II

(Non-legislative acts)

REGULATIONS

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

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources ([1]), and in particular Article 30(8) thereof,

Whereas:

(1) Directive (EU) 2018/2001 expands the role of voluntary schemes to include the certification of the compliance of biomass fuels with sustainability and greenhouse gas (GHG) emissions saving criteria and the compliance of renewable liquid and gaseous transport fuels of non-biological origin and recycled carbon fuels with the respective GHG emissions saving criteria. Furthermore, the voluntary schemes can be used to certify biofuels, bioliquids and biomass fuels with low indirect land-use change-risk.

(2) In order to establish whether biofuels, bioliquids, biomass fuels, renewable gaseous and liquid transport fuels of non-biological origin and recycled carbon fuels comply with the requirements of Directive (EU) 2018/2001, the correct and harmonised functioning of voluntary schemes is essential. Harmonised rules should therefore be established, to apply across the certification system, bringing about the necessary legal certainty on the rules applicable to economic operators and voluntary schemes.

(3) With a view to minimising the administrative burden, the implementing rules should be proportionate and limited to what is required to ensure that compliance with the sustainability and GHG emissions saving criteria and other requirements is verified in an adequate and harmonised manner that minimises the risk of fraud to the greatest extent possible. The implementing rules should therefore not be considered as a comprehensive standard but rather as minimum requirements. The voluntary schemes may accordingly complement these rules as appropriate.

(4) Economic operators may decide at any time to participate in a different voluntary scheme. However, in order to prevent an economic operator that has failed an audit under one scheme from immediately applying for certification under another scheme, all schemes receiving an application from an economic operator should require that operator to supply information about whether it failed an audit in the previous 5 years. This should also apply to situations where the economic operator has a new legal personality but remains the same in substance, so that minor or purely formal changes, for instance, in the governance structure or the scope of activities, do not exempt the new economic operator from such a rule.

([1]) OJ L 328, 21.12.2018, p. 82.

(5) The mass balance system aims to reduce the administrative burden for demonstrating compliance with the sustainability and greenhouse gas saving criteria by allowing mixing of raw material and fuels with differing sustainability characteristics and by allowing reassignment of the sustainability characteristics in a flexible manner to consignments withdrawn from such a mixture. In order to ensure transparency, mixing under the mass balance system is possible if e.g. raw material belong to the same product group. A product group can comprise for instance different types of non-food cellulosic material with similar physical and chemical characteristics, heating values and/or conversion factors or the types of ligno-cellulosic material covered under point q of Annex IX Part A to Directive (EU) 2018/2001. Virgin vegetable oils, used for the production of biofuels and bioliquids, may belong to the same product group. Raw materials, however, that can be used to produce biofuels, bioliquids and biomass fuels which are subject to different rules concerning their contribution towards the targets for renewable energy should generally not be considered to be part of the same product group as this would risk to undermine the objectives of Directive (EU) 2018/2001, which applies differentiated treatment of biofuels, bioliquids and biomass fuels on the basis of the feedstock they are produced from. In case of gaseous fuels, the EU interconnected grid is considered as one single mass balancing system. Gaseous fuels produced and consumed off the grid or through isolated local distribution networks are to be considered as separate mass balancing systems. Further, precautionary measures are required to ensure the consistency of sustainability claims when fuels are exported to third countries which do not apply the mass balance system. To this end, the mass balance system should also include information on quantities of fuels for which no sustainability characteristics have been determined and deliveries of fuels to uncertified operators shall be taken into account in the mass balance system, based on the physical nature of delivered fuels.

(6) In the preparation of the initial on-site audit as well as during subsequent surveillance or re-certification audits, the auditor should make an appropriate analysis of the overall risk profile of economic operators. Based on the auditor's professional knowledge and the information submitted by the economic operator, this analysis should take into consideration not only the level of risk of the specific economic operator but also of the supply chain (e.g. for economic operators that handle materials listed in Annex IX to Directive (EU) 2018/2001). The audit intensity, its scope, or both, should be adapted to the level of identified overall risk in order to ensure an adequate level of trust in the veracity of the information provided by the economic operators, mitigating the risks for material misstatements.

(7) In group auditing, where on-site audits are replaced by desk audits, voluntary schemes and certification bodies should ensure that those audits are able to provide the same level of assurance provided by an on-site audit (e.g. availability of high quality satellite images, data on protected areas and peatland that provide information on the relevant time horizon).

(8) Commission Delegated Regulation (EU) 2019/807 ([2]), acknowledges that under certain circumstances, the indirect land-use change (ILUC) impacts of biofuels, bioliquids and biomass fuels that are considered as high ILUC-risk can be avoided. In order to ensure a level playing field in the implementation of the low ILUC-risk certification process across voluntary schemes, it is necessary to lay down specific requirements to allow for certification of low ILUC-risk biofuels, bioliquids and biomass fuels. Certified low ILUC-risk biofuels, bioliquids or biomass fuels should be exempted from the limit and gradual reduction set for high ILUC-risk biofuels, bioliquids and biomass fuels produced from food and feed crops, provided that they meet the relevant sustainability and greenhouse gas emissions saving criteria laid down in Article 29 of Directive (EU) 2018/2001.

(9) Economic operators applying for low ILUC-risk certification can already have obtained a certification for other aspects by a voluntary scheme, or can apply for low ILUC-risk certification at the same time as applying for a certification for other aspects that can be covered by a voluntary scheme. Applicants can be a farm, a group of farmers or a first gathering point or a group manager acting on behalf of a group of farmers. In case of measures being applied to perennial crops, the start of the 10-year validity period of low ILUC certification can be postponed due to the delay between the measure being implemented and the yield increase being observed.

([2]) Commission Delegated Regulation (EU) 2019/807 of 13 March 2019 supplementing Directive (EU) 2018/2001 of the European Parliament and of the Council as regards the determination of high indirect land-use change-risk feedstock for which a significant expansion of the production area into land with high carbon stock is observed and the certification of low indirect land-use change-risk biofuels, bioliquids and biomass fuels (OJ L 133, 21.5.2019, p. 1).

(10) The measures provided for in this Regulation are in accordance with the opinion of the Committee on the Sustainability of Biofuels, Bioliquids and Biomass fuels established by Article 34(2) of Directive (EU) 2018/2001,

HAS ADOPTED THIS REGULATION:

CHAPTER I

INTRODUCTION

Article 1

Subject matter

This Regulation lays down implementing rules to ensure that it is verified in an efficient and harmonised manner that economic operators:

(a) comply with the sustainability criteria set in Article 29(2) to (7) of Directive (EU) 2018/2001;

(b) provide accurate data on greenhouse gas emission savings for the purposes of Article 25(2) and Article 29(10) of Directive (EU) 2018/2001;

(c) comply with the criteria for certification of low ILUC-risk biofuels, bioliquids and biomass fuels established by Delegated Regulation (EU) 2019/807.

Article 2

Definitions

For the purposes of this Regulation, the following definitions apply:

(1) 'voluntary scheme' means an organisation that certifies the compliance of economic operators with criteria and rules including, but not limited to, the sustainability and greenhouse gas saving criteria set out in Directive (EU) 2018/2001 and in Delegated Regulation (EU) 2019/807;

(2) 'recognised voluntary scheme' means a voluntary scheme recognised pursuant to Article 30(4) of Directive (EU) 2018/2001;

(3) 'recognised national scheme' means a national scheme recognised pursuant to with Article 30(6) of Directive (EU) 2018/2001;

(4) 'certificate' means a conformity statement by a certification body within the framework of a voluntary scheme, certifying that an economic operator complies with the requirements of Directive (EU) 2018/2001;

(5) 'suspended certificate' means a certificate temporarily invalidated due to non-conformities identified by the certification body or upon voluntary request of the economic operator;

(6) 'withdrawn certificate' means a certificate that has been permanently cancelled by the certification body or the voluntary scheme;

(7) 'terminated certificate' means a certification that has been voluntarily cancelled while it is still valid;

(8) 'expired certificate' means a certificate that is no longer valid;

(9) 'sustainability and greenhouse gas emissions saving characteristics' means 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;

(10) 'mix of raw material for the purpose of further processing' means the physical mixing of raw material for the sole purpose of producing biofuels, bioliquids or biomass fuels;

(11) 'economic operator' means 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;

(12) 'first gathering point' means a storage or processing facility managed directly by an economic operator or other counterpart under contractual agreement that is sourcing raw material directly from producers of agricultural biomass, forest biomass, wastes and residues or, in the case of renewable fuels of non-biological origin, the plant producing such fuels;

(13) 'certification audit' means an initial audit before participation in a scheme, with the purpose of issuing a certificate under a voluntary scheme;

(14) 'certification body' means an independent accredited or recognised conformity assessment body that concludes an agreement with a voluntary scheme to provide certification services for raw materials or fuels by carrying out audits of economic operators and issuing certificates on behalf of the voluntary schemes using the voluntary scheme's certification system;

(15) 'non-conformity' means non-compliance of an economic operator or certification body with the rules and procedures, established by the voluntary scheme, of which they are members or under which they operate;

(16) 'surveillance audit' means any follow up audit of certificates issued by a certification body within the framework of a voluntary scheme after certification and before a re-certification audit, which can be carried out quarterly, half-annually or annually;

(17) 're-certification audit' means an audit with the purpose of renewing a certificate issued by a certification body within the framework of a voluntary scheme;

(18) 'interconnected infrastructure' means a system of infrastructures, including pipelines, LNG terminals and storage facilities, which transports gases, that primarily consist of methane and include biogas and gas from biomass, in particular biomethane, or other types of gas that can technically and safely be injected into, and transported through the natural gas pipeline system, hydrogen systems as well as pipeline networks and transmission or distribution infrastructures for liquid fuels;

(19) 'hydrogen system' means a system of infrastructure, including hydrogen networks, hydrogen storage, and hydrogen terminals, which contains hydrogen of a high grade of purity;

(20) 'legal predecessors' means an economic operator that has been legally replaced by a new one, but no substantive changes or only superficial ones have been made regarding its ownership, management composition, working methods or scope of activity;

(21) 'product group' means raw materials, biofuels, bioliquids, non-gaseous biomass fuels with similar physical and chemical characteristics and similar heating values or gaseous biomass fuels, and LNG with similar chemical characteristics that all are subject to the same rules set out in Articles 7, 26 and 27 of Directive (EU) 2018/2001 for determining the contribution of biofuels, bioliquids and biomass fuels towards achieving the targets for renewable energy;

(22) 'site' means a geographical location, logistical facilities, transmission or distribution infrastructures with precise boundaries within which products can be mixed;

(23) 'proof of sustainability' means 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 feedstock or fuels with the sustainability and greenhouse gas emissions savings criteria set out in Articles 25(2) and 29 of Directive (EU) 2018/2001;

(24) 'raw material' means substances that have not yet been processed into fuels including intermediate products;

(25) 'fuels' means 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;

(26) 'financial attractiveness test' means the calculation of the Net Present Value (NVP) of an investment, based on additionality measures in the context of low ILUC-risk biomass certification;

(27) 'non-financial barrier test' means an assessment of the potential other barriers that are expected to prevent an economic operator from implementing additionality measures in the context of low ILUC-risk biomass certification;

(28) 'Union database' means the database provided for in Article 28, point 2 of Directive (EU) 2018/2001;

(29) 'grassland' has the meaning attributed to it in Article 1, point (1) of Commission Regulation (EU) No 1307/2014 ([3]).

CHAPTER II

GENERAL RULES ON GOVERNANCE, INTERNAL MONITORING, COMPLAINTS PROCEDURES AND TRANSPARENCY OF VOLUNTARY SCHEMES

Article 3

Governance structure of the voluntary scheme

1. Voluntary schemes shall establish a governance structure to ensure that the scheme has the necessary legal and technical capacity, impartiality and independence to perform its duties. Depending on the scope of the voluntary scheme, it shall set up a technical committee or an equivalent system of technical expert support, which in specific cases shall also allow the engagement of independent external experts to provide advice on technical issues.

2. Voluntary schemes shall include to the extent possible in the governance structure and decision-making a broad range of representatives from various relevant stakeholder groups such as farmers' or foresters' associations, environmental non-governmental organisations, indigenous and local communities potentially affected by the scheme, academia, and fuel producers. No individual stakeholder or stakeholder group shall have a dominant position in the decision-making process. Decisions shall only be taken where a quorum of the majority of stakeholders is reached.

3. Voluntary schemes shall set up rules and procedures to avoid conflicts of interest in decision-making. As a minimum standard, they shall enforce a system of checks and balances to ensure that no individual stakeholder, having a vested interest in the outcome of a decision, can have decisive influence on that particular decision.

4. Certification bodies shall set up integrity rules and procedures to ensure their full independence from the economic operators participating in the scheme. Voluntary schemes shall require that the certification bodies operating on behalf of the scheme are accredited to International Organisation for Standardisation (ISO) standard 17065.

5. The governance system of the certification body shall aim at ensuring the highest possible level of independence of the auditors' judgement by applying principles of auditors' rotation or other existing best practices in the area.

([3]) Commission Regulation (EU) No 1307/2014 of 8 December 2014 on defining the criteria and geographic ranges of highly biodiverse grassland for the purposes of Article 7b(3)(c) of Directive 98/70/EC of the European Parliament and of the Council relating to the quality of petrol and diesel fuels and Article 17(3)(c) of Directive 2009/28/EC of the European Parliament and of the Council on the promotion of the use of energy from renewable sources (OJ L 351, 9.12.2014, p. 3).

6. Persons having a potential conflict of interest shall be excluded from decision-making in both the voluntary scheme and the certification body. Voluntary schemes shall put in place appropriate procedures and an audit trail to identify and document such cases, and shall regularly review them as part of their internal monitoring systems.

Article 4

Non-conformities of economic operators under the scheme

1. Voluntary schemes shall set up a comprehensive system to deal with non-conformities by economic operators. As a minimum standard, that system shall include a clear classification of non-conformities, based on their degree of severity in accordance with the requirements of Article 10. For each type of non-conformity, there shall be a transparent set of rules and procedures to ensure timely enforcement of corrective measures and sanctions, including suspensions, where appropriate. Such enforcement procedures shall be triggered without delay, depending on the severity of the non-conformity and the urgency of the corrective measures.

2. Economic operators whose certificates are suspended, shall not be able to make sustainability claims until the suspension has been lifted. Suspended operators may not join another voluntary scheme during that period. Where the participation of an economic operator, or its legal predecessors, in a voluntary scheme is suspended or terminated by the withdrawal of its certificate following an audit which confirmed critical non-conformity, other voluntary schemes may refuse the participation of that operator for at least two years following the suspension or termination of participation.

