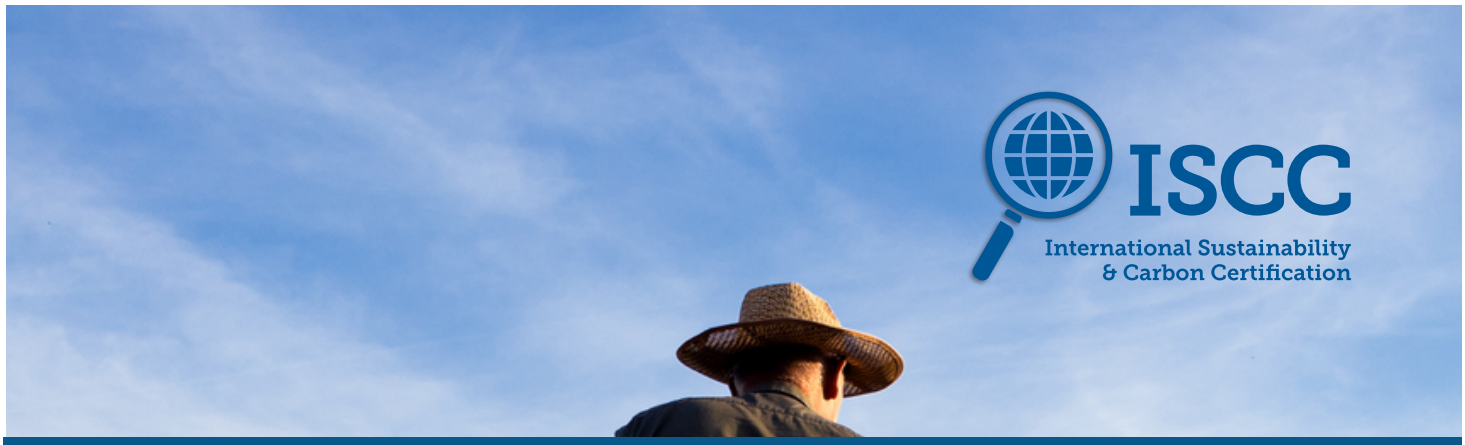

ISCC EU 202-07
Low ILUC Risk Feedstock

Version 1.1

Document Title: ISCC EU 202-07 Low ILUC Risk Feedstock

Version 1.1

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CONTENT

1 Introduction

Low ILUC risk feedstock definition

Indirect land use change (ILUC) can occur when the cultivation of crops for the production of biofuels, bioliquids or other products displaces the cultivation of crops for food and feed purposes and increases the pressure to extend agricultural land into non-cropland and possibly into areas with high carbon stock (such as forests, wetlands and peatlands). That in turn causes additional greenhouse gas emissions.

RED II regulation for ILUC risk feedstock

In March 2019, the European Commission published a Delegated Regulation[1] that supplements the RED II by determining high ILUC risk feedstocks (i.e., feedstocks for which a significant expansion of the production into land with high carbon stock is observed). Under certain circumstances, feedstocks classified to maintain a high ILUC risk can be cultivated in a way to avoid these displacement effects and to even add additional value to the relevant production areas. Such feedstocks can be used for the production of biofuels, bioliquids and biomass fuels. Criteria for the certification of low ILUC risk fuels are also laid down in the Delegated Regulation. Further, the European Commission (EC) also published an Implementing Regulation[2] with further guidelines and criteria for low ILUC risk certification. Both documents are taken into account for the development of this document.

CORSIA framework for low LUC risk feedstock

In addition, the International Civil Aviation Organization (ICAO) set out sustainability requirements for sustainable aviation fuels (SAFs) under the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) framework. Part of this framework is low Land Use Change (LUC) risk practices, setting out requirements for the certification of "additional biomass" being produced in agriculture.

The Guidance document "ISCC EU 202-07 Low ILUC Risk Feedstock" sets out requirements for the certification of low ILUC risk feedstocks under the ISCC EU scheme for farms/plantations and First Gathering Points (FGP) that are already certified under ISCC EU, aiming to prove compliance with these additional sustainability criteria for sustainable biomass. The requirements are based on the low ILUC risk framework described by the EC and ICAO and were derived from pilot audits conducted as part of the Horizon 2020 project BIKE[3].

Low ILUC risk feedstocks have to comply with the sustainability requirements for agricultural biomass as stated in ISCC EU System Documents 202-1 "Agricultural Biomass ISCC Principle 1" and 202-2 "Agricultural Biomass ISCC Principles 2-6". Furthermore, economic operators must prove that they produce additional biomass using one of the following approaches:

> Cultivation on previously unused land

> Achieving additional yield increase

This document describes the process of the low ILUC risk feedstock certification as well as the requirement to apply a financial attractiveness test and if required

[1] Commission Delegated Regulation (EU) 2019/807 of 13 March 2019 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

[2] Implementing Regulation 2022/996

[3] https://www.bike-biofuels.eu

also a non-financial barrier test to evaluate additionality measures. Moreover, it specifies how to calculate the dynamic yield baseline and the additional biomass volume.

2 Scope and fields of application

This document lays down the general principles for the certification of low ILUC risk feedstocks and the products derived from them. Furthermore, it describes the preparation and implementation of the set requirements as well as the system boundaries. The document includes a description of the use of relevant measures to be used by auditors in order to verify/ assess additionality measures applied on the different types of land. Specifications for group auditing and smallholders will be provided, as well as requirements for auditors and auditees. For accurate planning of the audit(s), this guidance document will entail information on audit preparation for both auditees and auditors and clear guidance for audit planning, execution, and documentation.

Low ILUC risk feedstock certification

This guidance document should be considered as a certification approach for ISCC EU certification for farms/plantations and first gathering points (FGPs). It provides the requirements for low ILUC risk certification for feedstocks and offers guidance for their implementation and verification.

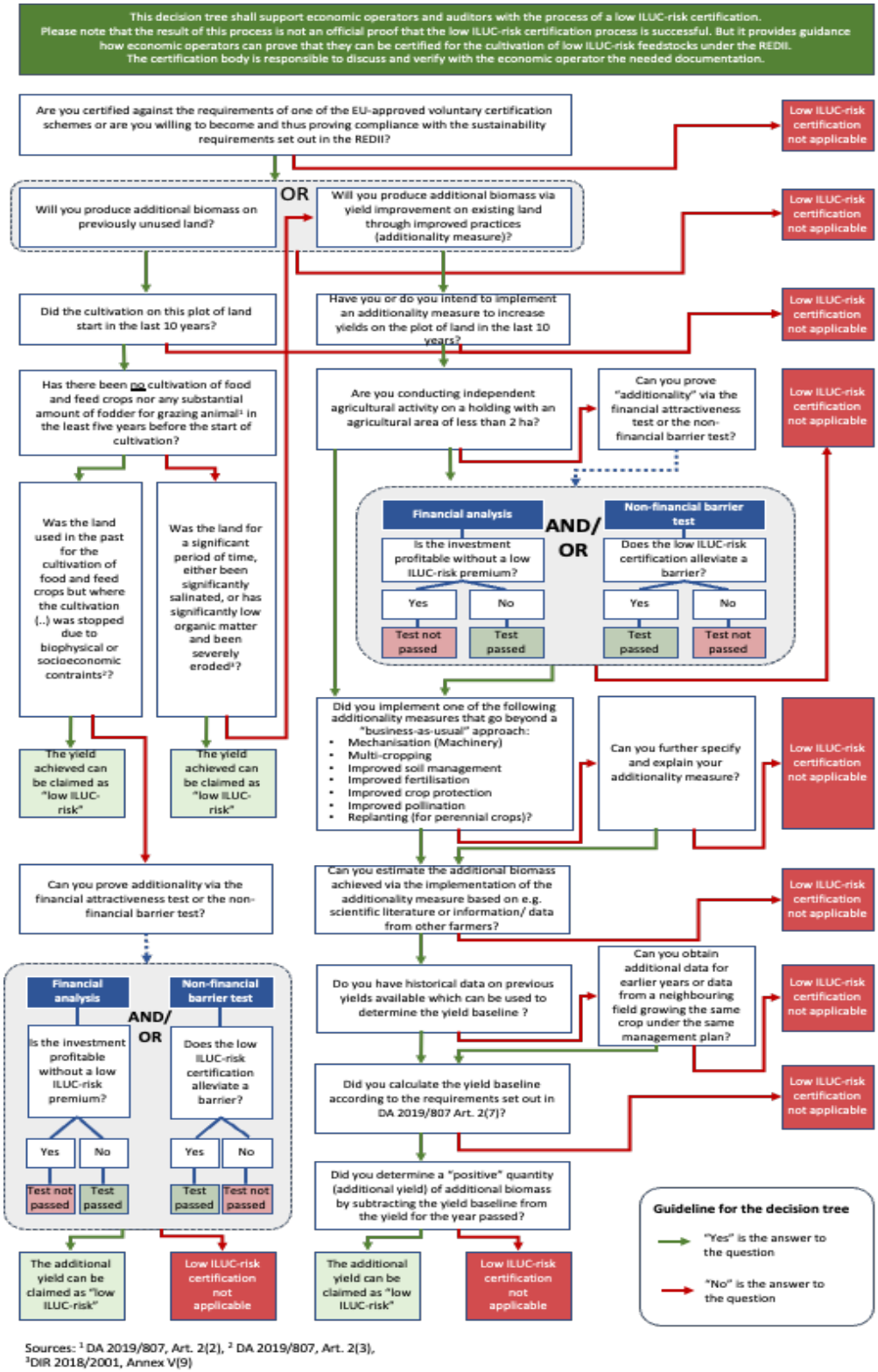
3 Low ILUC risk certification process

3.1 Registration and auditing process

Cooperation with a certification body

To start the certification process, an economic operator (EO) has to submit an application to a certification body (CB) cooperating with ISCC for low ILUC risk biomass certification under ISCC EU. The applicants may be farms or plantations and groups of smallholders, farms and/ or first gathering points (FGPs) acting on behalf of the smallholders[4] and farms.

[4] *See section 8.4 for more information on smallholders*



Sources: [1] DA 2019/807, Art. 2(2), [2] DA 2019/807, Art. 2(3), [3]DIR 2018/2001, Annex V(9)

Figure 1. Decision tree for certification of Low ILUC risk

Content of the low ILUC risk application

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[5];

(b) a description of the low ILUC risk additionality measure 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 measure(s) 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 voluntary scheme certification: name of the voluntary scheme, certificate number, status and validity period.

As part of the application, a precise calculation of the expected additional biomass and a self-assessment on whether the measure is additional are optional.

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

The certification application is ideally made before the implementation of the additionality measure, but low ILUC risk certification can be applied for up to ten years after the implementation of an additionality measure if appropriate data and evidence are available to allow for certification.

The baseline audit must be conducted by the CB

After the registration process, the baseline audit has to be conducted by the CB. The baseline audit aims to verify the management plan and establish and document the dynamic yield baseline against the management plan.

An ISCC EU audit procedure is available ensuring that all low ILUC risk audits are conducted on the basis of the requirements specified in this guidance document. The audit procedure supports the work of the CBs and facilitates a consistent and comparable verification of the low ILUC risk requirements during low ILUC risk certification audits. CBs have to use the document provided when conducting ISCC EU low ILUC risk audits. System Users can use the audit procedure to conduct internal assessments, for internal training or to prepare for an audit.

After the audit has been conducted, the CB submits the filled-out audit procedures to ISCC. In line with the general ISCC EU certification, the CB includes the relevant audit results in the audit report. The ISCC EU low ILUC risk certificate will be issued by the CB after a successful audit process and published separately on the ISCC

[5] *If applying for group certification, the application must include the name and contact details of the group lead and the name, contact details and locations of the farms/plantations that are part of the group.*

website. Verification audits for low ILUC risk certification take place annually (annual additionality audits).

In the event that the external audit showed that the audited System User did not meet the requirements of the ISCC low ILUC risk certification, the audit procedures must be submitted to ISCC immediately after termination of the audit.

3.2 Sustainability Requirements

Farms and plantations looking for a certification for low ILUC risk biomass have to comply with the sustainability requirements laid out in Article 29 of Directive (EU) 2018/2001, specifically the relevant criteria for the protection of land with high biodiversity value, high carbon stock, and peatland, the criteria for the protection of soil quality and soil organic carbon, and the greenhouse gas emission savings from the use of biofuels, bioliquids and biomass fuels. The whole farm/plantation (including all plots/fields managed and cultivated) must comply with these mandatory sustainability requirements; “cherry picking” is not allowed. All emissions must be documented and passed on to the recipient of the low ILUC risk material (i.e. the first gathering point).

The additionality measure shall not compromise future growing potential by creating a trade-off between short-term output gains and mid-to long-term deterioration of soil, water, air quality and pollinator populations. Furthermore, the measure shall not have a negative impact on the soil quality and soil carbon stock.

