertilisation or in autumn, a minimum of 2 months after harvest;
(e) direct measurements of soil carbon stock changes shall be taken for the first 30 cm of soil;
(f) the points of the initial sampling to measure the baseline of soil carbon stocks shall be used under identical field conditions (especially soil moisture);
(g) The sampling protocol shall be well documented.

2. Measurement of the soil carbon content:
   (a) soil samples shall be dried, sieved, and if necessary grounded;
   (b) if the combustion method is used, inorganic carbon shall be excluded.

3. Determination of dry bulk density:
   (a) changes in bulk density over time shall be taken into account;
   (b) bulk density should be measured using the tapping method, which is to say by mechanically tapping a cylinder into the soil, which greatly reduces any errors associated with bulk density measurement;
   (c) if the tapping method is not possible, especially with sandy soils, a reliable method shall be used instead;
   (d) samples should be oven-dried prior to weighing.

The application of the above methodology on esca and the calculation of the actual GHG emissions values shall be duly verified by certification bodies and documented in audit reports. Bonsucro will issue detailed guidance on the application of this methodology, including on their validated soil models to economic operators and certification bodies as well as to support their auditors in their verification tasks.

The Commission may revise the methodological approach described in this annex as well as the caps applied to annual claims of carbon stock accumulation, based on the outcomes of this monitoring or with the aim to align it with evolving knowledge or with new legislation in this area in the future (i.e., EU carbon farming initiative).

Non-exhaustive list of examples of essential management and monitoring practices to promote and monitor soil carbon sequestration and soil quality

Table 1. Examples of essential soil management practices to promote soil carbon sequestration (given the absence of residues) and promote soil quality

Requirement	Soil quality parameter
At least a 3-crop rotation, including legumes or green manure in the cropping system, taking into account the agronomic crop succession requirements specific to each crops grown and climatic conditions. A multi-species cover crop between cash crops counts as one.	Promoting soil fertility, soil carbon, limiting soil erosion, soil biodiversity and promoting pathogen control
Sowing of cover/catch/intermediary crops using a locally appropriate species mixture with at least one legume. Crop management practices should ensure minimum soil cover to avoid bare soil in periods that are most sensitive.	Promoting soil fertility, soil carbon retention, avoiding soil erosion, soil biodiversity
Prevent soil compaction (frequency and timing of field operations should be planned to avoid traffic on wet soil; tillage operation should be avoided or greatly reduced on wet soils; controlled traffic planning can be used).	Retention of soil structure, avoiding soil erosion, retaining soil biodiversity
No burning of arable stubble except where the authority has granted an exemption for plant health reasons.	Soil carbon retention, resource efficiency
On acidic soils where liming is applied, where soils are degraded and where acidification impacts crop productivity.	Improved soil structure, soil biodiversity, soil carbon
Reduce tillage/ no tillage - Erosion control – addition of organic amendments (compost, manure, crop residues) – use of cover crops, rewetting Revegetation: planting (species change, protection with straw mulch, and phosphate fertilisation) - landscape features - agroforestry	Increase soil organic carbon

Table 2. Examples of monitoring practices for soil quality and carbon mitigation impacts

Monitoring approach	Method of verification/ demonstration
Risk assessment	Identifying areas with high risk of soil quality decline helps prevent these risks and focus on areas with the greatest impact.
Soil organic matter analysis	Consistent sampling of soil organic matter improves monitoring so that this matter can be maintained or improved.
Soil organic carbon analysis	Soil organic carbon is seen as a good marker for wider soil quality.
Soil conditioning index sampling	A positive value indicates the system is expected to have increasing soil organic matter.
Soil erosion assessment	Ensures that erosion is below a tolerable level, i.e. USDA Agricultural Research Service 't' levels.
Nutrient management plan	A plan outlining nutrient strategy (focusing mostly on N, P, K) and fertiliser regimes can prevent nutrient imbalances.

Annex IV Minimum content of Bonsucro EU-RED audit reports, summary audit reports and certificates

This annex specifies the minimum content of the Bonsucro EU-RED audit report (Part 1), and of the Bonsucro EU-RED summary audit reports and certificates (Part 2).

1. Minimum content of the Bonsucro EU-RED audit report

1.1. Information about the economic operator:

a) contact details of main certified entity (company name and address, details of the designated point of contact);
b) scope of certification;
c) longitude and latitude coordinates (for farms and plantations certified as single entities);
d) area of certification (for first gathering points, or individually certified farms and plantations);
e) estimated amount of sustainable material that could be harvested annually (for agricultural and forestry supply chains);
f) estimated amount of sustainable material that could be collected annually (for waste and residue collection points);
g) list of sites under the scope of certification (name and address);
h) input/output materials (physically) handled by the certified sites – classifications must be in conformity with the requirements set out in Annex IX of RED recast;
i) estimated amount of sustainable input material used annually (producers of the final product only);
j) estimated amount of sustainable final product that could be produced annually (producers of the final product only).

1.2. Information about the certification body:

a) contact details (name and address) and logo;
b) composition of the audit team;
c) accrediting body and scope and date of accreditation.

1.3. Information about the audit process:

a) date of audit;
b) audit itinerary and duration (split by duration spent on-site and remotely – where relevant);
c) scheme standards audited/certified (including version number);
d) sites audited;
e) audit method (risk assessment and sampling basis, stakeholder consultation);
f) certification of other voluntary schemes or standards;
g) GHG data type (default or actual values – including information on the application of GHG emission savings factors).

1.4. Information about the audit results:

a) place and date of issuance;
b) list of non-conformities identified.

2. Minimum content of the Bonsucro EU-RED summary audit report or certificate

2.1. Information about the economic operator:

a) contact details of main certified entity (company name and address, details of the designated point of contact);
b) scope of certification;
c) longitude and latitude coordinates (for farms and plantations certified as single entities);
d) optional for first gathering points, points of origin, traders with storage: list of sites under the scope of certification (name and address);
e) input/output materials (physically) handled by the certified sites – classifications must be in conformity with the requirements set out in Annex IX to RED recast (for traders with/without storage, the type of material traded).

2.2. Information about the certification body:

a) contact details (name and address) and logo.

2.3. Information about the audit process:

a) date of audit;
b) scheme standards audited/certified (including version number);
c) sites audited;
d) GHG data type (default or actual values – including information on the application of GHG emission savings factors).

2.4. Information about the audit results:

a) the (unique) certificate number or code;
b) place and date of issuance;
c) list of non-conformities identified;
d) certificate valid from/to dates (and date certified if applicable);
e) stamp and/or signature of issuing party.

End of this standard.