3. Where an economic operator that was previously found to be in critical or major non-conformity applies for re-certification, 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.

Article 5

Internal monitoring, complaints procedure and documentation management system

1. Voluntary schemes shall set up a system of internal monitoring to verify compliance of economic operators with the rules and procedures applied by the scheme and to ensure the quality of the work carried out by the auditors of the certification bodies. Internal monitoring shall be undertaken at least once a year and reflect the geographical and raw material coverage of the voluntary scheme, as well as the level of risk of the activities conducted by the economic operators. As part of the monitoring process, voluntary schemes shall require certification bodies to submit all audit reports, and, where applicable, the calculations of actual values for the greenhouse gas emissions. The monitoring activities shall cover a random and risk-based sample of those audit reports by each certification body.

2. Voluntary schemes shall establish rules and procedures to ensure effective follow up of the results of the internal monitoring and, where necessary, the application of sanctions. On the basis of the results of the internal monitoring, corrective measures shall be taken at the level of the governance structure or of the internal monitoring process of the voluntary scheme in order to improve its functioning in the future. The results of the annual monitoring activities of the voluntary scheme shall be summarised in the annual activity report submitted to the Commission.

3. Voluntary schemes shall establish procedures for the lodging of complaints against economic operators or certification bodies. The complaints procedure shall be accessible on the voluntary scheme's website and allow complaints to be sent electronically or by post. The complaints procedure shall also ensure the protection of persons who report infringements or lodge complainants in good faith in accordance with Directive (EU) 2019/1937 of the European Parliament and of the Council ([4]). The website shall indicate at least all of the following information:

([4]) Directive (EU) 2019/1937 of the European Parliament and of the Council of 23 October 2019 on the protection of persons who report breaches of Union law (OJ L 305, 26.11.2019, p. 17).

(a) the information and the evidence to be provided to file a complaint, as well as the postal address or email address to which it is to be sent;

(b) guidance on which complaints are within the scope of the procedure;

(c) a step-by-step overview of how complaints are handled, from the receipt of the initial complaint through to resolution, and the associated timeframe for each step;

(d) the decision-making process for complaints and the process for appealing decisions;

(e) the consequences of the voluntary scheme finding a non-conformity as result of a complaint.

4. Voluntary schemes shall keep a register of all complaints, and provide a summary of those complaints to the Commission in the annual activity report. Upon request by the Commission or a Member State, they shall provide all documents related to a complaint and its handling.

5. Voluntary schemes and certification bodies shall establish a documentation management system that addresses each of the following elements:

(a) general management system documentation (e.g. manuals, 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; and

(f) procedures for taking preventive actions to eliminate the causes of potential non-conformities.

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

Article 6

Publication of information by voluntary schemes

Voluntary schemes shall make the following information publicly and freely available on a website:

(a) their governance structure, describing the roles of all relevant bodies, details on the ownership structure, composition and experience of the Board of Directors, Secretariat and Technical committee, or equivalent, as well as the list of members with voting rights or participants in the scheme, as appropriate;

(b) the list of economic operators participating in the scheme, their certification status, with their respective date of certificate issuance, suspension, withdrawal, termination or expiry, as well as the certificates or the summary audit reports drawn up in accordance with Annex II. Where audits identify critical or major non-conformities, voluntary schemes shall publish an aggregated list of these non-conformities together with a respective action plan and timing for their correction as agreed with the economic operators concerned. Specific information on the certificates or summary audit reports may be redacted to comply with personal data protection legislation. Economic operators whose certificates are withdrawn, terminated or expired shall be listed on the website for at least 24 months after the withdrawal, termination or expiration date. Changes in the certification status of economic operators shall be made public without delay;

(c) the latest version of their scheme documentation and the guidelines for audits. The documents shall include a date and version number and, where applicable, summarise any changes made compared to the previous document version;

(d) the contact details of the scheme, including telephone number, email address and correspondence address;

(e) the list of certification bodies carrying out independent auditing under the scheme, indicating for each certification body which national public authority or entity accredited or recognised it and which entity or national public authority of the Member State supervises it, in accordance with Article 30(9), second subparagraph, of Directive (EU) 2018/2001. Certification bodies that are no longer entitled to conduct independent auditing under the scheme shall be listed for at least 12 months after the last audit with an indication to that effect;

(f) the results of the annual monitoring activities of the voluntary scheme as summarised in the annual activity report.

Article 7

Change of scheme by economic operators

1. Voluntary schemes shall require economic operators to disclose the following information in their applications for certification:

(a) whether they or their legal predecessor are currently participating in another voluntary scheme or have participated in another voluntary scheme in the last 5 years;

(b) all relevant information, including the mass balance data and the auditing reports and, where applicable, any decisions to suspend or withdraw their certificates in the last 5 years;

(c) whether they withdrew from a scheme before the first surveillance audit.

2. Voluntary schemes shall exclude from the scheme economic operators in the following cases:

(a) they do not disclose the information in paragraph 1, point (a) and point (b);

(b) they or their legal predecessor failed the initial audit under another scheme, unless such initial 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. Where a voluntary scheme accepts the justification of the economic operators and decides to assess their application, the scope of the initial audit shall be adjusted to cover all relevant issues and specifically focus on the shortcomings identified in the initial audit that they failed in the other scheme;

(c) they or their 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. Where a voluntary scheme accepts the justification provided by the economic operator, the scope of the initial audit shall be adjusted to cover all relevant issues of the surveillance audit.

Article 8

Recognition of other voluntary schemes

Where part of the supply chain relies on other voluntary schemes, they shall accept evidence of voluntary schemes recognised in accordance with Article 30(4) of Directive (EU) 2018/2001, only to the extent of the scope of their recognition.

Article 9

Recognition of national schemes

Voluntary schemes shall not refuse recognition of recognised national schemes as regards the verification of compliance with the sustainability and GHG emissions saving criteria set out in Article 29(2) to (7) and (10) of Directive (EU) 2018/2001, with the GHG savings thresholds set out in Article 25(2) of that Directive and with the criteria for certification of low ILUC-risk biofuels, bioliquids and biomass fuels set out in Delegated Regulation (EU) 2019/807.

CHAPTER III

AUDIT PROCESS, AUDIT SCOPE, QUALIFICATIONS OF AUDITORS AND AUDIT SUPERVISION

Article 10

Audit process and levels of assurance

1. Voluntary schemes shall require that economic operators successfully pass an initial audit before allowing them to participate in the scheme. The initial audit of a new scheme participant or a re-certification of existing scheme participant 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 veracity of its statements. On the basis of the results of the initial audit, those economic operators who are considered low risk may be subject to subsequent limited assurance audits.

2. Voluntary schemes may authorise a certification body to perform the verification of compliance with different certification frameworks during the same auditing process, as long as the certification body certifies that economic operators satisfy the requirements in line with Article 1. Voluntary schemes that allow a certificate duration longer than one year shall ensure the carrying out of an annual surveillance audit of all economic operators participating in the scheme. However, in the case of group audits, the annual audit may cover a sample of the group members in accordance with Article 12. 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 previous audits. The technical reviewer shall be responsible for validating the results of surveillance audits.

Voluntary schemes shall establish detailed procedures setting out how audits are planned and conducted and how audit reports are drawn up. Voluntary schemes shall ensure that certification bodies conduct audits in accordance with ISO 19011 or the equivalent. Voluntary schemes shall also ensure an efficient and timely exchange of audit information between them to support the effective preparation and conduct of the audit. The audit shall include at least the following elements:

(a) identification of the activities undertaken by the economic operator which are relevant to the scheme's criteria;

(b) identification of the relevant systems of the economic operator and its overall organisation with respect to the scheme's criteria and checks of the effective implementation of relevant control systems;

(c) analysis of the risks which could lead to a material misstatement, based on the auditor'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, above all at the immediately upstream and downstream stages, for example, for economic operators that handle material listed in Annex IX. The audit intensity or scope, or both, shall be adapted to the level of overall risk identified, also based on plausibility checks of the production capacity of a plant and the declared quantities of produced fuels;

(d) a verification plan which corresponds to the risk analysis and the scope and complexity of the economic operator's activities, 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 conclusion will be based;

(f) a request to the operator for the provision of any missing elements of audit trails, an explanation of variations, or the revision of claims or calculations, before reaching a final verification conclusion;

(g) verification of the accuracy of data recorded by the economic operators or their representatives in the Union database.

3. Non-conformities identified during an audit shall be classified as critical, major and minor in accordance with the second, third and fourth subparagraphs.

The intentional violation of a voluntary scheme's standards such as fraud, irreversible non-conformity, or a violation that jeopardies the integrity of the voluntary scheme shall be considered to be a critical non-conformity. Critical non-conformities shall include, but are not limited to, the following:

(a) non-compliance with a mandatory requirement of Directive (EU) 2018/2001, such as land conversion which contravenes Article 29(3), (4) and (5) of that Directive;

(b) fraudulent issuance of a proof of sustainability or self-declarations, for example, intentional duplication of a proof of sustainability to seek financial benefit;

(c) deliberate misstatement of raw material description, falsification of GHG values or input data as well as the deliberate production of wastes or residues, for example, the deliberate modification of a production process to produce additional residue material, or the deliberate contamination of a material with the intention of classifying it as a waste.

Failure to comply with a mandatory requirement of Directive (EU) 2018/2001, where the non-conformity is potentially reversible, repeated and reveals 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.

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.

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

(a) in the case of critical non-conformities, economic operators applying for certification shall not be issued a certificate. Economic operators may re-apply for certification after the lapse of a fixed period of time, determined by the voluntary scheme. Critical non-conformities identified during surveillance or re-certification audits, or through a voluntary scheme's internal monitoring or complaints process, shall lead to the immediate withdrawal of the economic operator's certificate;

(b) in the case of major non-conformities, economic operators applying for certification shall not be issued a certificate. Major non-conformities identified during surveillance or re-certification audits, or through a voluntary scheme'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 90 days from notification, the certificate shall be withdrawn;

(c) in the case of minor non-conformities, voluntary schemes may define the time period for their resolution, not exceeding 12 months from their notification and the date of next surveillance or re-certification audit.

5. Voluntary schemes shall only certify economic operators where they comply with all the following requirements:

(a) have a documentation management system;

(b) have an auditable system for safekeeping and reviewing all evidence related to the claims they make or rely on;

(c) keep all evidence necessary to comply with this Regulation and Directive (EU) 2018/2001 for a minimum of 5 years, or longer where it is required by the relevant national authority;

(d) accept responsibility for preparing any information related to the auditing of such evidence.

6. The audit reports and summary audit reports or certificates drawn up or issued by a certification body within the framework of a voluntary scheme shall at least include the elements set out in Annex II.

Article 11

Auditor competence

1. A certification body performing audits on behalf of a voluntary scheme 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) No 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. The Commission shall review the effectiveness of the systems described in this paragraph with regard to their suitability to ensure adequate surveillance and issue guidance if appropriate.

The certification body shall select and appoint the audit team in accordance with ISO 19011, taking into account the competence needed to achieve the objectives of the audit.

2. The audit team shall have the competence, experience and the generic and specific skills necessary for conducting the audit taking into account the scope of the audit. Where there is only one auditor, the auditor shall also have the competence to perform the duties of an audit team leader applicable for that audit. The certification body shall ensure that the certification decision is taken by a technical reviewer that was not part of the audit team.

3. Auditors shall:

(a) be independent of the activity being audited, except for audits concerning Article 29(6), point (a), and Article 29(7), point (a) of Directive (EU) 2018/2001, for which first or second party auditing may be carried out up to the first gathering point;

(b) be free from conflict of interest;

(c) have the specific skills necessary for conducting the audit related to the scheme's criteria, including:

(i) for land-use criteria laid down in Article 29, points (2) to (9) of Directive (EU) 2018/2001 as well as the low ILUC risk certification methodology set in Chapter V and Annex VIII of this implementing regulation: 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;

(ii) for GHG emissions saving criteria laid down in Article 29(10) of Directive (EU) 2018/2001 or when determining the GHG emissions of recycled carbon fuels and renewable fuels of non-biological origin in accordance with the methodology set out in Article 28(5) of Directive (EU) 2018/2001: a minimum of 2 years' experience in fuel life-cycle assessment, and specific experience in auditing GHG emission calculations in accordance with the methodology set out in Annexes V and VI to Directive (EU) 2018/2001, that is relevant for the type of audits to be conducted by the individual auditor. Depending on the specific scope of the audit, that experience shall be complemented by experience in agriculture, agronomy, ecology, forestry, natural science, silviculture, engineering, energy management or a related field. Where the scope of the audit includes verifying soil organic carbon levels, for the purpose of applying the emission saving credit for soil carbon accumulation, technical knowledge on soil science shall also be required;

(iii) for the chain of custody criteria laid down in Article 30, points (1) to (2) of Directive (EU) 2018/2001: experience in mass balance systems, supply chain logistics, bookkeeping, traceability, and data handling or a related field;

(iv) for group auditing: experience in conducting group audits.

4. Voluntary schemes shall set up training courses for auditors, covering all aspects relevant to the scope of the scheme. The courses shall include an examination to demonstrate the participants' compliance with the training requirements in the technical area or areas in which they are active. Auditors shall participate in the training courses, before performing audits on behalf of the voluntary scheme.

5. Auditors shall undertake refresher training courses on a regular basis. Voluntary schemes shall implement a system to monitor the training status of active scheme auditors. Voluntary schemes shall also provide guidance to certification bodies, as required, on aspects that are relevant to the certification process. That guidance may include updates to the regulatory framework or relevant findings from the voluntary scheme's internal monitoring process.

Article 12

Group auditing

1. Voluntary schemes may perform group auditing only in the following cases:

(a) for producers of raw material, in particular smallholders, producer organisations and cooperatives as well as waste collectors;

(b) for compliance with the scheme's land-related criteria, where the areas concerned are in proximity and have similar characteristics, such as climatic or soil conditions;

(c) for the purpose of calculating GHG savings, where the units have similar production systems and types of crops.

Economic operators included in a group audit shall designate a group manager. First gathering points, producer organisations or cooperatives, may also act as group managers, representing the economic operators included in the group audit.

2. Group auditing may carry out verification for all units concerned on the basis of sample of units. Voluntary schemes shall set out guidelines on the implementation of a group auditing approach, including at least the following elements:

(a) role of the group manager, covering specifications for the internal management system and internal group inspection procedures;

(b) determination of sample size.

3. A sample consisting of a number of group members equivalent to the square root of the total number of group members shall be audited individually at least once a year. That number shall be increased in the event of a higher level of risk. Voluntary schemes shall establish criteria for determining the general level of risk in the areas and the consequences of that level of risk for the auditing approach. The sample shall be representative of the whole group and determined using a combination of risk and random selection. Random selection shall represent at least 25 % of the sample. The producer of raw material selected for the audit shall vary from year to year.