The reference for any land status determination is January 2008. If land had already been cropland in January 2008, the use of raw material from that land is in line with low ILUC risk certification. Cropland includes fallow land, i.e. land set to rest for one or several years before being cultivated again.[6]

The certification of these “core” sustainability criteria from Directive (EU) 2018/2001 shall be verified as part of the main certification to an EC-recognised voluntary scheme.

3.3 Auditor qualification

Auditors must have expertise for low ILUC risk certification

In addition to the requirements for ISCC EU auditors laid out in the ISCC system document, he/she must have the appropriate skills necessary to conduct the audit, and the CB must have the appropriate general skills necessary to perform audits. Besides this, the auditor must have the relevant expertise for low ILUC risk certification including knowledge and professional experience in the following fields:

(a) Land use characteristics and land categories

(b) Strong background in agriculture, plant production, land management or a related field

Further, the respective low ILUC risk auditor must have expertise in the assessment of yield increase measures and the verification of the land categories

[6] *According to Commission Regulation (EC) No 1200/2009 fallow land is land included in the crop rotation system, whether worked or not but with no intention to produce a harvest (e.g. bare land bearing no crops at all, land with spontaneous natural growth, which may be used as feed or ploughed in land sown exclusively for the production of green manure (green fallow))*

relevant for ISCC EU low ILUC risk certification, i.e., unused land or severely degraded land respectively. Further, he/she must be capable of assessing applied yield increase measures in the context of yield increases on the farm/ plantation. Auditors must have either a professional education in agriculture or a related field or must have conducted at least 10 audits on farm level.

Note that whilst it is a precondition for low ILUC risk certification to be used with an existing ISCC certificate. It is not a requirement that the economic operator was already certified in the voluntary scheme before. The baseline audit for low ILUC risk certification could, in principle, be conducted at the same time as an initial certification audit for a voluntary scheme.

3.4 Content of the management plan

Information on low ILUC risk is in 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) Description of the farm and the land area (selected site) for which the relevant measure has been implemented (maps & GIS data) including information on historic land management (proof of historic and actual land status)

(b) Definition of the delineated plot of land, (geographic coordinates (with a precision of 0.1 Metres for each measuring point))
    (i) Total area of the agricultural operation (total area of the agricultural unit, size of the total area cultivated)
    (ii) Total area of agricultural operation where additionality measure(s) were applied (delineated area) in ha

(c) Description of additionality measures and date of initial (or planned) application;
    (i) The situation of the farm/plantation/plot before the additionality measure was implemented. This should be a qualitative description of current practices, specifically relevant to the envisaged additionality measure.
    (ii) A description of the additionality measure, the timeline over which it was or will be applied and whether it will be combined with other additionality measures.
    (iii) An explanation of the expected future yield growth.

(d) Check on the sustainability of the additionality measure;

(e) Name and type of crops (annual/perennial) relevant for low ILUC risk certification including date of sowing and harvesting;

(f) Total amount harvested (metric tons, short: mt) for the relevant crop (historical data to be used for baseline audit, actual data for following audits)

(g) Where relevant, demonstration of additionality assessment (either financial attractiveness or non-financial barrier analysis);

(h) Determination of the dynamic yield baseline, including:

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

(ii) For cultivation on unused, abandoned or severely degraded land:

(1) Proof of land status;

(2) The baseline yield for cultivation on unused, abandoned or severely degraded land is considered to be zero.

(i) Estimation of the additional biomass yield per year, concerning 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 the implementation of the additionality measure. Every system user must have the management plan available at the beginning of each audit to allow for the verification of all documents.

The economic operator will have to demonstrate that the management plan sets reasonable expectations on the yield increase by referring to 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.

4 Definition of the delineated plot of land

The demonstration of a clear title to land in accordance with national practice and law is a precondition, which is normally verified as part of the “basic” certification process. In some cases, the economic operator might not technically own the land at the time they initially apply for certification, but to become certified they will need to provide satisfactory evidence that they will have the right to cultivate crops on the land.

Description of the delineated plot of land

The delineated plot needs to be described for each plot of land upon which an additionality measure is applied. The characteristics of the delineated plot of land shall allow the plot to be identified over the years to ensure that a comparison is possible between the business-as-usual crop system and the crop system with the additionality measure applied. The following information must be provided:

(a) Description of the delineated plot (including for example the plot number where relevant);

(i) Plot location (geographic coordinates with a precision of 0.1 metres for each measuring point);

(b) Surface area (in ha, 0.1 ha resolution); in the case of smallholders, on whose behalf an exemption from the financial additionality test is sought, the area should be smaller than 2 ha.[7]

(c) Ownership/ status of lease of the land;

(i) Description of recent history at minimum 3 years before the implementation of the additionality measure in the case of plots of land for which the additionality measure has been implemented within the last ten years

(ii) Acquisition dates as per contract of a newly acquired plot of land (in the case of a purchase or a lease).

(iii) Description of current use of land and recent (3-5 year) history, to supplement the historic yield data provided, in the case of a newly acquired plot of land;

(iv) Status of the farm, where delineated plot is identified: individually certified, part of a first gathering point, member of a group of farms/ plantations.

The delineated plot needs to be described for each plot of land upon which an additionality measure is applied.

The demonstration of a clear title to land in accordance with national practice and law is a precondition, which is normally verified as part of the voluntary scheme certification. In the case of unused, abandoned, or severely degraded land, the economic operator might not technically own the land at the time they initially apply for certification, but to become certified, they must provide satisfactory evidence that they have the right to cultivate crops on the land.

If the delineated plot is part of a crop rotation system, the crop rotation system needs to be described further. This includes the number of land plots that are part of the crop rotation system, the plot locations, surface areas (in ha) and target crop and crops grown on each plot over the last three to five years (in line with the historical yield data provided).

5 Description of the additionality measure

Low ILUC risk biomass needs to be produced as the result of an “additionality measure”.8 Additionality measures are measures that go beyond common agricultural practices on a fixed area of land (i.e. without expanding the surface of the land). Measures, or combinations of measures, shall boost output without compromising sustainability. The additionality measure shall not compromise

[7] *Delegated Regulation 2019/807, Article 2(9): “‘small holders’ means farmers who conduct independently an agricultural activity on a holding with an agricultural area of less than 2 hectares for which they hold ownership, tenure rights or any equivalent title granting them control over land, and who are not employed by a company, except for a cooperative of which they are members with other small holders, provided that such a cooperative is not controlled by a third party;”*

[8] *Delegated Regulation 2019/807, Article 2(5): ‘additionality measure’ means any improvement of agricultural practices leading, in a sustainable manner, to an increase in yields of food and feed crops on land that is already used for the cultivation of food and feed crops; and any action that enables the cultivation of food and feed crops on unused land, including abandoned land, for the production of biofuels, bioliquids and biomass fuels*

future growth 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 the homogenisation of the agricultural landscape through the removal of landscape elements and habitats such as solitary trees, hedgerows, shrubs, field edges or flower strips. Furthermore, the additionality measure shall not have a negative impact on the soil quality and the soil carbon stock.

Common agricultural practices can differ between crops and regions. The inclusion of a measure on this list does not automatically mean that a farmer implementing this measure is eligible for low ILUC risk certification. Auditors always need to judge whether this is a measure that will help the farmer achieve additional yield.

Additionality measures go beyond "business-as-usual"

Additional feedstock can only be claimed and calculated after the implementation of an additionality measure. The additionality measure must be clearly described. An economic operator seeking certification must include information on:

(a) The situation of the farm/plantation/plot before the additionality measure was implemented. This should be a qualitative description of current practices, specifically relevant to the envisaged additionality measure.

(b) A description of the additionality measure, the timeline over which it was or will be applied and whether it will be combined with other additionality measures.

(c) An explanation of the expected future yield growth.

The described additionality measure must be included in the following table which indicates a non-exhaustive list of additionality measures applicable for low ILUC risk certification. The list is controlled by ISCC. In the case of a new measure being applied, the economic operator will contact ISCC for the measure to be evaluated and added to the list in case it is found to be valid.

Additionality category	Additionality measure	Example
Replanting (for perennial crops[9])	Choice of crop varieties	Higher yield variety, better adaptation to eco-physiological or climatic conditions.
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 plowing, low tillage.
	Fertilisation	Optimisation of fertilisation regime, use of precision agriculture.

[9] *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 category	Additionality measure	Example
	Crop protection	Change in weed, pest and disease control.
	Pollination	Improved pollination practices.
	Other	Leaves room for innovation, combinations of measures and unforeseen developments.

Table 1. Non-exhaustive list of additionality measures

A verifiable additionality measure needs to be applied to be able to claim that additional biomass has been produced on a delineated plot of land. Furthermore, the additionality measures must meet at least one of the following conditions:

- They become financially attractive or face no barrier preventing their implementation only because their feedstocks can be counted towards the targets for renewable energy under Directive 2009/28/EC or Directive (EU) 2018/2001 (see section 7);
- They allow for cultivation of food and feed crops on abandoned land or severely degraded land (see section 8);
- They are applied by smallholders.

Only additional yield above the dynamic yield baseline may be claimed as low ILUC risk. 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.

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 considered an additionality measure. This differs from cultivation on unused, abandoned or severely degraded land, in which case the cultivation itself is the additionality measure.

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. A similar level of proof is needed for additionality measures that enable unused land to be brought back into use.

The additionality measures must be taken no longer than ten years before the certification under "ISCC EU low ILUC risk"

Measure must be taken within ten years before certification

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. All additionality measures need to be included and documented in the management plan.

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.

Additionality measures need to be taken no longer than ten years before the low ILUC risk certification.

During the audit, it must be proven that the applied additionality measure(s) could lead to an additional yield. This can be done, for example, by comparing the calculated dynamic yield baseline with the feedstock yield average of the last three years and the estimated additional biomass. Further, the auditor checks the claims included in the financial and/or barrier analysis as part of the baseline audit (see section 7).

The measures applied are made public for reasons of transparency. Proof that measures could lead to a yield increase must be available. Furthermore, it must be shown that there is financial attractiveness for farms to implement the respective additionality measures to produce feedstock that can be counted towards the RED II targets.

Please keep in mind, that the difference between best practices and additionality measures needs to be acknowledged. Best management practices will differ between smallholders and agribusinesses and so will additionality measures. When comparing smallholder plantations to optimised agri-business owned plantations, where best practices are already used, one needs to consider the difference between the type of additionality measures that can be applied. For example, increased mechanisation will not necessarily be seen as an additionality measure in the context of an agribusiness, but this could be the case for a smallholder plantation.

6 Sustainability of the additionality measure

The additionality measure must increase biomass

An additionality measure may only be certified if it aims to achieve additional yields as a result of an improvement in agricultural practice. Measures, or combinations of measures, shall boost output without compromising sustainability. The additionality measure shall not compromise future growth 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 the homogenization of the agricultural landscape through the removal

of landscape elements and habitats such as solitary trees, hedgerows, shrubs, field edges or flower strips. 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 abandoned or severely degraded land, in which case the cultivation itself is the additionality measure.

The ISCC 202 criteria for agricultural biomass must be fulfilled

The low ILUC risk certification must be in line, i.e. can only be provided if the economic operator complies with all sustainability saving requirements laid out in the ISCC EU 202-01 and ISCC EU 202-02. Therefore, a low ILUC risk certificate can only be issued to farmers that are certified under ISCC including all delineated plots. The certification status of the economic operator will be checked as part of the baseline audit and on an on-going basis as part of the annual audits, which should be conducted in line with the existing voluntary scheme audits.

The local auditor should flag any potential sustainability risks from the implementation of the additionality measure that they come across during the baseline audit. These risks would then be checked as part of the additionality audit. For example, if the additionality measure is an irrigation programme, auditors might flag water use as a potential water risk. Economic operators should show that they have measures to identify and mitigate any risks in the management plan and implementation of this should be checked as part of the additionality audit.

7 Demonstration of additionality

Producers must prove additionality of their measure

An additionality measure can only be considered low ILUC risk if it increases productivity beyond any increase that would already be expected in a business-as-usual scenario. Where such measures are applied on abandoned or severely degraded land or by smallholders, the baseline audit shall verify that economic operators comply with the appropriate requirements described in this document.

Thus, it must be demonstrated that the implemented measure(s) become financially attractive or face no barrier preventing their implementation. The chosen options and the respective data and calculations must be included in the management plan and verified during the baseline audit. The two tests have equal weight.

Additionality does not have to be demonstrated by smallholders in this way for measures on land that is abandoned or severely degraded, but it is a requirement for measures which bring unused land back into production. A verifiable additionality measure needs to be applied to be able to claim that additional crops for biofuel have been produced on a delineated plot of land.

Two options to prove additionality

There are two options to prove additionality: financial attractiveness or barrier test. Depending on the preference of the economic operator, either a financial attractiveness test and/or a barrier test can be prepared and included in the management plan.
In principle, any barrier whose cost can be estimated should be included in the financial attractiveness rather than in the non-financial barrier analysis. If this is not possible, the barrier should be tested in the barrier analysis.

For a project to be eligible for low ILUC risk certification, an economic operator only needs to pass one of the two types of additionality tests.