4. Group auditing shall be performed on-site, unless it is considered that desk audits are able to provide the same level of assurance as an on-site audit. Voluntary schemes shall set out the evidence required to allow for desk audits. Self-declarations from economic operators shall not be considered to be sufficient evidence. Audits of the group manager shall always be conducted on-site.

5. Critical or major non-compliance of individual group members identified during an audit shall be addressed according to process set out under paragraph 4 (a) and (b) of Article 10, as applicable. If a critical or major non-compliance is identified in the whole initial group sample, then an additional sample of group members of the same size shall also be audited. Systemic non-compliance of the majority of group members across the whole sample shall lead to the suspension or withdrawal of the whole group certification, as applicable.

Article 13

Auditing of waste and residues

1. Voluntary schemes and the certification bodies working on their behalf shall apply the requirements for the verification of the supply chain of biofuels and bioliquids made from waste and residues set out in paragraphs 2 to 7, and for biomass fuels the requirements set out in paragraphs 2 to 5.

2. The whole supply chain shall be covered starting from its origin, that is to say, the economic operator where the waste or residue material arises;

3. All economic operators shall be audited individually. However, group auditing approaches may be carried out at the origin of the supply chain, for example, restaurants and waste or residue producers;

4. The frequency and intensity of the auditing procedure shall reflect the overall level of risk. Voluntary schemes shall define clear rules, commensurate to the level of specific risk associated with the type of residues or waste. For biofuels and bioliquids, points of origin supplying five or more tonnes per month of waste or residue listed in part A and B of Annex IX to Directive (EU) 2018/2001 shall be subject to an on-site audit. The on-side audit may be based on a sample where a group auditing approach is taken.

5. Collection points shall be required to submit a list of all points of origin that have signed a self-declaration to the auditor prior to the audit of the collection point. The amount of waste generated monthly or annually shall be clearly stated on the self-declaration. Evidence or documents for all individual deliveries shall be available at the collection point and verified by the auditor, including waste disposal agreement, delivery slips and self-declarations;

6. The auditor shall verify the existence of a number of points of origin equivalent to at least the square root of all the points of origin on the list. The verification may be performed remotely, unless there is doubt concerning the existence of the point of origin or where it meets the criteria for on-site audit pursuant to point (4). Auditors shall check deliveries of sustainable material to downstream recipients by verifying the copies of the sustainability declaration issued by the collecting point to recipients of those deliveries, based on a random and risk-based sample;

7. The certification body shall carry out a mandatory surveillance audit within 6 months after the first certification. For collection points and traders that deal with both waste and residues and with virgin materials such as vegetable oils, an additional surveillance audit shall be conducted 3 months after the first certification audit, covering the first mass balance period. Where a collection point has multiple storage sites, the auditor shall audit the mass balance of every storage site.

8. If there are reasonable doubts about the nature of the declared waste and residues, the auditor is authorised to take samples and to have them analysed by an independent laboratory.

Article 14

Auditing of actual GHG emission calculations

1. Voluntary schemes shall require economic operators to provide auditors with all the relevant and up to date information concerning the calculation of actual GHG emissions, in advance of the planned audit. That information shall include input data and any other relevant evidence, information on the emission and conversion factors and standard values applied and their reference sources, GHG emission calculations and evidence relating to the application of GHG emission saving credits.

2. The auditor shall record the emissions occurring at the audited site in the audit report. For the processing of final biofuels, the auditor shall record the emissions after allocation and the achieved savings. Where the emissions deviate significantly from typical values or calculated actual values of emissions savings are abnormally high, reasons shall be given for the deviations in the report. Voluntary schemes shall establish procedures requiring certification bodies to immediately inform them of such deviations.

3. Auditors shall verify that the estimate of emissions saving from capture and replacement of CO_2 is limited to emissions avoided through the capture of CO_2 of which the carbon originates from biomass and which is used to replace fossil-derived CO_2. That verification requires access to the following information:

(a) the purpose for which the captured CO_2 is used;

(b) the origin of the CO_2 that is replaced;

(c) the origin of the CO_2 that is captured;

(d) information on emissions due to capturing and processing of CO_2.

For the purposes of point (b), economic operators using captured CO_2 may state how the CO_2 that is replaced was previously generated and declare, in writing, that emissions equivalent to that quantity are avoided as a consequence of the replacement. That evidence shall be considered sufficient to verify compliance with the requirements of Directive (EU) 2018/2001 and the avoidance of emissions.

4. Economic operators may only make actual GHG values claims after their capability to conduct actual value calculations has been verified by an audit.

5. Upon request, voluntary schemes shall provide access to actual GHG calculations certified under their voluntary scheme together with the respective audit reports to the Commission and the national authorities responsible for supervision of the certification bodies.

Article 15

Audits of mass balance systems

Voluntary schemes shall ensure that economic operators provide auditors with all mass balance data in advance of the audit.

During the initial audit, carried out before an economic operator is allowed to participate in a scheme, the auditor shall check the existence and functioning of the mass balance system.

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

(a) list of all sites, that are under the scope of certification. Each site shall have its own mass balance records;

(b) list of all inputs per site and the description of material handled and details of all suppliers;

(c) list of all outputs per site and the description of material handled and details of all customers;

(d) conversion factors applied, in particular in the case of installations processing waste or residues to ensure that the process is not modified to produce more waste or residue material;

(e) any discrepancies between book keeping 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.

Article 16

Auditing of natural and non-natural highly-biodiverse grassland

1. Auditors verifying whether land is highly biodiverse grassland as referred to in Article 29(3), point (d), of Directive (EU) 2018/2001 shall verify whether the land is or has been highly biodiverse grassland at any moment since January 2008. In their system documents, voluntary schemes shall inform the economic operators about the type of evidence, which their certification bodies may accept to prove historical area status since January 2008.

2. Where land remains grassland, or would have remained grassland in the absence of human intervention, and is located in any of the geographic ranges listed in Regulation (EU) No 1307/2014, it shall be considered as natural, highly biodiverse grassland.

3. For land that is located outside the areas referred to in paragraph 2, 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.

4. 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.

5. Any land that is, or was, non-natural, highly biodiverse grassland in or after January 2008 may be used for fuels production on condition that harvesting of the raw material is necessary to preserve the status of the grassland as highly biodiverse grassland and that current management practices do not present a risk of causing biodiversity decline of the grassland.

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.

Article 17

Supervision by the Member States and the Commission

1. Voluntary schemes shall require economic operators participating in the scheme as well as certification bodies conducting audits under the scheme to cooperate with the Commission and the competent authorities of the Member States, including granting access to the premises of economic operators where requested as well as making available to the Commission and the competent authorities of the Member States all information needed to fulfil their tasks under Directive (EU) 2018/2001. For those purposes, certification bodies shall also be required to:

(a) provide the information needed by Member States to supervise the operation of certification bodies pursuant to Article 30(9) of Directive (EU) 2018/2001;

(b) provide the information required by the Commission to comply with Article 30(10) of Directive (EU) 2018/2001;

(c) verify the accuracy of information entered into the Union database or relevant national database pursuant to Article 28(4) of Directive (EU) 2018/2001.

2. In the context of the supervision provided for in Article 30(9) of Directive (EU) 2018/2001, Member States shall establish procedures allowing certification bodies, regardless of whether their head office is located in a Member State or in a third country, to register for supervision and for carrying out the supervision.

3. Member States shall exchange information and share best practices on how to supervise the operation of the certification bodies in the context of a formal cooperation framework. Where certification bodies carry out the certification of raw materials, biofuels, bioliquids, biomass or other fuels in more than one Member State, the Member States concerned shall set up a common framework to supervise such certification bodies, including appointing one Member State as lead audit supervisor.

4. The lead audit supervisor shall be responsible, in cooperation with the other Member States concerned, for consolidating and sharing information about the outcome of the supervision of the certification bodies.

5. Member States shall to the extent possible establish cooperation frameworks with third countries for the supervision of certification bodies auditing in their territories, where relevant, in order to ensure the same level of information flow and the application of audit supervision standards to certification bodies operating in third countries.

6. Where a Member State has reasonable doubts about the ability of a specific certification body, located in the Union or in a third country, to carry out its audit work, it shall share that information with the other Member States, the Commission and the voluntary scheme under which the certification body operates. The voluntary scheme concerned shall immediately investigate the case. Upon completion of its investigation, the voluntary scheme shall inform the Member States and the Commission of the outcome of the investigation and of any corrective actions taken.

7. Economic operators and certification bodies failing or unwilling to comply with the requirements set out in paragraphs 1 to 6 of this Article shall be respectively excluded from participating in and conducting audits under voluntary schemes. Voluntary schemes shall submit annual activity reports to the Commission pursuant to Article 30(5) of Directive (EU) 2018/2001. The structure and content of the annual activity reports provided for in Article 30(5) of Directive (EU) 2018/2001 shall follow the minimum requirements set out in Annex III to this Regulation. The main report shall not contain confidential information and shall be published in full. Data shall be supplied separately in a format to be determined by the Commission.

8. Voluntary schemes shall notify the Commission without delay, about all substantial changes to the content of the scheme that might affect the basis for the recognition of the scheme. Such changes may include any of the following:

(a) changes to the mandatory sustainability criteria covered by the scheme;

(b) extension of the scope of the scheme beyond what is described in the Implementing act, recognising the scheme;

(c) extension of the scope of feedstock or biofuels referred to in the original scheme documents where the risk profile of added feedstock differs, for example, with the inclusion of wastes or residues, or where specific procedures are applied;

(d) changes to the mass balance rules;

(e) changes to auditing procedures or requirements for auditors;

(f) changes in, or extension of the GHG calculation methodology;

(g) any other change that could be considered to affect the basis for the recognition of the scheme.

CHAPTER IV

SPECIFIC RULES ON THE IMPLEMENTATION OF THE MASS BALANCE SYSTEM, THE UNION DATABASE AND THE ESTABLISHMENT OF GHG EMISSIONS AND BIOLOGICAL FRACTION OF FUELS

Article 18

Traceability and Union database

1. The sustainability and GHG emissions saving characteristics and other information describing raw materials or fuel, required for the purposes of Directive (EU) 2018/2001, together with transaction data shall be thoroughly documented and passed on from economic operator to economic operator through the supply chain. Such information shall include data to be transmitted through the whole supply chain as well as data that is specific for the individual transaction, as described in Annex I.

2. The information to be transmitted through the supply chain shall be included in the documentation accompanying the physical shipments of raw material or fuels. It shall also be included in the Union database as soon as this starts operation, in the case of liquid and gaseous transport fuels that are eligible for being counted towards the numerator referred to in Article 27(1), point (b) of Directive (EU) 2018/2001, or that are taken into account for the purposes referred to in Article 29(1), points (a), (b) and (c), first subparagraph, of that Directive.

3. For the purpose of tracing consignments of liquid or gaseous fuels in an interconnected infrastructure and subject to the same mass balancing system, the sustainability and GHG emissions saving characteristics and the other information as described in paragraph 1 shall be registered in the Union database at the first entry point and registered out as consumed at the point of final consumption. If gaseous fuels are withdrawn from an interconnected infrastructure and further transformed into gaseous or liquid fuels, the point of final consumption is considered to be the point of final consumption of the final gaseous or liquid fuels. In such a case, all intermediary stages from the withdrawal of the gaseous fuels from the interconnected infrastructure until the point of final consumption of the final gaseous or liquid fuels have to be registered in the Union Database.

Article 19

Implementation of the mass balance system

1. Voluntary schemes shall require the economic operators participating in the scheme to use a mass balance system, in accordance with Article 30(1) of Directive (EU) 2018/2001 that allows the mixing of raw material or fuels that differ in their sustainability and GHG emissions saving characteristics.

2. Voluntary schemes shall apply the following rules in the implementation of the mass balance system:

(a) raw material or fuels shall only be considered to be part of a mixture if they are mixed in a container, at a processing or logistical facility, or at a transmission and distribution infrastructure or site;

(b) different raw materials shall only be considered to be part of a mixture if they belong to the same product group, except where the raw material is mixed for the purpose of further processing;

(c) raw materials or fuels shall only be considered to be part of a mixture if they are physically mixed unless they are physically identical or belong to the same product group. Where raw materials or fuels are physically identical or belong to the same product group, they must be stored in the same interconnected infrastructure, processing or logistical facility, transmission and distribution infrastructure or site;

(d) fuels introduced into a logistical facility or a transmission or distribution infrastructure such as the gas grid or a pipeline network for liquid fuels, stored in LNG or other storage facilities shall only be considered to be part of a mixture pursuant to point (c) where that infrastructure is interconnected;

(e) economic operators shall be required to keep separate mass balances for raw materials and fuels which cannot be considered part of a mixture. Transfer of information about the sustainability and GHG emissions saving characteristics and sizes between different mass balances shall not be allowed. Pursuant to subparagraphs (a) to (c), raw materials inside biofuels, bioliquids or biomass fuels production facilities are considered to be part of a mixture. Therefore, the requirement to keep separate mass balances shall not apply to such facilities and a single mass balance can be kept;

(f) the mass balance system shall include information about the sustainability and the GHG emissions characteristics and quantities of raw material and fuels, including information about the quantities of raw material and fuels for which no sustainability or GHG characteristics have been determined;

(g) where a consignment of raw material or 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 raw material or fuel. The type of fuel to be booked out shall correspond to the physical nature of the raw material or fuel delivered;

(h) where a consignment of fuel is used to comply with an obligation placed on a fuel supplier by a Member State, it shall be considered to be withdrawn from the mixture of the mass balance;

(i) where 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 blend. For biofuels and bioliquids, Member States may further check the veracity of this information in accordance with Article 23;

(j) the sustainability and GHG emissions saving 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;

(k) where relevant for transparency reasons, the mass balance system shall include information on whether support has been provided for the production of the fuel or fuel precursor, and if so, the type of support;

(l) the appropriate period of time for achieving the mass balance shall be 12 months for producers of agricultural biomass and forest biomass and first gathering points sourcing only agricultural biomass and forest biomass, and 3 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 alternatives to the calendar year, economic operators may also use either the economic year that they use for bookkeeping purposes or another starting point for the mass balance period, provided that the choice is clearly indicated and applied consistently. At the end of the mass balance period, the sustainability data carried forward should be equivalent to the physical stock in the container, processing or logistical facility, transmission and distribution infrastructure or site;

(m) voluntary schemes shall specify the minimum set of sustainability and GHG emissions saving characteristics, in accordance with Annex I, that need to be passed down the supply chain as well as other information necessary to trace the consignments. In case of liquid or gaseous fuels introduced into an interconnected infrastructure and subject to the same mass balancing system, the respective sustainability and GHG emissions saving characteristics shall be assigned to the consignments entering and exiting the interconnected infrastructure. The voluntary schemes shall also ensure that economic operators correctly enter all relevant information in the Union database.