Measures shall be eligible for the purpose of low ILUC risk certification only if either their financial attractiveness test is negative-that is, 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 count towards the targets for renewable energy set out in the RED II.

7.1 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 additionality measure investment. The financial attractiveness test should be conducted by the owner of the certificate who needs to prove additionality[10].

Additionality measure is implemented after the initial audit

If the additionality measure is implemented after the initial audit, the auditor must verify in the following annual audit that the costs were actually incurred and that the estimation of additional biomass was realistic, ensuring that the measure met the additionality test.

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 analysis shall be related to the preparation, implementation, maintenance and decommissioning of the additionality measure that would not have been otherwise incurred.

The financial attractiveness is determined via NPV calculation

Financial attractiveness arises from a business case in which the net present value ('NPV')[11] 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 analysis.

Formula to calculate the NPV of an investment:

[10] *In case the FGP is not in the position to conduct the test (e.g. missing data), this can be done by the farmer.*

[11] *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 https://www.investopedia.com/terms/n/npv.asp*

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

Where:

= *expected income from additional biomass (estimate of additional biomass x feedstock sales price without low ILUC premium)*
= cost of additionality measure (CAPEX and OPEX) [12]

= discount rate

= time period

The parameters used in the financial attractiveness 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 three 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[13]

(c) discount rate to be used: 3.5% for high-income countries[14] and 5.5% for all other countries;

(d) lifetime of the investment:

(i) a lifetime of ten years[15] 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).

The NPV calculation shall not take into account actual costs for borrowed money, loans, and debt servicing payments when calculating the net cash inflow-outflow

[12] *CAPEX meaning capital expenditures, OPEX meaning operating expenses*
[13] *FAOSTAT producer prices. Source: http://www.fao.org/faostat/en/#data/PP*
[14] *OECD countries*
[15] *Some measures may have a shorter lifetime, e.g. fertiliser cost would have a lifetime of 1 year if applied every year*

for the additionality measure. These are covered by the discount rates of 3.5% and 5.5%, respectively. Financial attractiveness can be assessed for harvested biomass and for processed feedstocks if the First Gathering Point is also the processing unit (e.g., palm oil mills).

7.2 Non-Financial Barrier Analysis 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. The non-financial barrier test shall therefore be used only in very exceptional cases analysis.[16]

The economic operator (EO) 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 EO 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. In addition, the EO shall provide evidence that the additionality measure was made possible by an EU value signal, such as an investment from an EU company active in the bioenergy market, previous sales to EU bioenergy markets, support from or by an EU biofuels company, a supply contract with an EU biofuels company, or, for small farms, a link to an international agricultural trader.

The auditor decides whether the documents presented support the argument and whether the test is passed.

The validity of the operator's claim shall be assessed and validated by the baseline audit before issuing a low ILUC risk certificate. The EO must explain the non-financial barrier and how he overcame it. The EO should provide relevant evidences, e.g. contracts, reports, documents describing the non-financial barrier, the historical and actual situation. The auditor can verify these documents and assess if the non-financial barrier analysis is passed. The findings of the assessment must be documented as part of the audit documentation and issued to the voluntary scheme. Voluntary schemes have the possibility to request further documents in case of insufficient documentation of the assessment.

The following non-exhaustive list summarizes barriers that may inhibited EOs in the past to implement a certain additionality measure:

(a) **No access to finance**: EOs may be able to demonstrate that they face a barrier to gain access to finance to invest in the additionality measure without low ILUC risk certification in the past. This can be done via e.g. showing documents on the refusal of loan application (using a bank statement, a proposal from the bank or a documentation on the consulting process for financing the additionality measure), showing offers of finance of prohibitive rates without the low ILUC risk certification and/ or

[16] *Costs should be documented*

demonstrating their financial situation documenting that the investment in the additionality measure can only be conducted via external financing. It must be shown that low ILUC risk certification convinced the financial institution to provide the EO a loan to finance the additionality measure.

Verification guidelines:

- Can you demonstrate the refusal of loan application via e.g. a bank statement, a proposal from the bank or a documentation on the consulting process for financing the additionality measure?
- Can you demonstrate offers of finance of prohibitive rates without the low ILUC risk certification based on the estimated investment costs?
- Can you demonstrate that the investment in the additionality measure can only be conducted via external financing?
- Can you demonstrate that low ILUC risk certification enabled the access to finance from a bank or another organisation?

(b) **No access to a relevant input(s):** EOs may argue that a relevant input or measure is not accessible in their region, meaning for example not within a realistic distance from the farm. This could be e.g. a specific machinery, fertilizer or plant protection product that were not previously available in a region. Another example could be missing infrastructure that has prevented access to the input in the past. The relevant input must be decisive for the implementation of the additionality measure and the EO must demonstrate that the input increases the productivity of the land use and increases yields. Further, the EO must demonstrate since when he had access to the input and why the input was not available before. This can be done e.g. via market data, market reports, invoices.

Verification guidelines:

- Can you demonstrate that the relevant input is decisive for the implementation of the yield increase measure?
- Can you demonstrate since when you have access to the input and why the input was not available before (e.g. via market data or market reports, invoices, records)?
- Can you demonstrate that the low ILUC risk certification enables the access to the input?

{Guidance: (previously) high costs for the input is not an eligible barrier. Transport restrictions, missing logistical options, missing infrastructure should be explained/ documented in detail}

(c) **Access to labour:** An EO may be able to demonstrate that they were not able to recruit sufficient qualified staff for the cultivation and harvesting period. Low ILUC risk certification has helped to recruit additional qualified staff. To show the shortage of labour in the region, the EO can use statistical data on the labour market, historical data, employment statistics, show that

advertised jobs at reasonable rates are going persistently unfilled, previous recruitment activities and data on the reduction of workers.

Verification guidelines:

- Can you demonstrate that you are short on labour and that this is not related to financial aspects (wages, labour costs) but for other, non-financial reasons e.g. via statistics and historical data on workers/ qualification, wages, (regional) employment statistics, no/ low number of job applications due to recruitment activities, data on the reduction of workers?
- Can you demonstrate that the low ILUC risk certification enables the access to labour?

(d) **Legal restrictions:** An EO may be able to prove that there are legal restrictions on the land which prevent certain forms of management that could increase their yield or prevented market access (e.g. trading restrictions). Restrictions can be implemented on local, regional or national level. Further options are missing licenses, missing approvals by the competent authorities (e.g. for fertilizer, plant protection products, seeding materials) which prevented the EO to use these additionality measures in the past.

Verification guidelines:

- Can you demonstrate that local or national legislation is preventing the implementation of the yield increase measure (e.g. restrictions on agricultural practices), and market access, respectively, or can you demonstrate that missing licences or missing approvals by the competent authorities (e.g. for fertilizers, plant protection products, seeding material) restricted farmers to implement the yield increase measure?

(e) **Access to knowledge:** An EO may be able to prove that relevant knowledge was unavailable within a sector or region. It could also be possible that knowledge is available in the region, but kept within boundaries of, for example, big companies (patents), or programs with restrictions to registry. The EO shall demonstrate how the knowledge on the additionality measure was acquired (e.g. documentation of training material, hiring of experts/ consultants, reports) and why this knowledge was not available before. The knowledge does not need to be “innovative” (see “first-of-a-kind”), but “new” to the EO.

Verification guidelines:

- Can you demonstrate how you acquired the relevant knowledge on the additionality measure (e.g. documentation of the training, hiring of experts/ consultants, reports) and why you did not had access to this knowledge before (e.g. limited access to training, lack of professional training)?
- Can you demonstrate that the low ILUC risk certification enables the access to the knowledge?

{Guidance: this must be differentiated from "first-of-a-kind": the new knowledge does not have to be innovative (in general), but "new" to the economic operator}

(f) **First-of-a-kind measure**: An EO may be able to demonstrate that the additionality measure is a first-of-a-kind measure in the region or country, meaning that:

- The EO implements a technology (not applicable: knowledge, infrastructure, financing) ensuring higher productivity that is different from technologies that are implemented by other EOs, companies, farmers, projects, which are able to deliver the same output
- The technology is new and innovative for a short time and that the EO is one of the first adopters of this measure going beyond "business-as-usual" practices
- Its implementation started before the beginning of a commercial operation at another site in the same geographical area using the same technology and delivering the same output

Different technology means that the technology has the same output, but differ by at least one of the following:

- Input material(s)
- Machinery
- Production process (e.g. crop rotation, seeding material (e.g. own reproduction), agricultural management practice, mechanical plant protection)
- Water management/ Irrigation
- Soil management
- Harvesting process
- Etc.

The EO shall further demonstrate how he found out about this measure, e.g. via a publication or contact with other early adopters. The VS shall implement measures to limit the amount of EOs that can certify a measure claiming this option. As a general guideline, not more than 10% of farmers in a region can be claimed as "early adopters". Further, after the introduction of a new measure and the first low ILUC risk certificate for this measure in the respective countries, the measure can solely be claimed as "innovative" for the following five years at maximum.

Verification guidelines:

- Can you demonstrate that the measure is new for a short time, that you are one of the first adopters of this measure and is this not "common" (business as usual) agricultural practice in the region or country?
- Can you demonstrate how you found out about this measure, e.g. via a scientific publication, or contact with other early adopters?

{Guidance: the measure must be innovative in the region/ country with limited adopters, yet}

(g) **Participating in an investment/development program:** An EO may be able to demonstrate that he is participating in a program linked to yield increase for EU biofuels production. The program shall be managed and funded by “independent” organisations like the World Bank or the Bill & Melinda Gates foundation without a specific interest in the promotion of certain feedstocks for biofuels production. Programs and foundations which have a link to relevant industry partners (e.g. mineral oil company) are not seen as independent. The participation in the program can be proven e.g. via contracts, received fundings or participation in relevant events and trainings.

Verification guidelines:

- Can you prove participation in the program e.g. via contracts with the project management, or via received fundings or participation in relevant events/ training?
- Is the program funded by an independent organization without any specific interest in the promotion of a certain feedstock for biofuels production and for the EU biofuels market?

{Guidance: E.g. the World Bank or Bill & Melinda Gates foundation are “independent” organisations whereas e.g. programs and foundations funded by linked industries (e.g. growers associations, biofuels producers) are not seen as independent.}

Further, the EO shall provide evidence that the additionality measure was implemented to produce additional biomass for the EU biofuels market. This is also of relevance for “First-of-a-kind" measures. The following evidence may be used to prove this link, e.g.:

- If the EO has a contract with a biofuel producer or can prove that he produced feedstocks for biofuels production in the past.
- If the EO overcame the non-financial barrier with the help of an EU biofuels company who e.g. provided financial support, knowledge.
- If the EO used supporting material and/ or services from recognized voluntary certification schemes (e.g. information on low ILUC risk certification, participating in trainings, events) initiating the process of implementing an additionality measure and starting the low ILUC risk certification process.

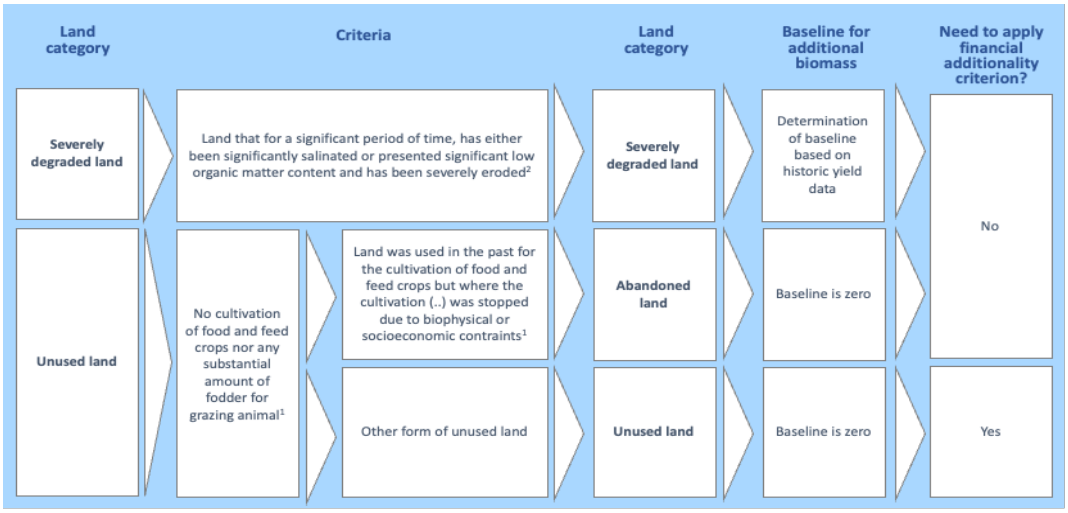
If the EO was not certified in the past and is going for low ILUC risk certification linked in time with the implementation of the additionality measure.

8 Cultivation on unused, abandoned or severely degraded land

Additional biomass can be cultivated on previously unused land

New crop production on unused land, abandoned agricultural land or severely degraded land can qualify as an additionality measure. All production on land which meets the definitions of “abandoned” or “severely degraded” can be certified as additional and there is no need for any other additionality measure such as a demonstrable increase in yield.