Article 20

Determining the GHG emissions of biofuels, biomass fuels and bioliquids

1. Voluntary schemes shall require economic operators to apply the methodology set out in Article 31 of Directive (EU) 2018/2001 when determining the GHG emissions of biofuels, bioliquids and biomass fuels.

2. For the purpose of determining the GHG emissions of biofuels, bioliquids and biomass fuels referred to in paragraph 1, the following specific rules shall apply:

(a) in taking into account the GHG emissions of inputs, where standard values of emission factors are used, the ones set out in Annex IX shall be applied;

(b) in determining the emissions from the extraction or cultivation of raw material, the methodology set out in Annex VII shall be applied;

(c) in determining the emission savings from soil carbon accumulation via improved agricultural management (e_{sca}), the methodology set out in Annex V shall be applied.

3. EU Member States may submit updated values of the emission factors of their national electricity mix to be considered by the Commission for updating the respective emission factors in Annex IX. After assessing these updated values, the Commission may accept them or alternatively provide the Member State concerned with a justification of the reasons for not doing so. Accepted updated figures will be made available in the section devoted to voluntary schemes and certification on the Commission's EUROPA website.

4. Emission savings from CO_2 capture and geological storage (Eccs) may only be taken into account where there is valid evidence that CO_2 was effectively captured and safely stored in accordance with Directive 2009/31/EC of the European Parliament and of the Council on the geological storage of carbon dioxide ([5]). Where the CO_2 is geologically stored, voluntary schemes shall verify the evidence provided on the integrity of the storage site and the volume of the CO_2 stored. Where a third party carries out the transport or geological storage, proof of storage may be provided through the relevant contracts with and invoices of that third party.

Article 21

Specific rules for waste and residues

1. Voluntary schemes shall apply the specific rules and exemptions for waste and residues set out in Directive (EU) 2018/2001 only if such raw material falls within the scope of the respective definitions in Article 2 of that Directive.

2. Whether a raw material is to be considered as a waste or residue shall be determined at the point in the supply chain where the material originates. Raw materials shall not be considered as a waste or residue where they or the process for their production have been deliberately modified for the purpose of declaring those materials as wastes or residues.

3. The waste and residues listed in Annex IV shall not be considered as waste or residues where they have been deliberately modified to be declared as a waste or residue.

4. Voluntary schemes shall provide economic operators with instructions and support on how they assess whether raw materials are considered waste and residues. Economic operators shall keep and present to auditors the underlying evidence for their assessments. Voluntary schemes shall establish specific rules for auditing such evidence.

5. For the purposes of complying with the requirements of Article 29(2) of Directive (EU) 2018/2001, voluntary schemes shall verify that the harvesting of agricultural waste and residues does not have a negative impact on the soil quality and the soil carbon stock. Such verification shall ensure that a relevant set of essential soil management or monitoring practices is applied on the land to promote soil carbon sequestration and soil quality, in accordance with Annex VI.

6. The application of the practices, referred to in paragraph 5, may be required and monitored either at national level or at the level of economic operators. At national level, voluntary schemes shall verify that the country of origin, whether it is a Member State or a third country, requires the application of essential soil management practices to address the potential impact of harvesting such residues on soil quality and soil carbon, and has in place mechanisms to monitor and enforce

([5]) Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No 1013/2006 (OJ L 140, 5.6.2009, p. 114).

the implementation of those practices. At the level of economic operators, voluntary schemes shall verify that such management practices are effectively applied and monitored at the level of the farm holdings supplying the biomass. Where group auditing is used, voluntary schemes shall verify that those practices are applied by all the economic operators covered by the group audit.

Article 22

Specific rules for recycled carbon fuels and renewable fuels of non-biological origin

Voluntary schemes shall require economic operators participating in the scheme to apply the methodology set out in Article 28(5) of Directive (EU) 2018/2001 when determining the GHG emissions of recycled carbon fuels and renewable fuels of non-biological origin.

Article 23

Specific rules for co-processing

1. Voluntary schemes shall require economic operators participating in the scheme to apply the methodology set out in delegated acts adopted pursuant to Article 28(5) of Directive (EU) 2018/2001 when determining the share of biofuel, and biogas for transport, resulting from biomass being processed with fossil fuels in a common process.

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

3. The frequency for carrying out the control tests referred to in paragraph 2 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 and biogas claimed reflect their actual shares.

4. In conducting audits, particular emphasis shall be placed on verifying the consistency between the amounts of biomass entering the process and the amounts of biofuel and biogas that are recorded as being produced from the biomass. For that purpose, the evidence supplied by the economic operators 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 and biogas. 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.

CHAPTER V

SPECIFIC RULES ON COMPLIANCE WITH THE REQUIREMENTS ON LOW ILUC-RISK CERTIFICATION

Article 24

Specific requirements for low ILUC-risk certification

1. Voluntary schemes shall require economic operators seeking to receive a low ILUC-risk certification to submit an application to a certification body having the competence to deliver such certification. Upon acceptance of the application, the economic operator shall submit a management plan containing the minimum information set out in Annex VIII. Where more than one additionality measure is applied, all additionality measures shall be documented in the management plan.

2. The certification body shall conduct an on-site baseline audit to verify the content of the management plan, as well as to establish and document the dynamic yield baseline.

3. As part of the baseline audit, the certification body shall assess whether the additionality measure(s), are expected to lead to an increase in yields in accordance with Article 2(5) of Delegated Regulation (EU) 2019/807 and compliance with the sustainability criteria set out in Directive (EU) 2018/2001.

4. The auditors carrying out the baseline audit on behalf of the certification body shall indicate in the baseline audit report any sustainability issues, stemming from the implementation of the additionality measures, which may potentially constitute a breach of the national or regional legal framework or do not comply with local specific conditions. Any sustainability issues shall be included in the annual audits.

5. Voluntary schemes shall issue low ILUC-risk certificates in accordance with the requirements on minimum content set out in point 4 of Annex VIII, and shall publish a list of those certificates on their website.

6. In the case of applications including additionality measures to be applied after certification, the baseline audit, the results of the additionality test, and the dynamic yield baseline shall be valid for 10 years. In the case of a perennial crops, an economic operator can choose to delay the start of the 10-year validity period by up to 2 years in the case of operational additionality measures or up to 5 years in the case of replanting.

7. Where the additionality measures have been already applied before certification, the baseline audit, the results of the additionality test, and the dynamic yield baseline shall be valid for 10 years from the starting year of the implementation of the additionality measure. In such a case, the baseline may be accepted for additionality measures taken not more than 10 years before, as long as sufficient data and documentary evidence is available providing the same level of assurances of a situation where the baseline audit was conducted before the implementation of the additionality measure(s).

8. Only additional biomass that has been produced after the low ILUC risk certification has been granted shall be eligible for a low ILUC-risk declaration. The actual amount of annual additional biomass declared by the economic operator shall be subject to annual audits.

9. The implementation of the management plan shall be subject to annual audits to verify that the content of the management plan is implemented correctly and that the quantities of additionally produced and claimed biomass for the purposes of low-ILUC certification, against the dynamic yield baseline, are correct.

10. An economic operator may apply more than one additionality measure over the years. Where two or more additionality measures are applied together in the same year on the same delineated plot of land, the additional biomass produced as a result shall be evaluated against the same dynamic yield baseline. The additional biomass may be certified as low ILUC-risk under the same certificate.

11. Where two or more additionality measures are applied at different times on the same delineated plot of land, the economic operator may choose either of the following options:

(a) update the dynamic yield baseline and the additionality test to create a new baseline valid for another 10 years;

(b) keep the original validity period of 10 years for the dynamic yield baseline and the additionality test following the initial certification year.

Article 25

Specific requirements for proving additionality

1. For the purposes of certifying biofuels, bioliquids, or biomass fuels as low ILUC-risk, voluntary schemes and certification bodies working on their behalf shall verify that economic operators have applied measures effectively increasing feedstock productivity beyond a business-as-usual scenario. Where such measures are applied on abandoned or

severely degraded land or by small holders, the baseline audit shall verify that economic operators comply with the appropriate requirements of Delegated Regulation (EU) 2019/807. In all other situations, proof of additionality shall be provided by carrying out a financial attractiveness or barrier analysis assessment.

2. In order to comply with the requirements set out in Article 5(1)(a) of Delegated Regulation (EU) 2019/807 regarding additionality measures, proposed investments shall either pass a financial attractiveness test or non-financial barrier test in accordance with Annex VIII.

3. Measures shall be eligible for the purpose of low ILUC-risk certification only where either their financial attractiveness test is negative, that is to say a negative net present value (NPV) of the investment without the inclusion of a market premium, or they demonstrate the presence of non-financial barriers that can be overcome only because the biofuels, bioliquids and biomass fuels produced from the additional feedstock can be counted towards the targets for renewable energy set out in Directive (EU) 2018/2001.

Article 26

Production on unused, abandoned or severely degraded land

1. For the purpose of complying with the requirements for production on unused or abandoned land as defined in Article 2, points (2) and (3), of Delegated Regulation (EU) 2019/807, economic operators shall provide evidence that for a consecutive period of at least 5 years before the start of cultivation of the feedstock used for the production of biofuels, bioliquids and biomass fuels, the delineated areas were used neither for the cultivation of food and feed crops or other energy crops nor for the cultivation of any substantial amount of fodder for grazing animals.

2. For land to qualify as abandoned land, the economic operator shall provide additional evidence that food or feed crops were once grown on the delineated area before the consecutive period referred to in paragraph 1. That evidence shall also prove that the production ceased for biophysical or socioeconomic reasons.

Biophysical changes which adversely affect the growing of food and feed crops may include, but are not limited to, the following events:

(a) an increased frequency of severe weather events such as droughts, storms or floods;

(b) changes in seasonal temperature patterns which affect plant phenology;

(c) increased pests and diseases;

(d) damage to irrigation systems;

(e) damage to soil such as severe salinisation, depletion of organic matter and erosion rendering them ‘severely degraded’.

3. Socioeconomic factors adversely affecting the economic viability of production, leading to the abandonment of the land may include, but are not limited to, the following events:

(a) changes in market prices: (for example increased input or labour costs, or both, or reductions in the price fetched by finished crops);

(b) labour becoming unavailable (for example as a result of migration);

(c) failure of the supply chain (for example through the closure of a local market or a transport link);

(d) disputes about ownership (for example in the context of inheritance);

(e) political instability (for example confiscation or nationalization of the land).

4. An application for the certification of feedstock as having been produced on severely degraded land, as defined in part C, point (9) of Annex V to Directive (EU) 2018/2001, shall be accompanied by the following soil test results, as applicable:

(a) in the case of salinisation, the results of testing by a qualified agronomist of the electroconductivity of the soil using the saturated paste method;

(b) in the case of low soil organic matter, results from an appropriate number of samples of soil from the delineated plot, determined by a qualified agronomist, using the dry combustion method;

(c) in the case of severe erosion, at least 25 % of the delineated plot shall have been eroded as determined by a qualified agronomist, supported by photographs.

5. Where a delineated area qualifies as unused land, it shall pass an additionality test as set out in point (4) of Annex VIII in order to be eligible for low ILUC-risk certification. Delineated areas that qualify as abandoned or severely degraded land shall not be required to pass the additionality test in order to be eligible for low ILUC-risk certification. In the case of production on unused, abandoned or degraded land, the dynamic yield baseline shall be set to zero with no trend line.

Article 27

Determining additional biomass for yield increase measures

1. The 'additional biomass' eligible for low ILUC-risk certification shall be the additional amount of feedstock produced in a clearly delineated area compared to the dynamic yield baseline as a direct result of applying an additionality measure.

2. The dynamic yield baseline shall be established by setting out a starting point, based on historical yield from the delineated plot, and a trend line based on global yield trends for the feedstock, which shall be determined in accordance with the principles set out in Annex VIII.

3. The actual yield for a delineated plot after implementation of the additionality measure shall be compared against the baseline referred to paragraph 2. The difference between the actual yield and the dynamic yield baseline is the additional feedstock eligible to be claimed as low ILUC-risk.

CHAPTER VI

FINAL PROVISIONS

Article 28

Entry into force and application

This Regulation shall enter into force on the third day following that of its publication in the *Official Journal of the European Union*.

It shall apply from 18 months after its entry into force.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

Done at Brussels, 14 June 2022.

For the Commission
The President
Ursula VON DER LEYEN

ANNEX I

DATA TO BE TRANSMITTED THROUGH THE WHOLE SUPPLY CHAIN AND TRANSACTION DATA

1. Data to be transmitted through the whole supply chain

(a) name of the voluntary or national scheme;

(b) proof of sustainability number;

(c) sustainability and GHG emission savings characteristics, including:

  (i) statement on whether the raw material or fuel complies with the criteria set out in Article 29(2) to (7) of Directive (EU) 2018/2001;

  (ii) GHG emission data calculated according to the methodology set out in Annexes V and VI to Directive (EU) 2018/2001 or Delegated Regulation (EU) 2019/807;

  (iii) description of when the installation started operation (for fuels only);

(d) name of raw material or name of raw material that the fuel is produced from;

(e) waste or animal by-product permit number (if applicable);

(f) fuel type (for fuels only);

(g) country of origin of raw material;

(h) country of fuel production;

(i) statement on whether the raw material or fuel complies with the criteria set out for low indirect land-use change-risk biofuels;

(j) information on whether support has been provided for the production of that consignment, and if so, the type of support scheme.

2. Transaction data

(a) supplier company name and address;

(b) buyer company name and address;

(c) date of (physical) loading;

(d) place of (physical) loading or logistical facility or distribution infrastructure entry point;

(e) place of (physical) delivery or logistical facility or distribution infrastructure exit point;

(f) volume: For fuels, the energy quantity of the fuel must also be included. For the calculation of the energy quantity, conversion factors in Annex III to Directive (EU) 2018/2001 must be used.

ANNEX II

MINIMUM CONTENT OF AUDIT REPORTS, SUMMARY AUDIT REPORTS OR CERTIFICATES

A. **Minimum content of the audit report**

1. With regard to 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 to Directive (EU) 2018/2001;

   (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).

2. With regard to 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.

3. With regard to 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, NUTS2 or actual values – including information on the application of GHG emission savings factors).

4. With regard to the audit results:

   (a) place and date of issuance;

   (b) list of non-conformities identified.

B. **Minimum content of the summary audit report or certificate**

1. With regard to 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 Directive (EU) 2018/2001 (for traders with/without storage, the type of material traded).