For cultivation on unused land, a test to demonstrate additionality (e.g. financial attractiveness test or non-financial barrier analysis test) must be applied.
In the case of cultivation on unused, abandoned and severely degraded land, the economic operator needs to describe and provide evidence for the land status as part of the management plan. The land status will be checked as part of the baseline audit by the certification body at the beginning of the certification process. Further, for the cultivation on unused land, it needs to show that cultivation has little risk of displacement of services from that land onto different and equivalent amounts of land elsewhere. In the case of production on unused, abandoned or degraded land, the dynamic yield baseline shall be set to zero with no trend line.



Sources: [1] DA 2019/807, [2] DIR 2018/2001

REDII, Annex V, C: '**Severely degraded land**' means land that, for a significant period of time, has either been significantly salinated or presented significantly low organic matter content and has been severely eroded.
DA 2019: '**Abandoned land**' means unused land, which was used in the past for the cultivation of food and feed crops but where the cultivation of food and feed crops was stopped due to biophysical or socioeconomic constraints;
DA 2019: '**Unused land**' means areas which, 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, were neither used for the cultivation of food and feed crops, other energy crops nor any substantial amount of fodder for grazing animals;

Figure 2. Overview on unused land subcategories

For the production of additional biomass on abandoned and severely degraded land, farmers are exempt from needing to pass the financial attractiveness or barrier analysis “additionality” tests. In addition, smallholders also do not need to prove additionality. There is no need for any of the sub-categories of land to demonstrate that an additionality measure has been implemented to increase the crop yield, as the baseline is considered to be zero; therefore, any biomass grown on the land is considered to be additional biomass.

Land that is classified as abandoned must have been used to produce food and feed crops in the past. Production on land that is unused but not abandoned or

severely degraded needs to pass the financial attractiveness or barrier analysis test to be eligible for low ILUC risk certification.

8.1 Cultivation on unused land

Unused land

Eligible lands for the "unused" land approach could include, among others, marginal lands, underused lands, unused lands, degraded pasture lands, and lands in need of remediation. For a land to be eligible for the unused land approach, economic operators shall provide evidence that for a consecutive period of at least five 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.

For the production of additional biomass on abandoned and severely degraded land, farmers are exempted from needing to pass the financial attractiveness or barrier analysis "additionality" tests. In addition, smallholders also do not need to prove additionality. None of the sub-categories of land need to demonstrate that an additionality measure has been implemented to increase the crop yield, as the baseline is considered to be zero, so any biomass grown on the land is considered additional biomass.

Land classified as abandoned must have been used to produce food and feed crops in the past. Production on land that is unused but not abandoned or severely degraded needs to pass the financial attractiveness or barrier analysis test to be eligible for low ILUC risk certification.

8.2 Cultivation on abandoned land

Abandoned land

'**Abandoned land**' means unused land, which was used in the past for the cultivation of food and feed crops but where the cultivation of food and feed crops was stopped due to biophysical or socioeconomic constraints.[17] As soon as energy crop cultivation on the land starts, low ILUC risk certification can be applied for a maximum of 10 years.

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 of at least 5 years of unused land. Documents on historic land use, remote sensing data, etc. can be used to prove historic and actual land status.

That evidence shall also prove that the production ceased for biophysical or socioeconomic reasons. Table 2 below provides a non-exhaustive list of evidence types that may be utilized to demonstrate compliance.

[17] *Delegated Regulation 2019/807*

Step	What needs to be demonstrated	Evidence which could be used
1	Food and feed crops were once grown	Documents (farm records) in which crops of the types meeting the definition can be identified and where the information can be dated to at least five years before the end of the period required to meet step 3; Sales documents
2a	The land was abandoned – production of food or feed crop ceased	Evidence from farm records of a sustained fall in production; Satellite imagery showing a period of at least a year during which no signature characteristic of agricultural production was evident; Photographic evidence of abandonment such as dilapidated buildings, unused machinery or stores.
2b	Biophysical reasons for abandonment of land	Evidence from a published source of significant changes lasting more than two years in, e.g.: - Frequency of extreme weather events such as storms, droughts or flooding; - Timing of precipitation; - Average temperature during the growing season; - Other factors such as pests and diseases which are reported by a qualified, independent agronomist to have had a significant adverse impact on farm performance. - Evidence from the previous farmer or local people without economic links to the EO.
2b	Socioeconomic reasons for abandonment of land	Evidence from either farm accounts or published statistical sources that prices obtainable for total output reduced, or prices of total inputs increased above-average (compared e.g. to the rate of inflation) over the three-year period preceding the 5-year period when food etc crops were not grown; Records of agricultural wages Evidence of reduced availability of labour, such as documentation of labour market opportunities arising elsewhere and evidence that these affected the availability of agricultural workers at the site Evidence that a key element of the supply chain, such as a road, riverboat service, market or downstream processor, failed or

		was otherwise unable to continue to serve the farm; Evidence that land was appropriated by the State or other public body.
3	That land was not used for food, feed, other energy crops or significant amounts of fodder for at least five years[18]	Satellite imagery showing a signature characteristic of no agricultural management for at least five consecutive years; Evidence that the land was in non-agricultural management for at least five years; Evidence that the land was used for other agricultural crops for at least five years
4	The production of energy feedstock started no later than 10 years before certification	Evidence from step 3
5	The crops being produced for certification allow for food and feed crops	Evidence such as seed packets, purchase or sales invoices, or agronomic reports which demonstrates that they are starch-rich crops, sugar crops or oil crops, or that the introduction of a biomass crop has supported the associated cultivation of starch-rich crops, sugar crops or oil crop for supply to food and feed markets.

Table 2. Evidence to be supplied to demonstrate land is abandoned

8.3 Cultivation on severely degraded land

Severely degraded land

'Severely degraded land' means land that, for a significant period of time, has either been significantly salinated or presented significantly low organic matter content and has been severely eroded. All of these characteristics are matters of physical fact and must be readily established during a site inspection.

Severely salinated land

Many crops are sensitive to salts in the soil, which can result in lower yields or an inability for crops to grow at all. Depending on the level of salinization, crops may show injuries, reduced growth, and decreased productivity. The number of crops able to grow and produce biomass decreases as salinization increases, varying by crop-specific salt tolerance.

[18] *Step 3 can be used on its own to prove that land is unused without being abandoned. All production on unused land may be certified. The "additionality measure" which enables it to be brought back into use may take any form. This is in contrast to other land (i.e. that which has been used more recently for food production) where only additional production which results from agricultural improvements may be certified.*

To test soil salinity, an electrical conductivity test should be performed, which measures the soil's ability to conduct electricity. Since water conducts electricity poorly, conductivity increases as the soil becomes more salinated.

Land that is severely degraded due to low organic matter and erosion

For soil to be considered severely degraded within the meaning of the Delegated Regulation, it must be both low in organic matter and severely eroded. Low soil organic matter (SOM) damages the soil structure, often making it more vulnerable to erosion by wind or water. It should be noted that both the low organic matter and erosion criteria need to be met. Therefore, soil that has been severely eroded does not qualify as "severely degraded" if it has adequate or high organic matter. Similarly, soils with very low organic matter cannot be considered severely degraded unless they have also suffered from severe erosion. SOM consists of soil organic carbon (SOC) and other components. SOC can be measured and – based on a stable conversion factor – SOM can be determined.

Thresholds between 1% and 2% are commonly used to determine critically low levels of SOC (about 1.7% - 3.4% SOM).

Soil erosion occurs when sediment of soil particles are displaced by wind, water, or anthropogenic causes such as tillage or removal of vegetation cover. Severe erosion is generally considered to be more than 1.5 t/ha/yr of soil loss. This can be proven through measurements (if available) or by using erosion risk maps with appropriate thresholds and/or photographic evidence.

To prove compliance with this definition, economic operators shall provide relevant soil test results:

(a) in the case of salinization, 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;

Criteria	Threshold	Guidelines for auditors
Significantly low soil organic matter content	<3.4% SOM	Commonly used values in literature are between 1-2% soil organic carbon, which is equivalent to 1.7-3.4% soil organic matter
Severely eroded	>1.5 t/ha/y soil loss, proven using measurements, maps or photographic evidence	Stopping erosion before it is irreversible
Significantly salinated	>4.0 dS/m	Cultivation hardly possible; yields decreased by 80%+ in comparison to regional average

Table 3. Threshold for severely degraded land

8.4 Soil Sampling

Soil sampling method

Soil samples shall be taken in line with the soil sampling protocol in Annex III and the procedures set out in Annex V of the IR 2022/996. The soil samples should be processed in a lab accredited to the ISO 10694:1995 standard for soil organic carbon, which is the dry combustion (elementary analysis) method. This method is used in the LUCAS 2018 study by JRC[19] and is required in the Implementing Regulation (EU) 2022/996[20] to measure soil organic matter. For soil organic carbon or soil organic matter measurement, an equivalent method, such as wet chemical oxidation (i.e., Walkley & Black), must be applied.

8.5 Smallholders

Definition of smallholders

Smallholders are farmers that independently cultivate and manage an agricultural activity on a holding with an agricultural area of less than 2 hectares for which they hold the ownership, tenure rights or any equivalent title granting them control over the land area and who are not employed by a company, except for a cooperative of which they are members with other smallholders, provided that such a cooperative is not controlled by a third party. Smallholders are exempt from proving additionality.

9 Determination of the dynamic yield baseline

Determination of the DYB

The economic operator must calculate the dynamic yield baseline (DYB) and document this as part of the management plan in case of yield increase measures. The dynamic yield baseline is used to determine the amount of additional biomass. The dynamic yield baseline must be crop-specific, determined for each delineated plot and can be determined for each type or a combination of additionality measure(s) applied.

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 three 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.

For farmers choosing the measure of previously unused, abandoned or severely degraded land, the dynamic yield baseline is set to zero (meaning that the starting point is zero). Any yield on these types of land is considered to be additional.

Worked examples for how to calculate the dynamic yield baseline and additional biomass are included in Appendix I.

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[19] *JRC (2018) LUCAS Soil Module: https://esdac.jrc.ec.europa.eu/public_path/shared_folder/dataset/75-LUCAS-SOIL-2018/JRC_Report_2018-LUCAS_Soil_Final.pdf*

[20] *Implementing Regulation (EU) 2022/996: https://eur-lex.europa.eu/eli/reg_impl/2022/996*

9.1 Setting the dynamic yield baseline for annual crops

DYB for annual crops

The dynamic yield baseline consists of two main elements: (1) a starting point and (2) a slope (see Figure 3). The observed yield for a delineated plot after implementation of the additionality measure will be compared against this baseline. The difference between the observed yield and the dynamic yield baseline is the additional biomass.

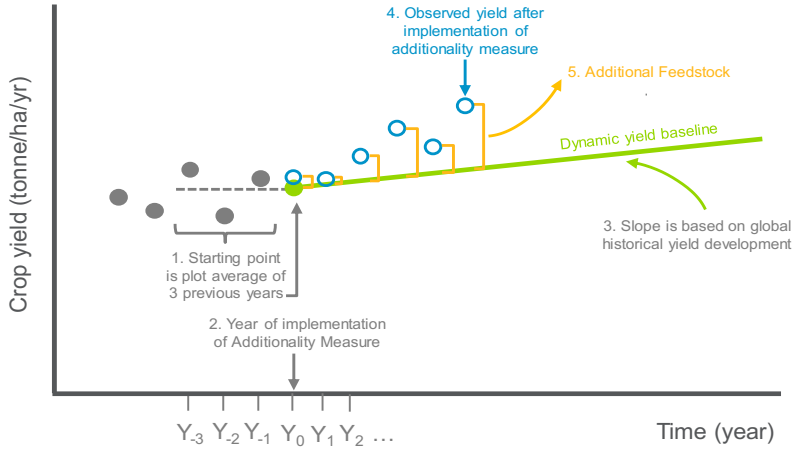

Figure 3. Dynamic yield baseline for annual crops: main principles and determination of the additional feedstock

(1) Starting point

The starting point is calculated based on historical yield data from the economic operator or, if operational, crop-specific data from the farm is not available, the best available data on crop yield for the respective plot(s)/region. The observed yield for a delineated plot after the implementation of the additionality measure will be compared against this baseline. The difference between the observed yield and the dynamic yield baseline is the additional biomass that can be claimed as low ILUC risk.

The dynamic yield baseline starts in year zero, 'Y0', the year in which the additionality measure is implemented. The starting point of the dynamic yield baseline in Y0 is calculated as the average of the historical annual crop yields of the target crop on the same delineated plot over the three most recent years preceding the implementation of the additionality measure (Y-1, Y-2, Y-3).

Where a farm rotates crops between fields and the 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:

Two options can be applied

Option 1: The economic operator calculates an average of the yields for the three 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 five years old.

Option 2: The economic operator calculates a weighted average of the yields of the three 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 three most recent years of crop yields is not available, whether inaccessible or not representative as per the auditor's judgement, additional data may be obtained for previous years or data from a neighbouring field growing the same crop under the same management plan. If one of the three years of historical data represents an exceptionally good or bad harvest (for example, a discrepancy of 20% 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 and shall be replaced with appropriate historic or actual data from comparable set-ups, plots, regions, etc.

In case no historical data is available, the best available data shall be used to determine the starting point. This can be statistical data (local, regional, or country-wide) data, information from experts, neighbours or local farmers as well as data published in peer-reviewed papers. The auditor is responsible for assessing the best data available and 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.

Note that an economic operator also needs to prove that they are taking an eligible additionality measure and justify how this will increase their yields. It is not allowed for a farmer with already above-regional-average yields to use regional data to set an artificially low dynamic yield baseline. 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.

Crop yield data quality shall also be taken into consideration. This is the case if a plot size varies too much for the three years upon which the average is based (for example, if the smallest plot size is less than 10% of the largest plot size in the years selected).

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 then decide whether a crop yield needs to be excluded or not.

The slope of the DYB is crop-specific and based on FAO data

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 ten years. 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 ten-year baseline validity period of the low ILUC certification.

Table 4 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.

The economic operator shall use the relevant value from the certification guidance available at the start of the certification period, and that value shall be valid for the ten-year dynamic yield baseline validity period.
The slope is based on global data, taking into account that yields from the same crop vary in different regions of the world, depending on different biotic and abiotic factors.

Crop	Slope-20*
Barley	0.035
Maize	0.074
Oil palm fruit	0.200
Rapeseed	0.036
Soybean	0.028

Crop	Slope-20*
Sugar beet	1.276
Sugar cane	0.379
Sunflower seed	0.035
Wheat	0.04

*Slope 20 is based on 2008-2017

Table 4. Slope of the trend line obtained for FAOSTAT World+ crop yield data. The average improvement in yield (tonne/ha/year) per year.

For any crop in the table, the dynamic yield baseline (DYB) 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). The following formula shall be used, starting at the year the additionality measure is implemented:

DYBx = (starting point DYB) + (slope20)x

Where:

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

x = year(s) after implementation of the additionality measure

For certification of measures taken in the past, the economic operator can use the relevant slope value from the certification guidance available at the start of the certification period to avoid having to calculate their own trendline based on FAOSTAT World+data from the 20 years prior to the implementation of their 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 three-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 4). 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.

If an additionality measure is taken on a novel biofuel crop for which there is no FAOSTAT data as a basis for the trend line, it may be defined by using the slope of the most closely related crop derived from global FAOSTAT data.

9.2 Setting the dynamic yield baseline for perennial crops

DYB for perennial crops

In contrast to annual crops, perennial crops are not replanted every year. Crop yields obtained for perennial crops follow a curve over their lifetime. This curve is characterised by its distinctive pattern and absolute yields. The absolute yield depends on the crop cultivars and external factors such as soil and seed quality, together with the environment. The pattern of yield over the lifetime of perennial crops is taken into account when setting the dynamic yield baseline. This allows to calculate an appropriate volume of additional biomass, for example for oil palm, both in lower-yielding immature years and higher-yielding mature years over the lifetime of the palm tree.

Depending on the yield variation observed over the lifetime of each 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 cultivars of palm trees on the delineated plot; if applicable;

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

(c) the area of land replanted each year on a plantation, if applicable;

(d) the historical crop yields obtained prior to the implementation of an additionality measure.

That data is combined with a growth curve applicable to the cultivars on the plot to determine the dynamic yield baseline. The key characteristic of 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 data set out in points (a) to (d) to adjust the magnitude of the dynamic yield baseline curve to the specific plot (that is to say, adjustment on the basis of the historical yields and age of trees).

Three options to determine the DYB for perennial crops

The following three options are available for determining the dynamic yield baseline for palm trees. For each of those options, the data required to set the dynamic yield baselines must include:

Option 1a: Standard growth curve

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

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

Option 1b: Economic operator provides growth curve[21]

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

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

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

(d) Economic operator's own reference growth curve.

Option 2: Group certification approach

(a) for the 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 does not remain constant year after year or is known and this mix of ages of trees is asymmetrical.

Option 2 may be applied when the age profile of the trees on the delineated plot is mixed and remains constant year-on-year, that is to say in a group certification approach or if a constant percentage of the plantation area being 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

Use of a standard growth curve for palm

This 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 the figure below.

The dynamic yield baseline is determined by using the three most recent years of historical crop yield data for the specific plot and the age of the palm trees when that yield was observed, ad using the annual percentage yield change from the standard curve to form a business-as-usual yield curve relevant to the specific plot. One baseline can be calculated for a whole plantation, or separate baselines can be calculated at a (sub-)plot level.

[21] *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*

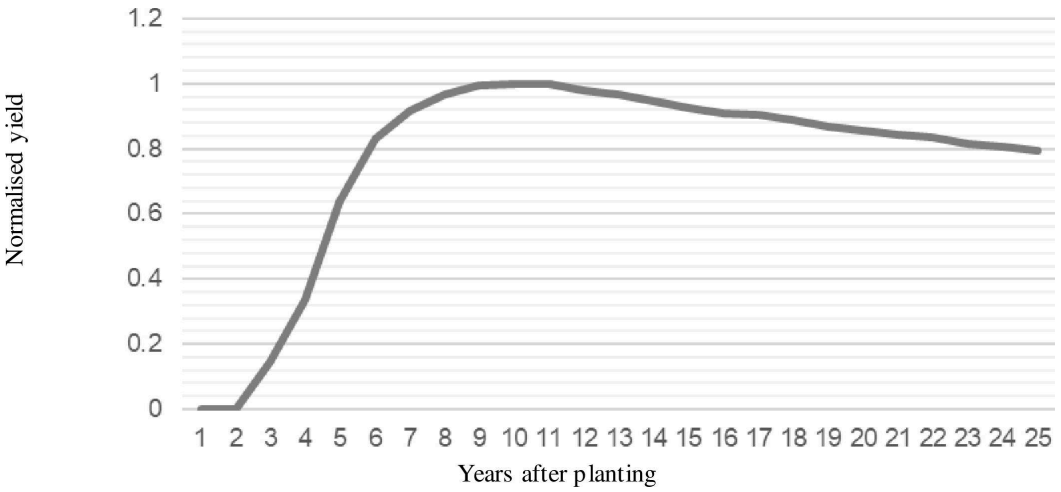

Figure 4. Standardised growth curve[22]

Years planting	1	2	3	4	5	6	7	8	9	10	11	12
Normalised yield	0	0	0.147	0.336	0.641	0.833	0.916	0.968	0.996	1	0.999	0.980
Years planting	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
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

Table 5. Normalised standard growth curve palm yield data

* 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.

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%

Table 6. Annual percentage change in yield from standard growth curve

* 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:

(a) 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;

[22] *Source: EC, IR 2022/996*

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

(c) 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);

(d) 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. Repeat this for each subsequent point to plot the dynamic yield baseline;

(e) Adjust the yield baseline by adding the compound annual growth rate (CAGR). The CAGR should be applied to every individual point on the growth curve.

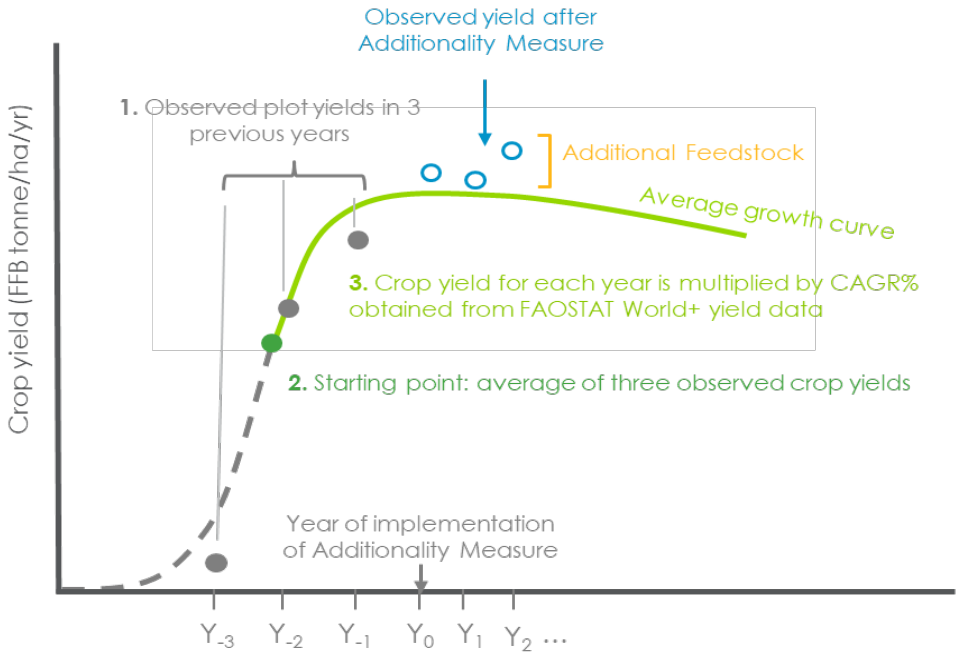

Figure 5. Determination of the standard growth curve for palm oil

Option 1b: Economic operator provides the growth curve

DYB based on a company-specific 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 which is 1.37%23.

Option 2: Group certification approach

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

DYB for group certification

In the case of, 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. In case the needed data is available at the FGP, the oil yield (CPO and PKO) can be used to determine the dynamic yield baseline and the additional biomass production. The starting point is combined with the global trendline slope for oil palm from FAOSTAT World+ data to determine the dynamic yield baseline.

The palm baseline shall be set for ten years from when the additionality measure is taken. If the oil palm trees reach 25 years old during that period, the baseline remains flat. In case replanting takes place during the ten-year period, the EO can recalculate the baseline – based on the same original historical yield data- so that they are comparing their actual yield to the appropriate (new) age of the trees.

If economic operators implement an additionality measure in different years, an individual baseline per plot needs to be applied.

Compound annual growth rate (CAGR)

The final step in setting the dynamic yield baseline for palm is to incorporate the global yield trend. This is done by applying the compound annual growth rate (CAGR) to each point of the yield baseline. The CAGR is calculated from FAOSTAT World+ yield data 2002 – 2021, based on the average yield increase shown in the table below.

Annual performance increase palm – business as usual	1.07%

Table 7. Compound annual growth rate palm (20-year period)

Therefore:

[23] *Based on FAOSTAT World+ 2008-2017 data, IR 2022/996*

$$Palm\ DYB = Age\ adjusted\ yield * (1 + CAGR)$$

Sugarcane

Sugar cane shall be treated as an annual crop when setting the dynamic yield baseline. Sugarcane is technically a perennial crop. However, the crop yield of sugarcane tends to average out over the harvesting season between replanted and ratoon crops on one plantation. The crop yield from a plantation would therefore be expected to remain relatively constant year-on-year (in the absence of specific measures to increase yield).

Therefore, sugarcane can be treated as an annual crop when setting a dynamic yield baseline (see section 9.1).

The economic operator should be able to document a constant year-on-year yield obtained over the delineated plot of land.

Other perennial crops

For other types of perennial crop, the voluntary scheme will need to determine a standard growth curve applicable to each crop. The curve shall be calculated according to the approach used for palm, based on publicly available literature and peer-reviewed data (e.g., peer-reviewed papers, official statistics) on the growth pattern of the crop.

9.3 Setting the dynamic yield baseline for sequential cropping

DYB for sequential cropping

Sequential cropping describes the practice of growing a second crop on the same land as a main crop, when the land would otherwise have been left fallow. If multi-cropping practices such as sequential cropping are used to optimise land use and this leads to a situation where overall farm yields are increased but the new (target) crop lowers the yield of the main (primary) crop, this shall be compensated in the calculation of low ILUC risk biomass often with additional benefits for soil carbon, decreased erosion and increasing biodiversity.

Sequential crops can include catch crops, cover crops or ley crops. They are typically fast-growing and are mainly cultivated outside the period in which the main crops are cultivated. The main crop is the plant that grows the most days (in comparison to the second crop) in the field during the main growing season. Sequential crops are planted either to be marketed (e.g. as fodder for livestock) or to improve the soil fertility of the arable land for main crops. Beside compliance with the sustainability requirements, it also must be verified that the crops are cultivated outside the cultivation period for main crops and that the cultivation is part of a crop rotation scheme (i.e. no permanent/ perennial cultivation).

It must be ensured that the introduction of sequential cropping into the crop rotation does not have a negative impact on the soil quality and the soil carbon stock.

Sequential cropping can, however, lead to a situation where the new (target) crop impacts the yield of the main crop. Whilst overall farm yields are increased with sequential cropping, there can be an impact on the main crop yield, for example if the harvest of the main crop is brought forward to allow time for seeding the second crop. Therefore, this section outlines the calculation methodology to determine the

quantity of additional biomass which can be claimed as low ILUC risk, considering the potential impact on the main crop yield.