2. With regard to the certification body: contact details (name and address) and logo

3. With regard to the audit process:
   (a) date of audit;
   (b) scheme standards audited/certified (including version number);
   (c) sites audited;
   (d) GHG data type (default, NUTS2 or actual values – including information on the application of GHG emission savings factors).

4. With regard to 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.

ANNEX III

LIST OF INFORMATION TO BE REPORTED BY VOLUNTARY SCHEMES IN THEIR ANNUAL ACTIVITY REPORTS TO THE COMMISSION

Voluntary schemes must report the following information in their annual activity reports to the Commission:

(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 Article 6.

(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, biomass fuels, recycled carbon fuels and renewable fuels of non-biological origin all certified, by country of origin and type, and the number of participants.

(g) 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.

(h) criteria for the recognition of certification bodies.

(i) 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;

(j) possibilities to facilitate or improve the promotion of best practices.

(k) voluntary schemes certifying forest biomass must include information on the way the risk assessment required in Article 29(6) and (7) of the Directive (EU) 2018/2001 is made.

ANNEX IV

NON-EXHAUSTIVE LIST OF WASTE AND RESIDUES CURRENTLY COVERED BY ANNEX IX TO DIRECTIVE (EU) 2018/2001

The substances listed in this annex shall be considered as falling under a category of raw material set out in Annex IX to Directive (EU) 2018/2001 without being explicitly mentioned. The list is not comprehensive and complements the existing list of materials in Annex IX to Directive (EU) 2018/2001.

Category in Annex IX to Directive (EU) 2018/2001	Feedstock sub-category/examples
Annex IX Part A d)	Drink waste
Annex IX Part A d)	Fruit/vegetable residues and waste (Only tails, leaves, stalks and husks)
Annex IX Part A d)	Bean shells, silverskin, and dust: cocoa, coffee
Annex IX Part A p)	Shells/husks and derivatives:, soy hulls
Annex IX Part A d)	Residues and waste from production of hot beverages: spent coffee grounds, spent tea leaves
Annex IX Part A d)	Dairy waste scum
Annex IX Part A d)	Food waste oil: oil extracted from waste food from industry
Annex IX Part A d)	Non-edible cereal residues and waste from grain milling and processing: wheat, corn, barley, rice
Annex IX Part A d)	Olive oil extraction residues and waste: olive stones
Annex IX Part A p)	Agricultural harvesting residues
Annex IX Part A q)	Palm fronds, palm trunk
Annex IX Part A q)	Damaged trees
Annex IX Part A p)	Unused feed/fodder from ley
Annex IX Part B b)	Waste fish oil classified as categories 1 and 2 in accordance with Regulation (EC) No 1069/2009.
Annex IX Part A d)	Other slaughterhouse waste (Animal residues (non-fat) Cat 1)
Annex IX Part A d)	Industrial wastewater and derivatives
Annex IX Part A g)	Palm sludge oil (PSO)
Annex IX Part A d)	Industrial storage settlings
Annex IX Part A d)	Biogenic fraction of end-of-life tyres
Annex IX Part A q)	Recycled/waste wood
Annex IX Part A d)	Humins
Annex IX Part A d)	Spent bleaching earth

ANNEX V

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 ($\mathbf{e_{sca}}$) in terms of g CO_2eq/MJ should use the following formula to calculate their actual values:

$$e_{sca} = (CS_A - CS_R) \times 3{,}664 \times 10^6 \times \frac{1}{n} \times \frac{1}{P} - e_f$$

Where:

CS_R	is the mass of soil carbon stock per unit area associated with the reference crop management practice in Mg of C per ha.
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 in Mg of C per ha.
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) in g CO_{2eq}/g C.
n	is the period (in years) of the cultivation of the crop considered.
P	is the productivity of the crop (measured as MJ biofuel or bioliquid energy per ha per year).
ef	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 CS_R and CS_A shall be based on measurements of soil carbon stocks. The measurement of CS_R shall be carried out at farm level before the management practice changes in order to establish a baseline, and then the CS_A 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 e_{sca} 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 voluntary schemes. Voluntary schemes shall be obliged to 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. The voluntary scheme shall be obliged to prepare a detailed report, presenting the validated modelling method used and its 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 (e_{sca}), made on the basis of modelling.

To claim emissions savings from soil carbon accumulation via agricultural management (e_{sca}), 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 shall be required by voluntary schemes 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 e_{sca} 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 e_{sca} 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. The voluntary scheme that has issued the certificate shall be obliged to enforce the penalties and dully 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 (e_{sca}) shall be capped to 45 g CO_2eq/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 e_{sca} practices. In all other cases, the cap referred to above shall be 25 g CO_2eq/MJ biofuel or bioliquid for the entire period of application of the e_{sca} practices.

Primary producers or economic operators, who are already engaged in eligible e_{sca} practices and have made respective Esca claims before the entry into force of this Implementing regulation, may apply a cap of 45 g CO_2eq/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 5 years.

If the application of eligible improved agricultural management practices (e_{sca}) 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 e_{sca} 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 CS_R 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 CS_Restimated 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 3 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 e_{sca} 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, that 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 e_{sca} and the calculation of the actual GHG emissions values shall be duly verified by certification bodies and documented in audit reports. Voluntary schemes are obliged to 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. Voluntary schemes shall be also obliged to include detailed statistical information and qualitative feedback on the implementation of the e_{sca} methodology in their annual activity reports to be submitted to the Commission.

The Commission shall duly monitor the implementation of the e_{sca} methodology as part of its monitoring of the activities of the voluntary schemes covering inter alia:

— Project implementation which should allow for, amongst others, evaluating the relation of modelling results against field measurements;

— Comparing claims and results against estimates of SOC saturation to derive criteria and recommendations and possibly requirements for long term maintenance of a given equilibrium to secure results in the long term;

— Derive recommendations and requirements for an appropriate model selection and calibration as well as reliable indicators to model results.

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).

ANNEX VI

NON-EXAUSTIVE LISTS 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 (biochar, compost, manure, crop residues) – use of cover crops, rewetting Revegetation: planting (species change, protection with straw mulch) – landscape features – agroforestry	Increase soil organic carbon

Table 1

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, e.g. 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.
Regular soil pH analysis	Monitoring pH helps identify imbalances in pH.

ANNEX VII

METHODOLOGY FOR DETERMINING THE EMISSIONS FROM THE EXTRACTION OR CULTIVATION OF RAW MATERIALS

To calculate the emissions from the extraction or cultivation of raw materials Part C, point 5 of Annex V and Part B, point 5 of Annex VI to Directive (EU) 2018/2001 state 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 raw materials shall be excluded. 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 Directive (EU) 2018/2001 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.

EMISSIONS FROM THE EXTRACTION OR CULTIVATION PROCESS ITSELF

The emissions from the extraction or 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. Where biofuels are used, the default GHG emissions set out in Directive (EU) 2018/2001 must be used.

1.2. Chemical fertilisers and pesticides

The emissions from the use of chemical fertilisers and pesticides ([1]) for the cultivation of raw materials 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. 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. If the economic operator does not know the factory supplying the fertiliser, it should use the standard values provided for in Annex IX.

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 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;

([1]) 'Pesticides' means all plant protection products, including herbicides, insecticides, fungicides, etc.

(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)*

The real amount of aglime used shall be duly documented. Emissions shall be calculated as follows:

1. 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 $CaCO_3$ equivalent aglime).

2. If soil pH is greater or equal to 6,4, an emission factor of 0,98/12,44 = 0,079 kg CO_2/(kg $CaCO_3$-equivalent) 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.

3. The liming emissions calculated from actual lime use, calculated in points 1 and 2 above, may be greater than the fertilizer neutralization emissions calculated in 1.4.1 if the fertilizer acidification was neutralized by the applied lime. In such a case, the fertilizer neutralization emissions (in 1.4.1) may be subtracted from the calculated liming emissions to avoid that its emissions are counted twice.

The emissions from fertilizer acidification may exceed those attributed to liming. In such a case, the subtraction would result in apparently negative net liming emissions because not all of the fertilizer-acidity is neutralized by aglime but also partly by naturally-occurring carbonates. In this case, the net liming emissions shall be counted zero, but the fertilizer-acidification emissions that occur anyway shall be maintained in line with section 1.4.1.

If data on actual aglime use is not available, the aglime use recommended by the Agricultural Lime Association shall be assumed. This shall be a function of the type of crop, measured soil pH, soil type and type of liming material. The accompanying CO_2 emissions shall be calculated using points 1 and 2 of the procedure above. However, the subtraction specified in point 3 shall not be applied in this case, since the recommended use of aglime does not include aglime used to neutralize fertilizer applied in the same year, so there is no possible double counting of fertilizer neutralization emissions.

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 ([2]), 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:

$$N_{total} - N = N_2O_{direct} - N\ 2O + N_2O_{indirect} - N$$

([2]) IPCC (2006), Vol. 4, Chapter 11: N_2O emissions from managed soils, and CO_2 emissions from lime and urea application.

Where:

For mineral soils: $N_{Direct} - N = [(F_{SN}\ 2O + F_{1ij}]\ ON) \bullet EF + [F_{CR} \bullet E_{F1}]$

For organic soils: $N_2O_{Direct} - N = [(F + F_1]\ ON) \bullet EF + [F_{F1}]\ CR \bullet E + [(F_{2CG,\ Temp}]\ OS,CG,Temp \bullet EF + [F_{CROS,CG,Trop} \bullet E_{2CG,Trop}]$

For both mineral and organic soils: $N_2O_{Direct} - N = [((F_{GASF})\ SN \bullet Frac + (F_{GASM}) \bullet EF_4]\ ON \bullet Erac + [(F+F+ F_{CR}) \bullet Frac_{Leach-(H)} \bullet EF_5]$

1.5.1. *Crop residue N input*

It must be calculated for:

(a) sugar beet, sugar cane 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 in the case of sugar cane;

$$F_{Burnt} \bullet C_f) \bullet [R_{AG} \bullet N_{AG} \bullet (1 - Frac_{Remove})]\ CR = Yield \bullet DRY \bullet (1\text{-}Frac + F_{VF}$$

(b) coconut and oil palm plantations applying a fixed N input based on literature as IPCC (2006) provides no default calculation method for standard emission factors, pursuant to Annex IX;

(c) for all other crops according to IPCC (2006) Vol. 4 Chapter 11 Eq. 11.7a 11.11, 11.12, as

$$F_{Burnt} \bullet C_f) \bullet AG_{DM} \bullet N_{AG} \bullet (1\text{-}Frac_{Remove})\ CR = (1\text{-}Frac + (AG + Yield \bullet DRY) \bullet R_{BG\text{-}BIO} \bullet N_{BG}$$

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}
$N_2O_{direct} - N =$	annual direct N_2O–N emissions produced from managed soils; kg N_2O–N ha^{-1} a^{-1}
$N_2O_{indirect} - N =$	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 + NOx–N) (kg N applied)$^{-1}$. Volatilisation from synthetic fertiliser
$Frac_{GASM} =$	0,20 (kg N NH_3–N + NOx–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 + NOx–N volatilised) $^{-1}$]

EF_5 = 0,0075 [kg N_2O–N (kg N leaching/run-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]

C_f = 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 N_2O 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'):

$$E = exp\left(-1{,}516 + \sum ev\right)$$

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 ([3])

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 N_2O 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

([3]) Data source: JRC report 'Definition of input data to assess GHG default emissions from biofuels in EU legislation' JRC 2019 (EUR 28349 EN). https://op.europa.eu/en/publication-detail/-/publication/7d6dd4ba-720a-11e9-9f05-01aa75ed71a1

EMISSIONS FROM THE COLLECTION, DRYING AND STORAGE OF RAW MATERIALS

Emissions from the collection, drying and storage of raw materials include all emissions related to fuel use in the collection, drying and storage of raw materials.

Emissions from collection

Emissions from the collection of raw materials include all the emissions resulting from the collection of raw materials 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).

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 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.

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, which can be at a NUTS2 ([4]) region or a national level. In case national electric emission coefficients are used, the values from Annex IX shall be used. 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.

([4]) Nomenclature of territorial units for statistics.

ANNEX VIII

MINIMUM REQUIREMENTS ON THE PROCESS AND METHOD FOR CERTIFYING LOW INDIRECT LAND-USE CHANGE (ILUC) RISK BIOMASS

A. **Process of low ILUC risk certification**

To start the certification process, an economic operator has to submit an application to a certification body recognised by a voluntary scheme for low ILUC risk biomass certification. The applicant may be a farm, a first gathering point or a group manager, acting on behalf of a group of farmers.

The low ILUC risk certification application shall contain at least the following information:

(a) the name and contact details of the applicant or applicants, including where relevant the members of a group for group certification ([1]);

(b) a description of the low ILUC risk additionality measures envisaged, including:

  (i) details on the delineated plot where the additionality measure will be implemented, including current land use, current management practices, current plot yield data, and if applicable a statement on whether the land is unused, abandoned or severely degraded;

  (ii) description of the additionality measures and an estimate of the additional biomass that will be produced following its application (either through a yield increase or production on unused, abandoned or severely degraded land);

(c) information on any existing Commission-recognised voluntary scheme certification (name of the voluntary scheme, certificate number, status and validity period).

If the application is made after the additionality measures have been implemented, only the additional biomass produced after the date of low ILUC risk certification may be claimed as low ILUC risk.

1. *Content of the management plan*

Once the low ILUC risk application is accepted, the economic operator shall develop a management plan and submit it to the certification body. The management plan shall build on the information in the certification application, and include:

(a) a definition of the delineated plot of land;

(b) a description of additionality measures;

(c) check on sustainability of the additionality measure against the requirements of Directive (EU) 2018/2001;

(d) where relevant, demonstration of additionality assessment (either financial attractiveness or non-financial barrier test);

(e) determination of the dynamic yield baseline, including:

  (i) for yield increase measures: at least 3 years of historical crop yield data related to the delineated plot of land;

  (ii) for cultivation on unused, abandoned or severely degraded land: proof of land status (the baseline yield for cultivation on unused, abandoned or severely degraded land is considered to be zero)

(f) estimate of the additional biomass yield per year, with reference to the dynamic yield baseline for the delineated plot.

The management plan must allow a comparison to be made between the use of the delineated plot before and after implementation of the additionality measure.

([1]) If applying for group certification, the application must include the name and contact details of the group manager and the name, contact details and locations of the farms/plantations that are part of the group.

2. *Non-exhaustive list of additionality measures*

Table 1

Non-exhaustive list of yield increase additionality measures.

Additionality category	Additionality measure	Example
Mechanisation	Machinery	Adoption of machinery that reduces/complements existing workforce input to boost output or reduce losses. This could include sowing, precision farming, harvesting machinery or machinery to reduce post-harvest losses.
Multi-cropping	Sequential cropping	Introduction of second crop on same land in the same year.
Management	Soil management	Mulching instead of ploughing, low tillage.
	Fertilisation	Optimisation of fertilisation regime, use of precision agriculture.
	Crop protection	Change in weed, pest and disease control.
	Pollination	Improved pollination practices.
	Other	Leaves room for innovation, combinations of measures and unforeseen developments.
Replanting (for perennial crops) ([1])	Choice of crop varieties	Higher yield variety, better adaptation to eco-physiological or climatic conditions.

([1]) Replanting at the end of the crop lifetime is always necessary for a perennial crop. For replanting to count as an additionality measure, the economic operator must prove that their replanting goes beyond 'business as usual'.

Additionality measures are measures that go beyond common agricultural practices. Table 1 contains a non-exhaustive list of the types of yield increase additionality measures that economic operators can apply. Measures, or combinations of measures, shall boost output without compromising sustainability. The additionality measure shall not compromise future growing potential by creating a trade-off between short-term output gains and mid/long-term deterioration of soil, water and air quality and pollinator populations. The additionality measures shall not result in homogenisation of the agricultural landscape through removal of landscape elements and habitats such as solitary trees, hedgerows, shrubs, field edges or flower strips.

Only additional yield above the dynamic yield baseline may be claimed as low ILUC risk. Furthermore, an additionality measure may only be certified if it aims to achieve additional yields as a result of an improvement in agricultural practice. If a measure is applied that only aims to improve the sustainability of the plot, without improving yields, it is not deemed an additionality measure. This is not the case with cultivation on unused, abandoned or severely degraded land, in which case the cultivation itself is the additionality measure.

The economic operator will have to demonstrate that the management plan sets reasonable expectations on the yield increase by referring to, for example, scientific literature, experience from field trials, information from agronomy companies, seed/fertiliser developers or simple calculations. Satisfactory evidence supporting the expected yield increase of the additionality measure applied is needed for the project to be certified.

In the case of agricultural improvements, the agricultural practices applied, machinery and means before and after the additionality measure has been applied shall be documented in detail as part of the management plan. This shall allow a comparison in order to (i) determine whether an additionality measure has been implemented; (ii) evaluate if that additionality measure may be considered to be additional compared to a 'business as usual' development.

B. **Additionality assessment: Financial attractiveness or barrier analysis tests**

1. *Financial attractiveness test*

The financial attractiveness test shall demonstrate that the investment required for the additionality measure becomes financially attractive only if the resulting additional yield is certified as low ILUC risk. The analysis shall consist of a simple financial analysis of the envisaged low ILUC risk additionality measure investment.

The test shall include only those costs and yields that are directly related to the additionality measure investment. Normal operating costs of the entire farm shall therefore not be included in the analysis. The costs and revenues included in the test shall be related to the preparation, implementation, maintenance and decommissioning of the additionality measure that would not have been otherwise incurred.

Financial attractiveness arises from a business case in which the net present value ('NPV') ([2]) of the investment is positive, which means that the investment may be conducted by the economic operator itself. As a result, only measures for which the business case analysis is negative (without the inclusion of a premium) shall pass the financial additionality test and become eligible to be certified as low ILUC risk. Outcomes above zero (a positive NPV) may still be eligible only if they pass the non-financial barrier test.

Formula to calculate the NPV of an investment:

$$NPV = \sum \frac{P - L}{(1 + i)^t}$$

Where:

P = expected income from additional biomass (estimate of additional biomass x feedstock sales price without low ILUC premium)

L = cost of additionality measure (CAPEX and OPEX)

i = discount rate

t = time period

The parameters used in the NPV calculation shall be in line with the data included in the management plan.

The following parameters shall be included in the NPV calculation:

(a) estimate of additional biomass volume;

(b) feedstock sales price [currency/tonne]:

(i) the feedstock sales price may be a single number extrapolated over the lifetime of the additional yield investment;

(ii) this single number may be based on an average of actual historical feedstock sales values achieved by the economic operator. The average value shall be based on data for the same 3 years that the historical yield data used to set the dynamic yield baseline;

(iii) in the event of introducing a new crop for which the economic operator does not have actual price data, this value may be based on price data from FAOSTAT ([3]);

(c) discount rate to be used: 3,5 % for high income countries ([4]) and 5,5 % for all other countries;

(d) lifetime of the investment:

(i) a lifetime of up to 10 years shall be used in conformity with the lifetime of the low ILUC risk certification (baseline validity);

(ii) in some cases, the maximum lifetime of the investment may be set at 25 years based on the typical lifetime of perennial crops (that is to say, oil palm tree, in the case of oil palm replanting);

(e) investment cost related to the additionality measure [CAPEX + OPEX].

([2]) NPV is the difference between the present value of cash inflows and the present value of cash outflows over a period of time. NPV is used in capital budgeting and investment planning to analyse the profitability of a future investment or project. Source: https://www.investopedia.com/terms/n/npv.asp

([3]) FAOSTAT producer prices. Source: http://www.fao.org/faostat/en/#data/PP

([4]) OECD countries

2. *Non-financial barrier test*

The non-financial barrier analysis shall only cover non-financial project barriers that prevent the implementation of the additionality measures in case of no low ILUC risk certification. Any barrier whose cost can be estimated shall be included in the financial attractiveness analysis rather than in the non-financial barrier analysis.

The economic operator that plans the additionality measure is responsible for justifying the existence of non-financial barriers. The justification shall consist of a clear, verifiable description of the situation that prevents the uptake of the additionality measure. The economic operator shall provide all the necessary verifiable evidence to support the claim and demonstrate how low ILUC risk certification would ensure that the non-financial barrier is overcome.

The validity of the operator's claim shall be assessed and validated by the baseline audit before issuing a low ILUC risk certificate.

C. **Setting the dynamic yield baseline and calculation of the actual volume of low ILUC risk biomass**

The dynamic yield baseline shall be set individually for each delineated plot based on the crop and the type or combination of additionality measures applied. Plot-specific historical crop yield data from at least the 3 years preceding the application of an additionality measure shall be used to calculate the starting point of the dynamic yield baseline. This shall be combined with a global crop-specific trend line for expected yields based on historical data of actual yields over the past decade, or longer if data is available. For perennial crops, the dynamic yield baseline also takes into account the yield curve over the lifetime of the crop.

1. *Setting the dynamic yield baseline for annual crops*

Where a farm rotates crops between fields and the crop whose yield will be increased ('target crop') has been planted in different fields on the same farm in previous years, two options are envisaged for gathering the historical yield data in order to calculate the dynamic yield baseline:

Option 1: The economic operator calculates an average of the yields for the 3 most recent years that the target crop was grown on the specific delineated plot prior to implementation of the additionality measure. As crops are grown in rotation, this may mean using data that is more than 5 years old.

Option 2: The economic operator calculates a weighted average of the yields of the 3 most recent years that the target crop was grown on the farm prior to implementation of the additionality measure, even if those yields were obtained from different plots of different sizes on the same farm.

If historical data for the 3 most recent years of crop yields is not available, whether inaccessible or not representative as per the auditor's judgement, or if crop yield data is of insufficient quality, additional data may be obtained for earlier years or data from a neighbouring field growing the same crop under the same management plan. If 1 of the 3 years of historical data represents an exceptionally good or bad harvest (for example, discrepancy of 30 % or more compared to the other reference years), the outlier crop yield shall not be included in the calculation to avoid skewing the three-year average ([5]).

The auditor is responsible for determining a yield outlier, based on their expert judgement, experience on the ground and knowledge of the economic operator's practices over the long term. The auditor is also obliged to evaluate whether the crop yield data is of insufficient quality to be included as part of the baseline and annual audits, and to then decide whether a crop yield needs to be excluded or not.

The slope of the dynamic yield baseline shall be taken as the slope of a straight trend line fitted for yield developments of the target crop over the previous 10 years or longer if data is available. It is based on global data and shall be derived from the FAOSTAT World+ data for the relevant crop. This shall be done at the start of the certification period, and the slope shall be valid for the 10-year baseline validity period of the low ILUC certification.

Table 2 shows the slope of the dynamic yield baseline for the most common biofuel feedstock crops. These values are obtained by fitting a trend line over 20 years of global crop data obtained from FAOSTAT.

([5]) In line with Article 2(7) of Delegated Regulation (EU) 2019/807, yield fluctuations should be excluded.

Table 2

Slope of the trend line obtained for FAOSTAT World+ crop yield data. Average improvement in yield (tonne/ha/year) per year.

Crop	Barley	Maize	Oil palm fruit	Rapeseed	Soybean	Sugar beet	Sugar cane	Sunflower seed	Wheat
Slope-20	0,035	0,074	0,200	0,036	0,028	1,276	0,379	0,035	0,04

Slope-20 is based on 2008-2017.

For any crop in the table, the dynamic yield baseline is determined by taking the starting point (three-year average of historical yields prior to application of the additionality measure) and adding the global trend line (slope) from Table 2. The following formula shall be used, starting at the year the additionality measure is implemented:

$DYBx = (starting\ point\ DYB) + (slope_{20})x$

Where:

DYB_x = dynamic yield baseline in year x after implementation of the additionality measure

x = year(s) after implementation of additionality measure

If the additionality measure is to replace the existing crop with a different (higher yielding) crop on a delineated plot, the counterfactual situation is the cultivation of the existing crop. The dynamic yield baseline shall be determined based on historical yield and trend line data for the existing crop.

The starting point of the baseline shall be the 3-year average of the crop yield obtained for the lower performing existing crop. The trend line is based on the global FAOSTAT trend line data for the existing crop (see Table 2). This approach shall only be used if it can be demonstrated that the better performing crop could be introduced due to changes in the biofuel market, as demonstrated in the additionality assessment.

2. *Setting the dynamic yield baseline for perennial crops*

Depending on the yield variation observed over the lifetime of different types of perennial crop, different methodological approaches shall be possible.

For palm trees, the following data may be used by economic operators of oil palm plantations when determining their dynamic yield baseline:

(a) the historical crop yields obtained prior to implementation of an additionality measure;

(b) the planting year of palm trees on the delineated plot of land and/or their age profile;

(c) the cultivars of palm trees on the delineated plot, if applicable;

(d) the area of land replanted each year on a plantation, if applicable.

That data is combined with a growth curve to determine the dynamic yield baseline. The key characteristic from the growth curve shall be the shape, not the magnitude of the yield.

The growth curve gives the shape and it needs to be combined with the historical yield data and age of the trees, as set out in points (a) and (b), to adjust the magnitude of the dynamic yield baseline curve to the specific plot.

The following three options are available for determining the dynamic yield baseline for palm trees.

For each option, the data required to set the dynamic yield baselines must include:

(a) **Option 1a: Standard growth curve**

(i) 3 most recent years of historical crop yields for palm trees grown on the delineated plot;

(ii) age of trees on the delineated plot/planting year;

(b) **Option 1b: Economic operator provides growth curve** ([6])

(i) 3 most recent years of historical crop yield for palm trees grown on the delineated plot;

(ii) age of trees on the delineated plot/planting year;

(iii) the cultivars of palm trees on the delineated plot;

(iv) economic operator's own reference growth curve.

(c) **Option 2: Group certification approach**

(i) for the 3 most recent years, the total hectares and total yield in fresh fruit bunches (FFB) for palm trees grown on the delineated plot/plantation(s), producing palm as part of the group.

Options 1a and 1b apply where an additionality measure is taken on a stand of trees that are the same age, or if the age profile of the trees on the delineated plot(s) is known and does not remain constant year after year.

Option 2 may be applied when the age profile of the trees on the delineated plots is mixed and remains relatively constant year after year, that is to say in a group certification approach or if a consistent percentage of a plantation area is replanted each year, resulting in a constant age profile for the trees.

Option 2 shall not be used if more than 20 % of the volume in the group comes from the same plantation, or if more than 5 % of the total area in the group is being replanted in the same year. In that case, option 1a or b shall be used to determine the baseline.

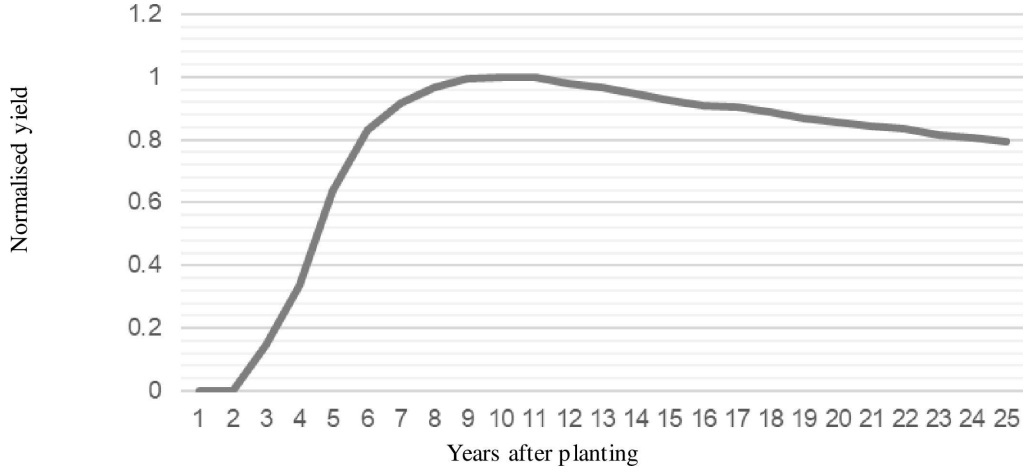
Option 1a: Standard growth curve

The first option uses the shape of a pre-established 'standard' growth curve (based on existing scientific evidence) to determine the dynamic yield baseline for a delineated plot. The standard curve has been normalised and is shown in Figure 1 and Table 3 below.

The dynamic yield baseline is determined by using the 3 most recent years of historical crop yield data for the specific plot and the age of the palm trees when that yield was observed, and using the annual percentage yield change from the standard curve to form a 'business-as-usual' yield curve relevant to the specific plot.

Figure 1

Normalised standard growth curve palm yield



([6]) To use this option, economic operators have to show that the correlation between the standard growth curve and their baseline growth curve is less than 0,8.

Table 3

Normalised standard growth curve palm yield data

Years after planting	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Normalised yield	0	0	0,147	0,336	0,641	0,833	0,916	0,968	0,996	1	0,999	0,980	0,965
Years after planting	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**≥ 26** (*)
Normalised yield	0,945	0,926	0,910	0,906	0,888	0,870	0,858	0,842	0,836	0,815	0,806	0,793	0,793

(*) After 25 years, the yield would be expected to continue to decline. However, as the typical lifetime of an oil palm tree is around 25 years, there is a lack of data to support the magnitude of the decline after 25 years. Therefore, a conservative approach is taken to assume that the yield curve would remain at the 25-year level.