If multi-cropping practices such as sequential cropping are used, different options for the calculation of additional biomass can be applied. The economic operators have two 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;

   - 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 the introduction of the second crop.

In case this is not possible via a comparison of actual yields, and due to the complexity and natural variation expected in yields year-on-year, economic operators can prove that the introduction of the sequential crop does not impact the growth of the main crops by showing that the introduction of the sequential crop does not impact the growing period of the main crops, the soil fertility, or the nutrient balance of the soil. To demonstrate that the main crop yields are not affected by sequential cropping and that this is done in a sustainable way, the farmer needs to show that:

- The main crop growing period remains the same before and after the introduction of sequential cropping, and
- The introduction of sequential cropping meets the definition of sustainable additionality measure, also with respect to the main crop, namely that it does 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 and it does 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.

In this regard, auditors should specifically check that the additional inputs and management practices needed for the cultivation of the secondary crop (e.g. additional fertilizer, plant protection products, irrigation) are used in a way that this does not jeopardise the mid/ long-term environmental factors mentioned (soil,

water, air quality and pollinator populations). The consumption of these inputs must be determined and applied in relation to the additional biomass production by the secondary crop (e.g. additional fertilizer application shall be determined based on the additional nutrient requirement/ consumption of the secondary crop). Most important, soil fertility and soil carbon stocks shall not be decreased via the introduction of sequential cropping.

Option 2: If the sequential crop lowers the yield of the main crop

- In case the second crop lowers the yield of the main crop, the absolute change in total *energy* produced from the land shall be used to calculate the additional biomass. Thus, the energy content of the biomass harvested is the unit that must be used to calculate the yield loss of the main crop and compensated for in the quantity of additional biomass that can be claimed as low ILUC risk. In cases in which the sequential crops are sown as a mixture, the whole biomass harvested must be taken into account, resulting in a non-crop specific additional biomass calculation.
- Energy content values from the IR 2022/996 should be used where available and appropriate to the crop harvested. Otherwise, a reputable country-specific source could be used. If it is not possible to find appropriate energy content values, and these are not expected to be significantly different for the different crops in rotation, the percentage change in tonnes of biomass produced can be used as a simpler alternative. This should be decided by the auditor.
- Below, the steps are described separately for, (a) a crop rotation system in which the main crop is the same each year and, (b) a crop rotation system in which the main crop is not the same each year.

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 the 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.

The change in main crop yield should be calculated by comparing the observed yield after the introduction of sequential cropping to a baseline yield based on the absolute energy content. The net additional biomass shall be calculated by subtracting the absolute decrease in energy yield of the main crop from the energy yield of the sequential crop, giving the amount of additional biomass which can be claimed as low ILUC risk. The following steps detail how to perform this calculation:

1. Set the dynamic yield baseline for the main crop.
2. Convert the main crop and sequential crop yields to energy yields using the crops' energy value from Annex IX of the IR 2022/996. If the energy yield of the main crop before the sequential crop decreases compared to the baseline, then the absolute decrease in energy content in the main crop energy yield shall be applied to the sequential crop energy yield to compensate the impact of the overall energy loss to the system and calculate the net additional biomass that can be claimed as low ILUC risk.

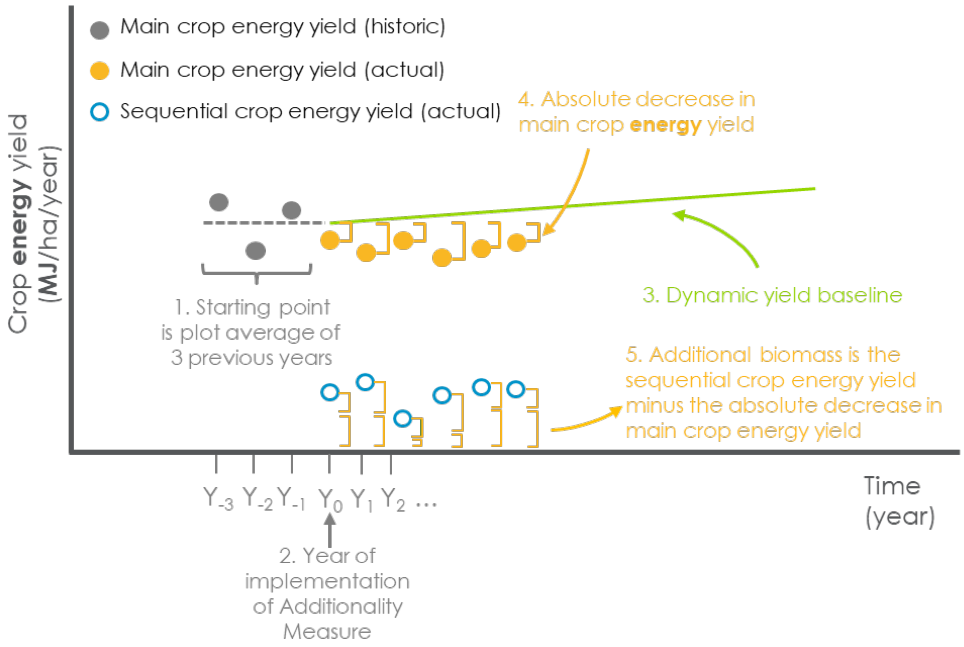

Figure 6. Example of the Option 2a additional feedstock calculation approach

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, or when the introduction of a sequential crop leads to a change in

the crop rotation 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. To do this, the economic operator needs to set crop-specific dynamic yield baselines for all the relevant main crop(s). This is because different crops have different typical yields, so each main crop must be compared to its own specific dynamic yield baseline to fairly determine the impact of the sequential crop on the main crop yield.

Consider the secondary crop's impact on the main crop

The economic operator needs to compare the observed yield of the main crop after the 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 the 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.

After implementation of sequential cropping, the net additional biomass shall be calculated by subtracting the absolute decrease in energy yield of the main crop (compared to the crop-specific dynamic yield baseline) from the energy yield of the sequential crop, giving the amount of additional biomass which can be claimed as low ILUC risk. The following steps detail how to perform the calculation.

1. For each main crop in the rotation, set a crop-specific dynamic yield baseline, as outlined in chapter 3.5.1.1.
2. Follow Step 2 of the "Option 2a" methodology, comparing the yield of the main crop before the sequential crop to their crop-specific baseline for each respective year.

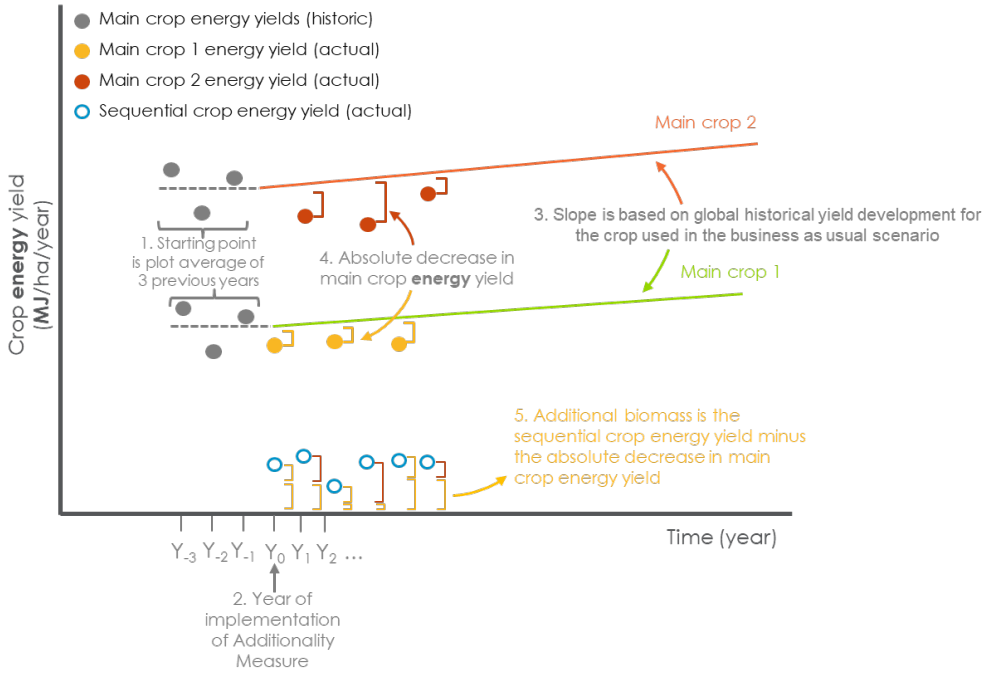

Figure 7. Example of the Option 2b additional feedstock calculation approach

Note that in both cases, the net additional biomass cannot be more than 100% - i.e. if there is a year when the main crop yield increases, despite a change in the growing period, the maximum additional biomass that can be claimed is the full yield of the sequential crop. See worked example in Appendix I.

In case the main crop after the sequential crop is impacted, no impact can be applied in the first year of sequential cropping, and the farmer is allowed to claim the whole sequential crop yield as additional biomass in the first year. However, the impact needs to be calculated and compensated for in the following sequential cropping year, by applying the decrease in main crop from the previous year. See worked example in Appendix I.

10 Determination of additional biomass volume

Additional biomass must be determined by DYB and actual yields

After implementation of the additionality measure, the economic operator must be obliged to record the actual crop yield achieved each year on the delineated plot to be able to determine the actual volume of low ILUC risk biomass that may be claimed. This is done by comparing the crop yield achieved with the dynamic yield baseline. In the ongoing annual audits, the auditor must verify 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.

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 amount of additional biomass declared by the economic operator shall be subject to annual audits. In principle, the additional biomass produced can be determined based on the raw material harvested (e.g. fresh fruit bunches), or on the basis of the usable intermediate product (e.g. crude palm oil and palm kernel oil) processed at the

certified First Gathering Point (the scope “processing unit” must also be covered), as long as the calculation of dynamic yield baseline and additional biomass uses consistent units over time.

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.

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 volume, the economic operator must record the crop yield from the delineated plot for each year, from the start of the implementation of the additionality measure. The economic operator needs to prove the link between the specific delineated plot and the crop yield achieved (tonne/ha or energy units for sequential cropping).

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 can 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 can 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 specific delineated plot on a farm) based on a template to be issued by the voluntary scheme.

In the case of group auditing, it could be that the first gathering point acts as the group lead and is responsible for recording yield data for all delineated plots (see section 6).

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 observed yield and the yield projected by the dynamic yield baseline for the same year, multiplied by the surface area A (ha) of the delineated plot. This additional volume can be claimed as low ILUC risk biomass.

The dynamic yield baseline shall be established by setting out a starting point, based on historical yield from the delineated plot, which shall be determined by the principles set out in section 9. The actual yield for a delineated plot after implementation of the additionality measure shall be compared against the baseline. The difference between the actual yield and the dynamic yield baseline is the additional feedstock eligible to be claimed as low ILUC risk.

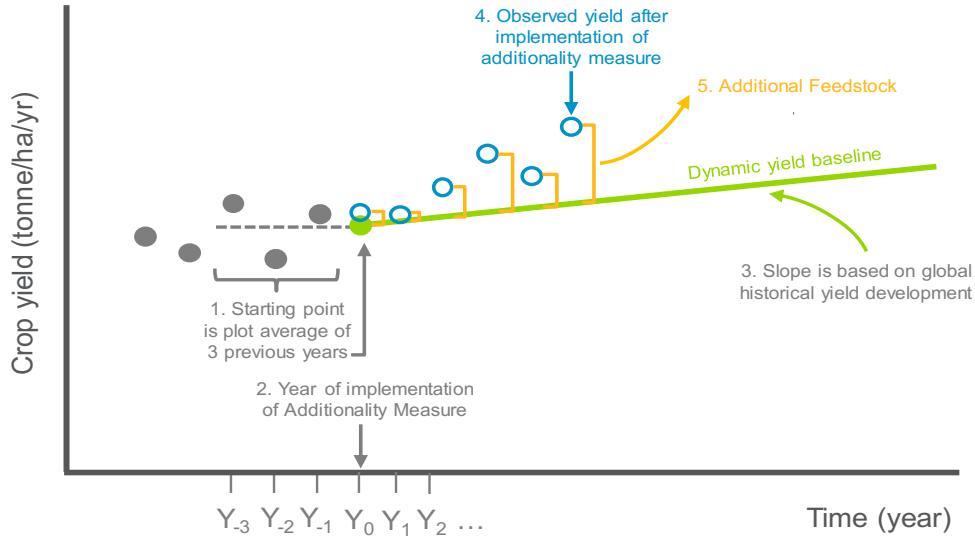

Figure 8. Dynamic yield baseline for annual crops: main principles to determine the additional feedstock.