Option 1a involves the following methodological steps:

1. To determine the average historical crop yield, collect the three most recent historical crop yields observed on the delineated plot prior to implementation of the additionality measure, as well as the corresponding age of the trees when those yields were observed;

2. Calculate an average (mean) of the three historical crop yields;

3. Based on the age of the trees when the historical yield data is from, determine where this average historical crop yield shall be on the standard growth curve (e.g. if the yield data is from trees aged 7, 8 and 9 years, the average historical yield should be considered to be year 8);

4. To determine the next point of the dynamic yield baseline, multiply the average historical crop yield from step 2 by the corresponding calculated annual percentage change, derived from the standard growth curve (Table 4 below). Repeat this for each subsequent point to plot the dynamic yield baseline;

Table 4

Annual percentage change in yield derived from standard growth curve

Years after planting	**1 to 3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
Annual percentage change	-	128,0 %	90,6 %	30,0 %	10,0 %	5,6 %	2,9 %	0,4 %	- 0,1 %	- 1,9 %	- 1,6 %	- 2,0 %
Years after planting	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**≥ 26** (*)
Annual percentage change	- 2,1 %	- 1,7 %	- 0,5 %	- 1,9 %	- 2,0 %	- 1,4 %	- 1,8 %	- 0,8 %	- 2,5 %	- 1,1 %	- 1,6 %	0 %

(*) After 25 years, the yield would be expected to continue to decline. However, as the typical lifetime of an oil palm tree is around 25 years, there is a lack of data to support the magnitude of the decline after 25 years. Therefore, a conservative approach is taken to assume that the yield curve would remain at the 25-year level.

5. To incorporate the global yield trend in the dynamic yield baseline, apply the compound annual growth rate (CAGR) calculated from FAOSTAT World+ yield data (Table 5 below), to each point of the dynamic yield baseline to obtain the CAGR corrected dynamic yield baseline.

Table 5

Compound annual growth rate palm (20-year)

Annual performance increase palm – business as usual	**1,37 %**
Based on FAOSTAT World+ 2008-2017	

Option 1b: Economic operator provides the growth curve

This option may be used in exceptional cases, if the economic operator can demonstrate that option 1a is not appropriate for their specific case. In such a case, if the economic operator has an expected growth curve determined based on the available data of palm seedlings (that relates to their 'business-as-usual' scenario), that curve may be used as the basis for the dynamic yield baseline instead of using the standard growth curve. All steps described in Option 1a shall be followed, replacing the standard growth curve with the economic operator's own curve. The economic operator shall therefore calculate the annual percentage change.

The plot-specific growth curve shall still be corrected for global yield development using the CAGR calculated FAOSTAT World+ yield data (Table 5).

Option 2: Group certification approach

In the case of group certification, or when a first gathering point or mill acts as the unit of certification, the dynamic yield baseline may be set using a similar 'straight line' dynamic yield baseline approach as used for annual crops. This approach may be used if a group manager, first gathering point or mill is seeking to certify a group that is taking the same additionality measure, and when the plantation or area supplying the mill contains a mix of ages of trees meaning that the annual yield supplying the mill has remained relatively constant.

To determine the dynamic yield baseline, the group manager needs to record the total plantation area (ha) supplying the mill and the total yield (fresh fruit bunches) that corresponds to that area in each of the last 3 years. This is used to determine the yearly yield per hectare for each of the last 3 years (in tonnes/ha). These data points are then averaged and used as the starting point for the dynamic yield baseline. The starting point is combined with the global trendline slope for oil palm from FAOSTAT World+ data (Table 2) to determine the dynamic yield baseline.

Sugar cane shall be treated as an annual crop when setting the dynamic yield baseline.

3. *Setting the dynamic yield baseline for sequential cropping*

If multi-cropping practices such as sequential cropping are used, the economic operators have three options to calculate the additional biomass:

1. Demonstrate that the second crop does not lower the yield of the main crop.

2. If the second crop lowers the yield of the main crop:

   a. Determine a dynamic yield baseline for a system in which the main crop is the same each year;

   b. Determine a compensation factor for a system in which the main crop is different each year;

Option 1. Demonstrate that the second crop does not lower the yield of the main crop

If an economic operator can demonstrate that the introduction of the second crop does not lower the yield of the main crop, the whole yield of the second crop can be claimed as additional biomass.

This may be demonstrated, for example, by comparison of the observed yield of the main crop before (3-year historical average) and after introduction of the second crop.

Option 2a. Determine a dynamic yield baseline for a system in which the main crop is the same each year

The dynamic yield baseline shall be based on the 'business as usual' situation for the delineated plot of land. When the main crop is the same each year, the baseline shall be determined based on at least the 3-year average historical yield of the main crop on that plot, combined with the global trend line for the main crop, as is done for annual crops.

This approach may also be used when the crop rotation follows a clearly defined rotation pattern that can be observed from historical data, which enables the business-as-usual situation to be clearly determined. In this case, it may be necessary to use data older than 3 years to determine the average historical yield of the main crop.

After implementation of sequential cropping, the net additional biomass shall be calculated as the difference between the total annual yield from the delineated plot of land (that is to say, the yield of the main crop plus the yield of the second crop) and the main crop dynamic yield baseline.

If the main and second crops are different feedstocks that produce a different combination of crop components (for example, oil, protein meal, starch, fibre), when the main crop and second crop yields are added together, the calculation shall be based on appropriate units of measurement to allow for the calculation of a single representative figure for the net additional biomass produced. Respectively, the methodology shall allow for an effective compensation of the biomass loss of the main crop. For example, the calculation can be done on a simple weight (tonnes) basis or an energy content basis (e. g. if the full second crop is used for energy, such as for biogas). The choice of methodology shall be justified by the economic operator and validated by the auditor.

Option 2b. Determine a compensation factor for a system in which the main crop is different each year

When the main crop differs each year in the crop rotation and does not follow a regular pattern, the economic operator needs to assess any loss in yield of the main crop due to the second crop and to take it into account in the volume of additional biomass claimed.

The economic operator needs to compare the observed yield of the main crop after introduction of the second crop with the historical yield of the same (main) crop. That comparison may be done based on observed yields in neighbouring fields (e.g. if the same farm grows the same crops on rotation but in different fields), or on the basis of justified scientific literature that describes the impact of sequential cropping on those crops in that region.

The impact on yield of the main crop shall be translated into a compensation factor that shall be deducted from the volume of the second crop to calculate the additional biomass. As for Option 2a, the factor can be based on weight or energy content and shall allow for an effective compensation of the biomass loss of the main crop. The choice of methodology shall be justified by the economic operator and validated by the auditor.

4. *Calculating additional biomass volume*

After implementation of the additionality measure, the economic operator shall determine the volume of low ILUC risk biomass that can be claimed by comparing the actual crop yield achieved on the delineated plot with the dynamic yield baseline. The auditor must verify in the annual audit that the volume of additional biomass achieved is in line with the projections in the management plan, and seek justification if there are discrepancies of more than 20 % compared to the estimates in the management plan.

If certification is sought for an additionality measure applied in the past, the additional biomass yield may be calculated and recorded in the management plan. While this allows the actual volume of low ILUC risk biomass to be precisely calculated, low ILUC risk biomass may only be claimed after low ILUC risk certification has been awarded. Retrospective claims cannot be made for biomass supplied in the past.

To calculate the additional biomass volume, the economic operator must record the full crop yield from the delineated plot for each year, from the start of the implementation of the additionality measure. The economic operator must prove the link between the specific delineated plot and the crop yield achieved (tonne/ha).

If the harvested volume is only measured (weighed) at a first gathering point where products from multiple farms or plots arrive, then the documentation from the first gathering point may be used as proof of the harvested volume (yield) for the farms and plots involved.

A record of the business transaction between the economic operator and the first gathering point may be used as evidence, as long as the link back to the specific delineated plot can be proven. In this case, the first gathering point is responsible for collecting and recording the crop yield data. It shall record yields of biomass collected per farm (and if necessary, for a specified delineated plot on a farm) based on a template to be issued by the voluntary scheme.

In the case of group auditing and if the first gathering point acts as the group lead, it shall be responsible for recording yield data for all delineated plots.

To calculate the additional biomass volume, the crop yield data obtained for a given year shall be compared to the dynamic yield baseline. The additional biomass yield is equal to the difference between the crop yield observed and the yield projected by the dynamic yield baseline for the same year, multiplied by the surface area A (ha) of the delineated plot in question. This additional volume can then be claimed as low ILUC risk biomass.

Additional biomass = $(Y_x - DYB_x) \times A$

Where:

Y_x = Observed yield in year x (in tonne/ha/yr)

DYB_x = Dynamic yield baseline in year x (in tonne/ha/yr)

A = Surface area of delineated plot (ha)

D. **Minimum content of the low ILUC risk certificate**

Low ILUC-risk certificates must contain all the following information:

(a) contact details of main certified entity (company name and address, details of the designated point of contact);

(b) scope of certification (type of additionality measure and additionality test applied as well as type of economic operator (if they are small holders));

(c) longitude and latitude coordinates (for farms and plantations certified as single entities);

(d) list of sites under the scope of certification (name and address);

(e) total volume of biomass certified as low ILUC risk;

(f) contact details of the certification body (name and address) and logo;

(g) (unique) certificate number or code;

(h) place and date of issuance;

(i) certificate valid from/to dates (and date certified, if applicable);

(j) stamp and/or signature of issuing party.

STANDARD VALUES OF EMISSIONS FACTORS

	parameter:			GHG emission coefficient				Fossil energy input
	unit:		$gCO_{2,eq}/g$	gCO_2/kg	gCH_4/kg	gN_2O/kg	$gCO_{2\text{-}eq}/kg$	MJ_{fossil}/kg
Global warming potential								
	CO_2		1					
	CH_4		28					
	N_2O		265					
Agro inputs:								
N-fertiliser (kg N)								
	Ammonium nitrate (AN)			2 671	6,9	2,1	3 469	
	Ammonium sulphate (AS)			2 560	6,5	0,0	2 724	
	Ammonium nitrate sulphate (ANS)			2 561	8,9	1,3	3 162	
	Anhydrous ammonia			2 662	6,8	0,0	2 832	
	Calcium ammonium nitrate (CAN)			2 863	7,3	2,1	3 670	
	Calcium nitrate (CN)			2 653	7,0	5,1	4 348	
	Urea			1 703	9,3	0,0	1 935	
	Urea ammonium nitrate (UAN)			2 182	7,5	1,1	2 693	
P_2O_5-fertiliser (kg P_2O_5)								
	Triple superphosphate (TSP)			517	0,9	0,0	544	
	Rock phosphate 21 %P_2O_5 23 %SO_3			95	0,0	0,0	95	
	Mono ammonium phosphate (MAP) 11 %N 52 %P_2O_5			967	2,5	0,0	1 029	
	Di-Ammonium-Phosphate (DAP) 18 %N 46 %P_2O_5			1 459	3,7	0,0	1 552	

	parameter:		GHG emission coefficient				Fossil energy input
	unit:	$gCO_{2,eq}/g$	gCO_2/kg	gCH_4/kg	gN_2O/kg	$gCO_{2\text{-eq}}/kg$	MJ_{fossil}/kg
K_2O-fertiliser (kg K_2O)							
	Muriate of Potash (MOP) 60 %K_2O		409	0,17	0,0	413	
Other fertilisers							
	NPK 15-15-15		4 261	10,0	1,7	5 013	
	MgO (kg MgO)		769	0,0	0,0	769	
	Sodium (Na) fertiliser (kg Na)		1 620	0,0	0,0	1 620	
	Seeds- barley		189,5	0,08	0,4001	310,6	3,23
	Seeds- eucalyptus cuttings		0,0	0,00	0,0000	0,0	
	Seeds- maize		189,5	0,08	0,4001	310,6	3,23
	Seeds- poplar cuttings		0,0	0,00	0,0000	0,0	
	Seeds- rapeseed		451,0	0,27	1,0024	756,5	8,33
	Seeds- rye		191,0	0,08	0,4001	312,1	3,23
	Seeds- soy bean		0,0	0,00	0,0000	0,0	
	Seeds- sugar beet		2 363,0	1,37	4,2096	3 651,7	38,44
	Seeds- sugar cane		4,97	0,00	0,0000	5,0	0,06
	Seeds- sunflower		451,0	0,27	1,0024	756,5	8,33
	Seeds- triticale		180,0	0,04	0,4000	300,2	3,00
	Seeds- wheat		163,7	0,04	0,4000	283,9	2,76

	parameter:		GHG emission coefficient				Fossil energy input
	unit:	$gCO_{2,eq}/g$	gCO_2/kg	gCH_4/kg	gN_2O/kg	$gCO_{2\text{-}eq}/kg$	MJ_{fossil}/kg
Residues (feedstock or input):							
	Biogas digestate		0,0	0,00	0,0000	0,0	0,00
	EFB compost (palm oil)		0,0	0,00	0,0000	0,0	0,00
	Filter mud cake		0,0	0,00	0,0000	0,0	0,00

	parameter:	GHG emission coefficient				Fossil energy input		Density	LHV (lower heating value) MJ/kg
	unit:	gCO_2/MJ	gCH_4/MJ	gN_2O/MJ	$gCO_{2\text{-}eq}/MJ$	MJ_{fossil}/kg	MJ_{fossil}/MJ	kg/m^3	(on a dry basis)
Fuels- gases									
	Natural gas (EU mix)	66,00	0,0000	-	66,00		1,2000		49,2
	LPG	66,30	0,0000	0,0000	66,31		1,2000		46,0
	Methane								50,0
Fuels- liquids (also conversion inputs)									
	Diesel	95,1	-	-	95,10		1,2300	832	43,1
	Gasoline	93,3	-	-	93,30		1,2000	745	43,2
	Heavy fuel oil	94,2	-	-	94,20		1,1600	970	40,5
	Ethanol							794	26,81
	Methanol	97,08	0,0001	0,0000	97,09		1,7639	793	19,95
	DME							670	28,4
	FAME							890	37,2
	HVO								44,0
	PVO							920	37,0

	parameter:	GHG emission coefficient				Fossil energy input		Density	LHV (lower heating value) MJ/kg
	unit:	gCO_2/MJ	gCH_4/MJ	gN_2O/MJ	$gCO_{2\text{-eq}}/MJ$	MJ_{fossil}/kg	MJ_{fossil}/MJ	kg/m^3	(on a dry basis)
	Syn diesel (BtL)							780	44,0
	Palm oil							920	37,0
	Rapeseed oil							920	37,0
	Soybean oil							920	37,0
	Sunflower oil							920	37,0

	parameter:	GHG emission coefficient				Fossil energy input	Density	LHV MJ/kg
	unit:	gCO_2/MJ	gCH_4/MJ	gN_2O/MJ	gCO_2-eq/MJ	MJfossil/MJ	kg/m3	(on a dry basis)
Fuels- solids (also conversion inputs)								
	Hard coal	102,62	0,3854	0,0003	112,32	1,0909		26,5
	Lignite	116,68	0,0014	0,0001	116,73	1,0149		9,2
	Wood chips						155	19,0
	Wood pellets					0,0080	650	19,0

	parameter:	Density	LHV MJ/kg
	unit:	kg/m^3	(on a dry basis)
Fuels/feedstock/co-products/residues/wastes			
	Agricultural residue bales		18,0
	Animal fat (tallow)		38,8
	Bagasse		17,0
	Bagasse exit mill (dry)	120	17,0

	parameter:	Density	LHV MJ/kg
	unit:	kg/m³	(on a dry basis)
Fuels/feedstock/co-products/residues/wastes			
	Bagasse bales (dry)	165	17,0
	Bagasse pellets (dry)	650	17,0
	Barley		17,0
	Biogasoline		44,0
	Biowaste		20,7
	DDGS (barley)		17,8
	DDGS (maize)		19,2
	DDGS (rye)		17,8
	DDGS (triticale)		18,0
	DDGS (wheat)		18,1
	Eucalyptus (SRC)		19,0
	Fatty acids		37,0
	FFB		24,0
	Forestry residues		19,0
	Glycerol		16,0
	Industry residues (wood)		19,0
	Manure		12,0
	Maize (grain only)		17,3
	Maize whole crop		16,9
	Palm kernel meal	570	18,5
	Palm kernel oil		37,0

	parameter:	Density	LHV MJ/kg
	unit:	kg/m³	(on a dry basis)
Fuels/feedstock/co-products/residues/wastes			
	Poplar (SRC)		19,0
	Rapeseed		27,0
	Rapeseed oil cake		18,4
	Rye		17,1
	Sawdust		19,0
	Soybeans		23,0
	Soybean oil cake		19,1
	Stemwood (Pine)		19,0
	Straw		17,2
	Straw bales	125	17,2
	Straw chopped	50	17,2
	Straw pellets	600	17,2
	Sugar beet		16,3
	Sugar beet pulp		16,1
	Sugar cane		19,6
	Sunflower seed		27,2
	Sunflower oil cake		18,2
	Triticale		16,9
	Vinasse		14,0
	Waste cooking oil		37,0
	Wheat		17,0
	Wheat straw		17,2

parameter:	GHG emission coefficient								Fossil energy input		LHV MJ/kg
unit:	gCO_2/kg	gCH_4/kg	(at 0 % water)	$gCO_{2\text{-eq}}$/kg	gCO_2/MJ	gCH_4/MJ	gN_2O/MJ	$gCO_{2\text{-eq}}$/MJ	MJ_{fossil}/kg	MJ_{fossil}/MJ	(on a dry basis)
Conversion inputs											
Ammonia	2 350,6	0,00	0,0022	2 351,3					42,50		
Ammonium sulphate ($(NH_4)_2SO_4$)	420,9	1,29	0,0002	453,2					7,56		
Antifoam (assumed to be propylene glycol)	3 119,5	4,96	0,105	3 274,8					34,97		
Alpha-amylase	1 000,0	0,00	0,0000	1 000,0					15,00		
Gluco-amylase	7 500,0	0,00	0,0000	7 500,0					97,00		
Calcium chloride ($CaCl_2$)	38,6	0,002	0,001	38,8					0,50		
Cyclohexane	723,0	0,00	0,0000	723,0					9,90		
Diammonium phosphate (DAP)	653,2	0,81	0,004	674,4					10,23		
Fuller's earth	197,0	0,04	0,0063	199,8					2,54		
n-Hexane					80,08	0,0146	0,0003	80,53		0,3204	45,1
Hydrochloric acid (HCl)	977,1	2,91	0,0376	1 061,1					14,84		
Lubricants	947,0	0,00	0,0000	947,0					53,28		
Magnesium sulphate ($MgSO_4$)	191,4	0,04	- 0,002	191,8					- 3,24		
Monopotassium phosphate (KH_2PO_4)	238,7	0,91	0,012	264,9					4,43		
Nitrogen	52,6	0,12	0,0024	56,4					1,08		
Phosphoric acid (H_3PO_4)	2 808,9	11,36	0,1067	3 124,7					28,61		
Potassium hydroxide (KOH)	403,0	0,40	0,0208	419,1					11,47		
Pure CaO for processes	1 188,5	0,10	0,0080	1 193,2					7,87		
Sodium carbonate (Na_2CO_3)	1 133,5	4,39	0,0060	1 245,1					14,92		
Sodium chloride (NaCl)	12,7	0,02	0,001	13,3					0,23		

parameter:		GHG emission coefficient								Fossil energy input		LHV MJ/kg
unit:		gCO_2/kg	gCH_4/kg	(at 0 % water)	$gCO_{2\text{-eq}}/kg$	gCO_2/MJ	gCH_4/MJ	gN_2O/MJ	$gCO_{2\text{-eq}}/MJ$	MJ_{fossil}/kg	MJ_{fossil}/MJ	(on a dry basis)
Conversion inputs												
	Sodium hydroxide (NaOH)	485,5	1,45	0,0271	529,7					10,16		
	Sodium methoxide ($Na(CH_3O)$)	2 207,7	7,56	0,0965	2 425,5					45,64		
	SO_2	52,0	0,03	0,001	53,3					0,78		
	Sulphuric acid (H_2SO_4)	210,2	0,24	0,0046	217,5					4,02		
	Urea	1 790,9	1,92	0,027	1 846,6					31,71		

parameter:		Fuel Efficiency	Transport exhaust gas emissions	
unit:		MJ/t.km	$gCH_4/t.km$	$gN_2O/t.km$
Transport efficiencies – Trucks				
	Truck (40 tonne) for dry product (Diesel)	0,81	0,003	0,0015
	Truck (40 tonne) for chips (and similar size dry product) (Diesel)	0,84	0,004	0,0016
	Truck (40 tonne) for liquids and pellets (Diesel)	0,87	0,004	0,0016
	Truck (40 tonne) for manure (Diesel)	0,88	0,004	0,0016
	Truck (40 tonne) for biowaste (Diesel)	0,84	0,004	0,0016
	Truck (40 tonne) for sugar cane transport	1,37	0,001	0,0039
	Truck (12 tonne) for FFB transport (Diesel)	2,24	0,002	0,0015
	Dumpster truck MB2213 for filter mud transport	3,60	0,000	0,0000
	Tanker truck MB2318 for vinasse transport	2,16	0,000	0,0000
	Tanker truck MB2318 for cane seed transport	2,61	0,000	0,0000
	Tanker truck with water cannons for vinasse transport	0,94		
Transport efficiencies – Ships				

parameter:		Fuel Efficiency	Transport exhaust gas emissions	
unit:		MJ/t.km	gCH_4/t.km	gN_2O/t.km
	'Handymax' bulk carrier (fuel oil) – Grains	0,10		
	'Handysize' bulk carrier (fuel oil) – wood chips with bulk density 221 kg/m³	0,26		
	'Supramax' bulk carrier (fuel oil) – wood chips with bulk density 221 kg/m³	0,16		
	'Handysize' bulk carrier (fuel oil) – pellets with bulk density 650 kg/m³	0,10		
	'Supramax' bulk carrier (fuel oil) – pellets with bulk density 650 kg/m³	0,07		
	'Handysize' bulk carrier (fuel oil) – agri-residues with low bulk density (125 kg/m³)	0,43		
	'Supramax' bulk carrier (fuel oil) – agri-residues with low bulk density (125 kg/m³)	0,27		
	'Handysize' bulk carrier (fuel oil) – agri-residues with high bulk density (300 kg/m³)	0,20		
	'Supramax' bulk carrier (fuel oil) – agri-residues with high bulk density (300 kg/m³)	0,13		
	'Handysize' bulk carrier (fuel oil) – PKM	0,13		
	'Supramax' bulk carrier (fuel oil) – PKM	0,07		
	Chemical/product tanker, 12,617 kt (fuel oil)	0,12		
	Chemical/product tanker, 15 kt (fuel oil) for ethanol transport	0,17		
	Chemical/product tanker, 15 kt (fuel oil) for FAME and HVO transport	0,16		
	Chemical/product tanker, 22,56 kt (fuel oil)	0,10		
	Inland bulk carrier, 8,8 kt (diesel)	0,32	0,093	0,0004
	Inland ship for oil transport, 1,2 kt (diesel)	0,50	0,030	
Transport efficiencies – Pipeline and rail				
	Local (10 km) pipeline	0,00	0,000	0,0000
	Freight train USA (diesel)	0,25	0,005	0,0010
	Rail (electric, MV)	0,21		

Carbon Intensity of electricity produced and consumed in the EU in 2019 [gCO_2eq/kWh]

With upstream emissions, without emissions from construction

	CI net electricity production	CI used electricity HV	CI used electricity MV	CI used electricity LV
Austria	153	238	240	245
Belgium	204	214	215	219
Bulgaria	493	504	510	532
Cyprus	757	768	772	787
Czechia	518	526	531	549
Germany	389	386	388	398
Denmark	100	135	136	139
Estonia	654	468	471	485
Greece	577	585	590	610
Spain	245	248	251	263
Finland	105	127	128	130
France	74	81	82	86
Croatia	208	329	333	349
Hungary	277	307	310	322
Ireland	349	357	360	374
Italy	352	331	333	343
Latvia	203	312	315	325
Lithuania	79	291	294	305
Luxembourg	93	311	312	316
Malta	455	437	441	454
Netherlands	430	415	417	426
Poland	742	715	720	741
Portugal	268	282	285	299

Romania	388	421	427	454
Slovakia	168	316	319	329
Slovenia	269	281	283	291
Sweden	20	25	25	26
EU27	**288**	**295**	**298**	**308**
Iceland	7	7	7	7
Norway	12	20	20	21
Switzerland	32	107	108	112
United Kingdom	271	277	280	292
Albania	0	302	308	332
Bosnia Herzegovina	799	766	776	818
Kosovo	1 099	1 067	1 097	1 224
Moldova	246	446	453	476
Montenegro	472	588	599	646
North Macedonia	794	760	774	831
Serbia	807	819	833	892
Turkey	487	508	516	546
Belarus	449	458	462	479
Russia	459	474	479	496
Ukraine	407	419	423	439

	parameter:	GHG emission coefficient		
	unit:	gCH_4/MJ	gN_2O/MJ	gCO_2-eq/MJ
*Emissions from machinery operations incl. chipping (**per MJ diesel**)*				
	CH_4 and N_2O emissions from use of diesel (transport)	0,0008	0,0032	0,97
	CH_4 and N_2O emissions from use of diesel (forestry)	0,0008	0,0032	0,97
	CH_4 and N_2O emissions from use of diesel (agriculture)	0,0013	0,0032	0,97

	parameter:	GHG emission coefficient		
	unit:	gCH_4/MJ	gN_2O/MJ	gCO_2-eq/MJ
*Emissions from boiler or CHP (**per MJ feedstock**)*				
	CH_4 and N_2O emissions from agricultural residue boiler	0,0017	0,0007	0,24
	CH_4 and N_2O emissions from agricultural residue CHP	0,0017	0,0007	0,24
	CH_4 and N_2O emissions from bagasse boiler	0,0025	0,0012	0,43
	CH_4 and N_2O emissions from bagasse CHP	0,0025	0,0012	0,43
	CH_4 and N_2O emissions from biogas CHP gas engine	0,3400	0,0014	8,92
	CH_4 and N_2O emissions from biogas boiler	0,0025	0,0010	0,36
	CH_4 and N_2O emissions from hard coal CHP	0,0018	0,0050	1,53
	CH_4 and N_2O emissions from lignite CHP	0,0007	0,0028	0,86
	CH_4 and N_2O emissions from NG boiler	0,0025	0,0010	0,36
	CH_4 and N_2O emissions from NG CHP	0,0042	0,0008	0,36
	CH_4 and N_2O emissions from NG gas engine	0,0030	0,0001	0,10
	CH_4 and N_2O emissions from palm shells and fibres boiler	0,0030	0,0040	1,27
	CH_4 and N_2O emissions from palm shells and fibres CHP	0,0030	0,0040	1,27
	CH_4 and N_2O emissions from PKM boiler	0,0017	0,0007	0,24
	CH_4 and N_2O emissions from PKM CHP	0,0017	0,0007	0,24
	CH_4 and N_2O emissions from sawdust boiler	0,0049	0,0010	0,41
	CH_4 and N_2O emissions from straw pellet boiler	0,0017	0,0007	0,24
	CH_4 and N_2O emissions from straw pellet CHP	0,0017	0,0007	0,24
	CH_4 and N_2O emissions from wood chip boiler	0,0049	0,0010	0,41
	CH_4 and N_2O emissions from wood chip CHP	0,0049	0,0010	0,41
	CH_4 and N_2O emissions from wood pellet boiler	0,0030	0,0006	0,25
	CH_4 and N_2O emissions from wood pellet CHP	0,0030	0,0006	0,25

	parameter:	GHG emission coefficient		
	unit:	gCH_4/MJ	gN_2O/MJ	gCO_2-eq/MJ
	CH_4 and N_2O emissions from liquid fuel boiler	0,0009	0,0004	0,14
	CH_4 and N_2O emissions from wood pellet co-combustion (fluidised bed coal-fired power plant)	0,0010	0,0610	18,20
	CH_4 and N_2O emissions from wood pellet co-combustion (pulverised coal-fired power plant)	0,0009	0,0014	0,44
*Emissions from digestate storage (**per MJ biogas**)*				
	CH_4 and N_2O emissions from open biowaste digestate storage	0,4930	0,0319	21,82
	CH_4 and N_2O emissions from open maize digestate storage	0,4422	0,0082	13,51
	CH_4 and N_2O emissions from open manure digestate storage	1,9917	0,0663	69,56

		GHG emission coefficient							
		gCO_2/kg	gCH_4/kg	gN_2O/kg	gCO_2-eq/kg	gCO_2/MJ	gCH_4/MJ	gN_2O/MJ	gCO_2-eq/MJ
*Manure methane credits (**per MJ biogas**)*									
	CH_4 and N_2O emission credits for manure						1,4700	0,0279	45,05
	No emissions	0,0	0,00	0,0000	0,0	0,00	0,0000	0,0000	0,00