The following formula shall be used:

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

Where:

Y_x = Observed yield in year x (in tonne/ha/yr or energy units for sequential cropping)

DYB_x = Dynamic yield baseline in year x (in tonne/ha/yr or energy units for sequential cropping)

A = Surface area of delineated plot (ha)

11 Requirements for Traceability

Include low ILUC risk quantities on the Sustainability Declaration

According to the Directive (EU) 2018/2001, economic operators along the physical supply chain have to demonstrate that the sustainability criteria of the RED II have been fulfilled. The sustainability criteria relevant under the RED II include the description of the raw materials and the country of origin of the raw materials, material related greenhouse gas (GHG) emissions, and evidence that the land related sustainability criteria of the RED II for the production of the raw materials have been fulfilled. For the scope of the low ILUC risk certification, the requirements remain valid. The same holds true for the information that needs to be transferred throughout the entire supply chain, i.e., in the form of sustainability declarations. In addition to the criteria for traceability set out under ISCC EU, the following information must be included by the first gathering point for low ILUC risk certified material on the respective delivery documents (e.g. sustainability declarations)

- The type of crop relevant for low ILUC risk certification
- The type of additionality measure applied
- The amount of low ILUC risk certified material supplied

Appendix I

Examples of how to calculate the dynamic yield baseline and additional biomass

Example 1: Oil Palm (perennial crop)

This worked example will use fictional data (see Table 8 below) and will walk through setting the dynamic yield baseline and calculating the additional biomass step by step. At the bottom of this worked example, a visual representation of the dynamic yield baseline and additional biomass can be found.

Table below shows fictional 'actual' yield for a palm plantation. The trees were 7 years old when the additionality measure was taken (Y0).

Additionality Year	Y-3	Y-2	Y-1	Y0	Y1	Y2	Y3	Y4
Age of trees	4	5	6	7	8	9	10	11
Actual yield (FFB tonnes / ha)	12	11	15	19	22	18	25	22

Table 8. Fictional actual yield data for oil palm plantation

1. First, we need to determine the starting point of the dynamic yield baseline, which is the average of last three years before the additionality measure was taken (Y-3 to Y-1). The starting point in this example is 12.67 t/ha.
2. To determine the shape of the curve, we can either use the percentage change or the normalized yield. Table 9 below contains both the percentage change and the normalized yield for the age of the trees. Using the starting point calculated in the previous step, we can calculate the rest of the dynamic yield baseline. The formula below outlines how to calculate Y-1 and can similarly be used to calculate the subsequent years to create a full curve.

$$Y - 1 = 12.67 * (1 + 30.0\%)$$

Additionality Year	Y-3	Y-2	Y-1	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
Age of trees	4	5	6	7	8	9	10	11	12	13	4
Normalised curve (FFB tonnes / ha)	0.34	0.64	0.83	0.92	0.97	1.00	1.00	1.00	0.98	0.96	0.95
Annual change age weighted average yield (%)		90.6%	30.0%	10.0%	5.6%	2.9%	0.4%	-0.1%	-1.9%	-1.6%	-2.0%
Age adjusted YB (FFB tonnes / ha)		12.67	16.47	18.12	19.14	19.69	19.78	19.76	19.39	19.08	18.70

Table 9. Dynamic yield baseline calculation

To make the baseline dynamic and account for yield increase in a business-as-usual setting, the compound average growth rate (CAGR) needs to be added. For palm, this is 1.07%.

Additionality Year	Y-2	Y-1	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
DYB (FFB tonnes / ha)	12.81	16.65	18.31	19.34	19.90	19.99	19.97	19.60	19.28	18.90

Table 10. Calculating additional biomass

To calculate the additional biomass, we subtract the actual yield from the dynamic yield baseline.

Additionality Year	Y0	Y1	Y2	Y3	Y4
Actual yield (FFB tonn ha)	19	22	18	25	22
DYB (FFB tonnes / ha)	18.31	19.34	19.90	19.99	19.97
Additional yield (FFB tonnes / ha)	0.69	2.66	-1.90	5.01	2.03

Table 11. Additional biomass calculation

In this example, in the first year (Y1) there is an additional biomass of 2.66 t/ha that can be claimed as low ILUC risk. This can be multiplied by the area to get the total additional biomass that can be claimed as low ILUC risk. However, in the second year (Y2) the actual yield is lower than the baseline and therefore no additional biomass can be claimed that year. In year three (Y3) additional biomass can again be claimed (5.01 t/ha).

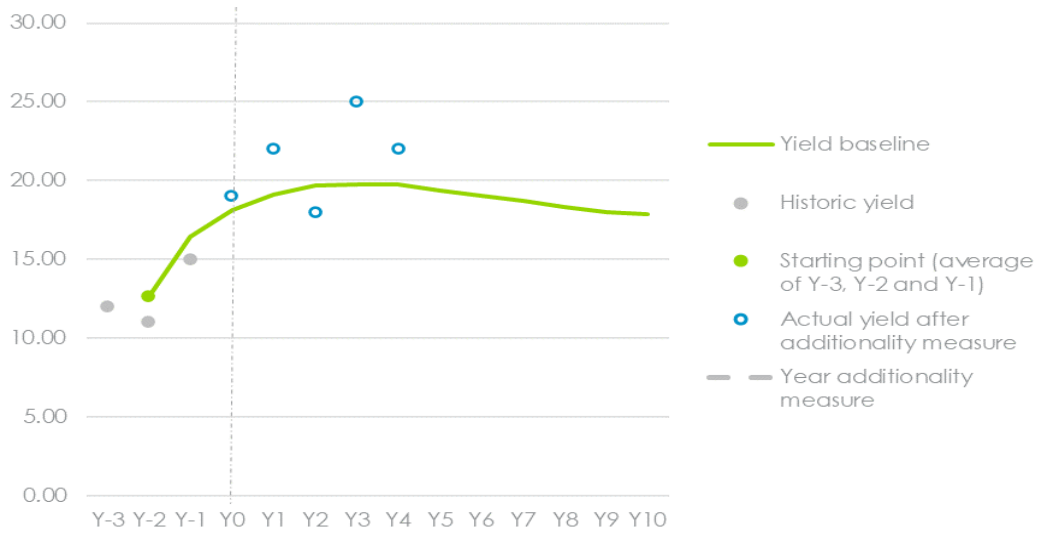

Figure 9. Worked example: dynamic yield baseline oil palm

Example 2: Sequential cropping (Option 2b)

This worked example will use fictional data and will walk through setting the baseline and calculating the additional biomass step by step. At the bottom of this

worked example, a visual representation of the dynamic yield baseline and additional biomass can be found.

Setting the dynamic yield baseline

Figure 10 shows the example crop rotation before and after the implementation of sequential cropping in year zero (Y0). Before the introduction of sequential cropping, the rotation is maize, followed by wheat, followed by a fallow period. When sequential cropping is implemented, a rye crop is cultivated during the fallow period, which results in the maize being sown one month later and having a shorter growing period. Both are 2-year crop rotation cycles, meaning they repeat every 2 years. (Note that in practice the timing of the crop rotation is typically staggered across different fields on a farm so that the farm will produce some of each crop every year, rather than only producing some crops in some years and others in other years.)

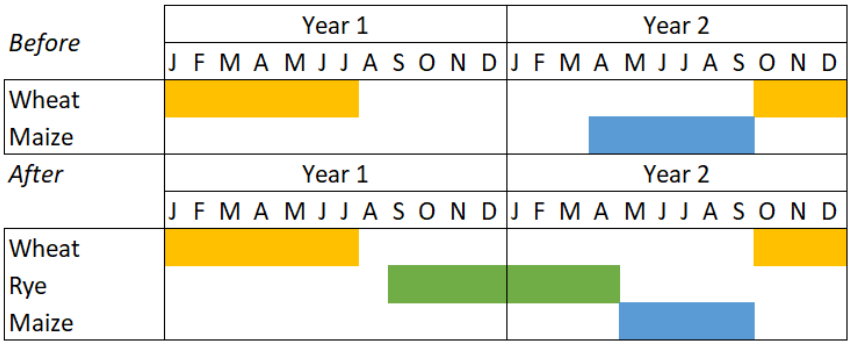

Figure 10. Fictional crop rotation: before and after implementation of sequential cropping

Table 12 below shows fictional 'actual' yield values before and after the implementation of sequential cropping for this worked example.

Additionality Year	Y-6	Y-5	Y-4	Y-3	Y-2	Y-1	Y0	Y1	Y2	Y3
Wheat	7.3	-	6.9	-	6.8	-	7.2	-	6.6	-
Maize	-	15.2	-	14.7	-	15.1	-	12.1	-	14.0
Rye (winter energy crop)	-	-	-	-	-	-	-	7.3	-	8.2

Table 12. Fictional actual crop yields (t/ha)

Because there are two main crops in the rotation (wheat and maize), we need to set a separate crop-specific dynamic yield baseline for each crop. The dynamic yield baseline is calculated by taking the average yield of the last three years before the additionality measure was taken (Y-6 to Y-1 as six years of data are needed to get three historic yield data points for each main crop as they are each harvested every other year). Therefore:

For annual crops, we also need to add the slope, therefore these would be the crop-specific dynamic yield baselines:

Additionality Year	Y0	Y1	Y2	Y3
Wheat DYB (t/ha)	7.00	7.05	7.09	7.14
Maize DYB (t/ha)	15.00	15.08	15.15	15.23

Table 13. Crop -specific dynamic yield baselines for wheat and maize

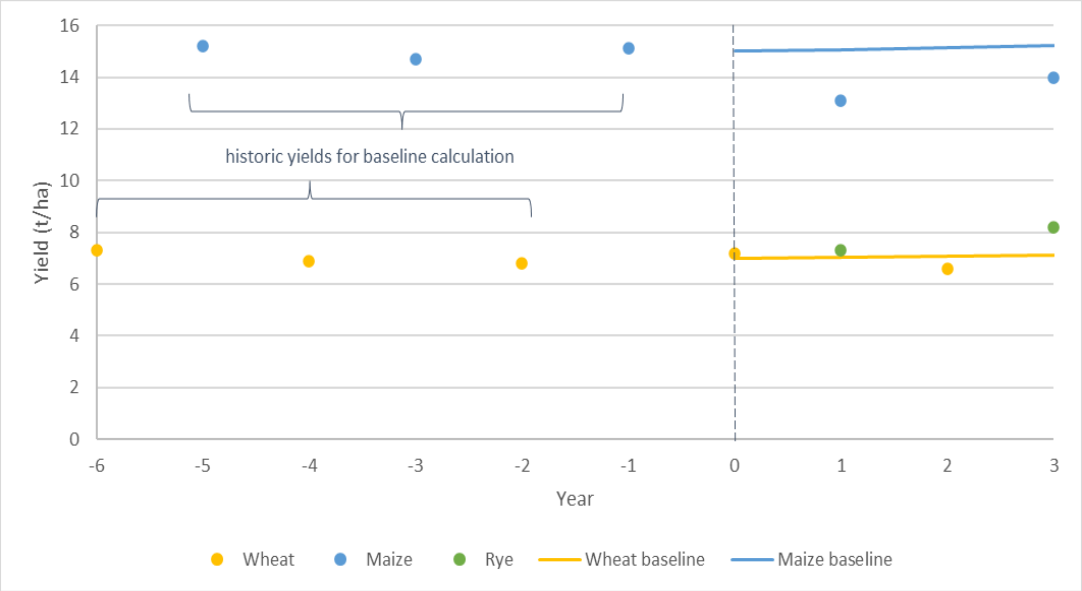

Figure 11. Yields for worked example of annual sequential crops (t/ha)

Calculating the additional biomass

To calculate the additional biomass, we must compare the actual main crop yields to the crop-specific baselines in terms of energy content. This requires whole crop energy content data for the crops in the rotation. If this is not available in Annex IX of Implementation Regulation 2022/996, a reputable country-specific source could be used. In this case we will use data from French database INRAE-CIRAD-AFZ as this example rotation is commonly employed in the North Western France.

	Energy content	Dry matter (DM)
Wheat	18.5 MJ/kg DM	87.8%
Maize	18.6 MJ/kg DM	86.3%
Rye (winter energy crop)	18.0 MJ/kg DM	86.7%

Table 14. Data used for worked example of additional biomass calculation

The following general equation can be used for calculating energy yield values for each crop.

$$Starting\ point\ baseline_{wheat} = \frac{7.3 + 6.9 + 6.8}{3} = 7.0\ t/ha$$

$$Starting\ point\ baseline_{maize} = \frac{15.2 + 14.7 + 15.1}{3} = 15.0\ t/ha$$

This results in the following outputs.

Additionality Year	Y-6	Y-5	Y-4	Y-3	Y-2	Y-1	Y0	Y1	Y2	Y3
Wheat	118,574	-	112,077	-	110,452	-	116,950	-	107,204	-
Maize	-	243,987	-	235,961	-	242,382	-	210,279	-	224,725
Rye (winter energy crop)	-	-	-	-	-	-	-	113,924	-	127,969

Table 15. Fictional actual crop yields converted to energy content (MJ/ha)

To perform the additional biomass calculation in terms of energy content, the baseline also needs to be calculated in terms of energy content. Using the same method of taking the average yield of the last three years before the additionality measure was taken, this gives a baseline starting at 113,701 MJ/ha for wheat and 240,777 MJ/ha for maize.

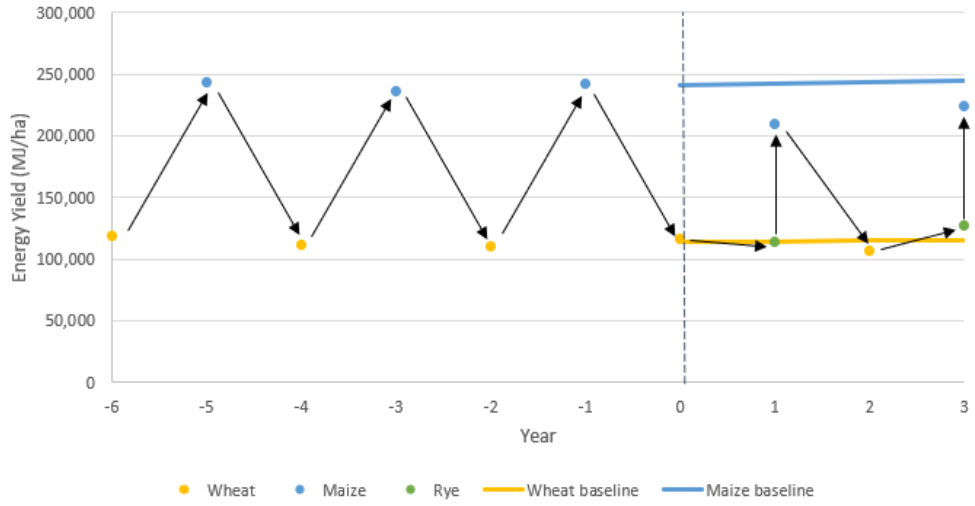

Figure 12. Yields for worked example for annual sequential crops (MJ/ha)

To calculate how much of each sequential crop harvest (rye) can be claimed as additional biomass, it is necessary to calculate a compensation factor. We have added arrows to the yield figure to show the chronological order in which the crops are harvested (black arrows in Figure 12). This makes it easier to visualize which yields to take into account when calculating the compensation factor for each year.

Looking at Figure 12, in Y0, a new rotation begins with wheat being grown as normal. This is then followed by rye (the sequential crop) in Y1. Because the wheat yield in Y0 was higher than the baseline (up by 3,249 MJ/ha), and no more than 100% of the sequential crop harvest can be claimed as low-ILUC, the total

compensation is 0, and the additional biomass is equal to 113,924 MJ/ha, which equates to 7.3 t/ha, or 100% of the sequential crop yield. (This needs to be multiplied by the area of sequential crop to get the total additional biomass that can be claimed as low ILUC risk.)

After the sequential crop in Y1, the maize crop is planted and harvested in Y1. The rotation then starts again with a wheat crop harvested in Y2. The overall impact on both these main crops should then be applied to the sequential crop harvest in Y3. The maize yield in Y1 is 31,713 MJ/ha below the maize baseline, and the wheat yield in Y2 is 7,992 MJ/ha below the wheat baseline. This means the overall impact on energy yield is 39,705 MJ/ha, which when applied to the sequential crop yield in Y3 results in 88,264 MJ/ha of additional biomass, or 5.66 t/ha. This needs to be multiplied by the area of sequential crop to get the total additional biomass that can be claimed as low ILUC risk. This equates to 69% of the sequential crop yield in Y3 being eligible to be claimed as low ILUC additional biomass.

For the next sequential crop harvest in Y5, the economic operator would calculate the total compensation by adding the maize impact in Y3 (-19,694 MJ/ha) to the wheat impact in Y4 (not yet known). This calculation would then be repeated for subsequent years as the rotation repeats.

Year	Y0	Y1	Y2	Y3
Wheat compensation	+3,249		-7,992	
Maize compensation		-31,713		-19,694
Total compensation		+0		-39,705
Additional biomass (MJ/ha)		113,924		88,264
Additional biomass (t/ha)		7.3		5.66

Table 16. Additional biomass calculation values, the colors indicate the sequential crop year to which each value applies (blue = Y1, green = Y3)

Appendix II – Worked examples of NPV calculation

The figures below show illustrative examples of NPV calculations for a financial attractiveness additionality test of a fictional farm.

On the first farm, the farmer invests 3000 USD capital and has an operating cost of 100 USD/yr related to the additionality measure. On the second farm, the farmer invests 5,500 USD capital and has an operating cost of 150 USD/yr related to the additionality measure. On both farms (for simplicity for the worked example), the farmer has an estimated additional yield of 2.2 tonne/ha after their investment in the

additionality measure, with a feedstock sales value of 350 USD/tonne. The lifetime of this investment is 10 years at a discount rate of 5%.

In the first example farm, the NPV is positive so the project would not pass the financial attractiveness test and would have to move on to a non-financial barrier analysis to see if it is eligible for low ILUC risk certification.
In the second example farm, the NPV is negative, so the project would pass the financial attractiveness test and is eligible for low ILUC risk certification.

Financial Attractiveness Analysis

Aadditional CAPEX		$ 3,000	Capital investment for the additionality measure
Additional OPEX		$ 100	Additional annual operational costs expected for the addition
Discount rate	5%		
NPV		$ 2,432.24	

		Year										
		0	1	2	3	4	5	6	7	8	9	10
Profits												
Value												
Sales value	USD/tonne	0	770	770	770	770	770	770	770	770	770	770
NPV		0	770	733	698	665	633	603	575	547	521	496
Losses												
Value												
additional CAPEX	USD/ha	3000										
additional OPEX	USD/ha	100	100	100	100	100	100	100	100	100	100	
NPV		3100	95	91	86	82	78	75	71	68	64	

Figure 13. Example 1: The NPV is positive and therefore this project would not pass the financial attractiveness additionality test

Financial Attractiveness Analysis

Aadditional CAPEX		$ 5,500	Capital investment for the additionality measure
Additional OPEX		$ 150	Additional annual operational costs expected for the addition
Discount rate	5%		
NPV		$ -473.15	

		Year										
		0	1	2	3	4	5	6	7	8	9	10
Profits												
Value												
Sales value	USD/tonne	0	770	770	770	770	770	770	770	770	770	770
NPV		0	770	733	698	665	633	603	575	547	521	496
Losses												
Value												
additional CAPEX	USD/ha	5500										
additional OPEX	USD/ha	150	150	150	150	150	150	150	150	150	150	
NPV		5650	143	136	130	123	118	112	107	102	97	

Figure 14. Example 2: The PV is negative and therefore this project would pass the financial attractiveness additionality test

Appendix III – Soil sampling protocol

In line with the soil sampling approach in Annex V of Implementing Regulation (EU) 2022/996, we recommend that 15 well-distributed sub-samples be mixed into 1 composite sample per every 5 hectares or per field, whichever is smaller. The composite sample shall be at least 500 grams[24]. Smaller fields with the same climatic conditions, soil type, and reference farming practice (if farming is present) can be grouped. Fields should be divided into sampling units where there are differences in key characteristics, such as:

- Climatic conditions
- Soil type, texture, or slope
- Reference farming/management practices
- Observed crop/vegetation growth
- Other visual differences of the plot, such as colour differences indicated by the Munsell Soil Color

The samples shall be taken at regular intervals in a “W-shape” across the field. Samples shall not be taken at a ‘low spot’ in the field or areas with consistently high moisture content (see Figure below).

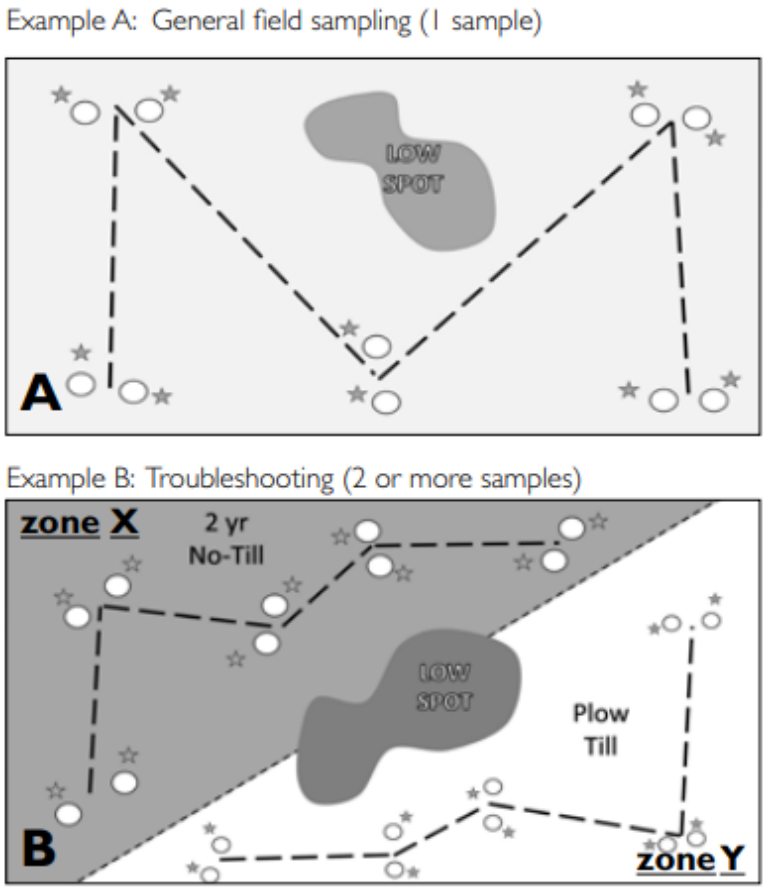

Figure 15. Example of soil sampling

[24] *JRC (2018) LUCAS Soil Module : https://esdac.jrc.ec.europa.eu/public_path/shared_folder/dataset/75-LUCAS-SOIL-2018/JRC_Report_2018-LUCAS_Soil_Final.pdf*

The samples shall be taken at a 30 cm of depth where possible. If the soil is less than 30 cm in depth, then the deepest soil sample possible shall be taken. It shall be documented where the soil is thinner than 30 cm and how many samples were taken that were less than 30 cm in depth. The soil sampling process shall be well documented by marking sub-sample locations on a map, and the field divisions shall be marked on the map. The differences in characteristics between the fields shall also be documented.

The samples shall be taken either before soil cultivation and fertilization or a minimum of 2 months after harvest. Do not take soil samples after heavy rainfall or irrigation events.

There are two commonly used methods to extract soil samples: either by shovel (method 1) or with a metal ring (method 2).

Method 1

These steps are based on the framework compiled by Cornell University[25]. A practical step-by-step video (8 minutes) can be viewed here[26]. See Figure 16 below for a visual representation of the steps.

The steps are:

1) Remove surface debris.
2) Use a shovel to dig a small hole that is 35 cm deep.
3) From the side of the hole, use the shovel to take a thick slice of soil at 30 cm deep.
4) Remove any excess soil from the shovel and make sure it is level to have an even distribution of topsoil and subsoil.
5) Place the soil into a clean pail.
6) Repeat steps 1-5 for the 15 sub samples and mix thoroughly. Place into a clearly labelled and re-sealable 4-liter bag.
7) Before moving to another sampling location, make sure to clean the shovel to avoid soil contamination or mixing the last sampling soil residues with the new sampling location.

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[25] *Cornell University (2017) Comprehensive Assessment of Soil Health: http://www.css.cornell.edu/extension/soil-health/manual.pdf*

[26] *Please note that there are differences between the Cornell Framework and our soil sampling protocol. This video is for illustrative purposes only.*

Figure 16. Soil sampling protocol method[27]

Method 2

Similar to method 1, but instead of a shovel, a metal ring (30 cm) is used to extract the soil. These steps are compiled by Regenerative Organic Alliance[28]. See Figure 17 for a visual representation of the steps.

1) Remove surface debris and place the metal ring on the flat field surface.
2) Place a wood block on top of the metal ring and use it to drive the ring fully into the ground.
3) Use a garden trowel to dig around the ring and carefully lift it with the trowel underneath.
4) Make sure the sample is flat and even before putting it in a clean pail.
5) Repeat steps 1-4 for the 15 sub samples and mix thoroughly in the pail. Place the mixed sample into a clearly labelled and re-sealable 4-liter bag.
6) Before moving to another sampling location, make sure to clean the shovel to avoid soil contamination or mixing the last sampling soil residues with the new sampling location.

After the samples are taken, the fresh soil shall not be stored at temperatures above 4 degrees Celsius or for more than 28 days after sampling.

[27] *Cornell University (2017) Comprehensive Assessment of Soil Health: http://www.css.cornell.edu/extension/soil-health/manual.pdf*

[28] *Regenerative Organic Certified (2020) Soil Sampling Guidelines: https://regenorganic.org/wp-content/uploads/2020/06/ROC_June2020_Soil_Sampling_Guidelines.pdf*

Figure 17. Soil sampling protocol method[29]

[29] *Regenerative Organic Certified (2020) Soil Sampling Guidelines: https://regenorganic.org/wp-content/uploads/2020/06/ROC_June2020_Soil_Sampling_Guidelines.pdf*